

PROGRAM PRODUCTS

**3270-PC CONTROL PROGRAM  
P/N 1837434, Feature #1505**

**PURPOSE**

The 3270-PC Control Program provides the 3270 Personal Computer with the controls necessary for the user to select screen configurations, manipulate and interact with the displayed data, and manage screen presentations. The screen presentation may consist of up to four host interactive sessions, two local notepad sessions and one IBM Personal Computer DOS 2.0 session.

**HIGHLIGHTS**

- Concurrent operation of up to four host interactive sessions, up to two local notepad sessions, and one IBM Personal Computer DOS 2.0 session.
- Base 3270 (four color) or 3270 Extended Data Stream (eight color, Distributed Function Terminal mode only) support.
- Two host-interactive modes, set during 3270-PC and 3274 customization:
  - Distributed Function Terminal mode: One to four sessions (or LUs) emulating any mdl 3178, 3278 (except mdls 2A and 5), or 3279 (except mdl 2C) via a 3274 with configuration support T or D.
  - Control Unit Terminal mode: One session (or LU) emulating a 3178, 3278 mdl 2, or 3279 mdl S2A via either:
    - 1) 3274, any mdl and configuration support
    - 2) 4321, 4331, or 4361 Display/Printer adapter
- Advanced screen management, including the ability for the user to:
  - View through a window on the display screen the portion of an application's presentation space defined by the window in the presentation space. A window is a user-controlled display area (up to 2,000 characters) to allow viewing all or part of a presentation space. A presentation space is a logical representation of a host (up to 3,440 characters) or local (2,000 characters) session.
  - Move the window to any location on the display screen.
  - Move the window to any location within the presentation space.
  - Share the display screen with multiple applications windows.
  - Alter the size of a window, permitting various combinations of concurrent applications to be seen.
  - Window Enlarge to dedicate the display screen to one presentation space.
  - Define combinations of windows in up to ten logical screens.
  - Define the foreground and background color for host sessions not using Extended Data Stream attributes.
  - Define the background color for the screens.
  - Select base-color (3279 4-color) mode.
- Copy a block of data within or between any presentation space, except to the IBM Personal Computer DOS 2.0 presentation space.
- Keystroke Record/Play function to capture often used keystroke entries for later storage and playback.
- Save and restore (using IBM Personal Computer DOS 2.0) the current 5271 and 3270-PC Control Program environment, including screen profiles, keystroke recordings, and notepad presentation spaces.
- File transfer (host to and from a 3270-PC file) in ASCII, binary, or EBCDIC data format.
- One IBM Personal Computer DOS 2.0 session permitting the operation of non-APA graphics IBM Personal Computer applications that use or observe IBM Personal Computer DOS 2.0 and BIOS protocols and conventions.
- One or two local notepad sessions for copy or save of data from other sessions, personal notes, or general scratch-pad use.
- 5150/5160 Personal Computer function in native mode, except APA graphics.
- Use of other 5150/5160 Personal Computer options with IBM Personal Computer DOS 2.0 applications.
- Print to the 3270-PC attached printer of 3274 attached printer.
  - Screen copy to the 3270-PC attached printer.
  - 5150/5160 Personal Computer full screen (presentation space) to the 3270-PC attached printer.
  - Host full screen (presentation space) to 3274 attached printer or 4321, 4331, or 4361 Display/Printer adapter attached terminal printer.

- Ease-of-use functions:
  - Operator Information Area (OIA).
  - Message line: User prompt area.
  - Help function: Displays active workstation control functions and sessions.
  - On Line Tutorial: Explains the capabilities and functions of the 3270-PC and simulates workstation functions. (The tutorial can be run in a standard 5150/5160 Personal Computer with a Dual-Sided Diskette and IBM Personal Computer DOS 2.0).
- Alert function (host sessions only).
- Response Time Monitor (Control Unit Terminal mode only).
- Maintenance utilities:
  - INDPATCH
  - Hardware diagnostics
  - Trace
  - Error handler service
  - Dump facility

**CUSTOMER RESPONSIBILITIES**

- Customizing the 3270-PC and 3274. Spare blank diskettes must be ordered by the customer as required.
- Producing a backup copy of the 3270-PC Control Program.
- Protection of data from unintended modification, destruction, or disclosure, and for the accuracy and integrity of the results.
- Testing other IBM Personal Computer programs not included with the 3270-PC to assure viability. IBM does not accept any responsibility for them.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 3270 PC Control Program requires a 5271 System Unit, a 5151 Monochrome or 5272 Color Display, and a 5271 keyboard.

The following table identifies the storage increments required for the several 3270-PC Control Program functions:

Function	Storage Increment Total
Choose one:	
Control Unit Terminal mode	94,116 bytes
Distributed Function Terminal:	
Non-SNA mode	145,828 bytes
SNA mode	156,708 bytes
Add for each session, (maximum of four)	
1,920 characters, base (4-color)	1,968 bytes
1,920 characters, EDS (8-color)	3,888 bytes
2,560 characters, base (4-color)	2,624 bytes
2,560 characters, EDS (8-color)	5,184 bytes
3,440 characters, base (4-color)	3,526 bytes
3,440 characters, EDS (8-color)	6,966 bytes
Add for each notepad session, (maximum of two)	3,840 bytes
Configuration Total:	
For local applications, add:	
5150/5160 Personal Computer session (maximum of one)	2,000 bytes
IBM PC DOS 2.0	24,000 bytes

The balance of the storage capacity is available for local application use. 3270-PC applications that run under IBM PC DOS 2.0 have the following application storage requirements:

Save Restore	8,320 bytes
File Transfer	15,870 bytes
Patch	6,656 bytes
Tutorial	25,088 bytes

Note: Local applications may require additional storage.



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PP 1837-434.2

Oct 83

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PROGRAM PRODUCTS

**3270-PC Control Program (cont'd)**

**SOFTWARE REQUIREMENTS**

IBM Personal Computer DOS 2.0 (P/N 6024061)

**PACKAGING**

The 3270-PC Control Program resides on two IBM Personal Computer diskettes that are packaged with the *3270-PC Control Program User's Guide and Reference*.

**ORDERING and SCHEDULING**

The 3270-PC Control Program must be ordered as a feature (#1505) against the 5271-YYY. IBM PC DOS 2.0 and all other IBM Personal Computer programs must be ordered as a feature against the 5271-XXX mdl. The appropriate QDA number should be entered at order entry time or prior to shipment from the IBM FE Distribution Center in Raleigh.

When the 3270-PC Control Program is ordered, the 3270-PC Control Program Online Tutorial (Helper) is automatically included. The Tutorial provides a user-involved description of how to operate the 3270-PC. The Tutorial may be ordered separately and it runs in a standard 5150/5160 Personal Computer (64KB, Dual-Sided Diskette, and IBM PC DOS 2.0 minimum).

In addition, IBM PC DOS 2.0 (4061, P/N 6024061) must be available for customization of the 3270-PC Control Program.

IBM Personal Computer programs marketed by NAD or NMD may be ordered with the 3270-PC and receive the same QDA discount as the 3270-PC Control Program when ordered at the same time.

## PROGRAM PRODUCTS

**IMPLEMENTATION PACKAGES for the  
6580 DISPLAYWRITER SYSTEM**

ADMINISTRATIVE SUPPORT ... 5608-AX1

APPLICANT PROCESSING ... 5608-AX2

PERSONNEL REPORTING ... 5608-AX3

**PURPOSE**

These IBM 6580 Implementation Packages assist IBM 6580 Displaywriter System users in setting up specific applications using IBM 6580 Displaywriter System Textpack 4 (5608-TR4) or Textpack 6 (5608-TR6). Each package consists of three components: A procedure guide for the operator, a prerecorded diskette and a catalog of reports for principals. The prerecorded diskette can be used to establish files with unique data for each application. The *Operator's Guide* can be used to step through all the functions necessary to implement and maintain specific files and produce the identified application reports or letters.

**HIGHLIGHTS**

- Customer-installable.
- Adaptable to specific application requirements.
- Provides pre-designed files and shell documents.
- Provides stored set-ups for report generation.
- Provides a variety of sample documents.

**DESCRIPTION**

- Administrative Support Implementation Package 5608-AX1

The Administrative Support Implementation Package is designed to assist in performing many routine administrative tasks required to support management-level professionals. Some of the tasks addressed by this package are:

- Correspondence tracking by author, subject and date.
- Calendar of meetings, action items and maintenance items.
- Directories of personnel.
- Inventory by contract number, serial number and department.
- Travel expenses (detail and summary), travel itinerary.
- Library of printed material by author, topic, publication.
- Customer inquiry tracking by location, inquiry, code.
- Time card reports (detail and summary); absence, overtime, expenses.
- Office expenses by department and vendor.

- Applicant Processing Implementation Package 5608-AX2

The Applicant Processing Implementation Package is designed to support the administrative tasks associated with the recruiting and/or employment of personnel. Included in this Implementation Package are:

- Applicant and Requisition files.
- Interview invitation letters.
- Applicant rejection letters.
- Employment offers.
- Applicant activity reports.
- Job requirements report.
- Affirmative action reports.

- Personnel Reporting Implementation Package 5608-AX3

The Personnel Reporting Implementation Package is designed to streamline the personnel function and provide management with timely employee information. This implementation package includes:

- Active employee file.
- History file.
- Salary analysis reports.
- Affirmative action reports.
- Hiring and promotion reports.
- Various employee directories.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of Displaywriter licensed programs, as well as certain problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Implementation Package licensed programs are designed to operate on the following IBM 6580 Displaywriter System:

- IBM 6580 Display Station model A04, A06, B04 or B06.
- IBM Dual Diskette Unit.
- IBM Printwheel Printer.
- 12- and 15-Pitch Printwheels.

- 25-line or Large Display.
- Sheetfeed Paper Handler and 2D Diskettes are recommended but not required.

**SOFTWARE REQUIREMENTS**

Each Implementation Package licensed program is designed to operate with IBM 6580 Displaywriter System Textpack 4 (5608-TR4) or Textpack 6 (5608-TR6) and Reportpack (5608-SR5) licensed programs.

**DATA SECURITY, AUDITABILITY and CONTROL**

Customers are encouraged to use backup storage when processing their data. IBM has no responsibility for protecting customer data and no facility for recovery of lost data.

**DOCUMENTATION**

(available from Mechanicsburg)

- Administrative Support Implementation Package (5608-AX1) consists of:
  - Administrative Support Principal's Catalog
  - Administrative Support Operator's Guide
  - Administrative Support Licensed machine-readable Material on a prerecorded diskette 1
- Applicant Processing Implementation Package (5608-AX2) consists of:
  - Applicant Processing Principal's Catalog
  - Applicant Processing Operator's Guide
  - Applicant Processing licensed machine-readable material on a prerecorded diskette 1
- Personnel Reporting Implementation Package (5608-AX3) consists of:
  - Personnel Reporting Principal's Catalog
  - Personnel Reporting Operator's Guide
  - Personnel Reporting licensed machine-readable material on a prerecorded diskette 1

**Note:** Form numbers will be announced at availability.

**TERMS and CONDITIONS:** See PP Index



**6580 DISPLAYWRITER SYSTEM  
CHARTPACK  
5608-SRA****PURPOSE**

Chartpack, a licensed program for the Displaywriter System, provides the capability to produce various types of business charts. Charts that can be created are bar charts, line charts, pie charts, and free-form charts (such as organization charts). All of these charts can be displayed and revised using either 25-line or large display models of the 6580 Displaywriter equipped with a Chartpack display adapter card (feature #6955). Charts can be stored on diskette, merged to print with text documents, and printed on 5218 and 5228 Printwheel Printers with printwheels designed for use with Chartpack.

**HIGHLIGHTS**

- Create and revise a variety of business charts: Bar, line, pie, and free-form
- Display and print charts during or after the creation process
- View the same information in different chart formats
- Merge charts to print with text documents
- Add text and legend notation to any chart
- Draw vertical and horizontal connecting lines on charts

**DESCRIPTION**

Chartpack is a Displaywriter licensed program that operates with either Textpack 4 or Textpack 6. This program provides the capability to produce various types of business charts such as bar charts, pie charts, line charts, and free-form charts (e.g., organization charts). These charts can be viewed on the display, stored on diskette, revised, and printed.

With the Chartpack program, the operator selects menu items and chooses the appropriate options to describe the chart, enters the label information and data values needed to draw the chart, and then types any extra text and legend notation to enhance the chart.

Based on menu responses and data input by the operator, the Chartpack program automatically determines the size and position of the chart on a page.

The spacing of all axis labels, the height and width of bars, and the relative percentages of pie chart sections are also computed by the program. For operator assistance in creating line and bar charts, 'help' screens are available which show examples of possible formats.

At any time during the creation or revision of a chart, the operator can display or print as much of the chart as has been defined up to that point. In this way, the operator can view the chart as it is being defined. The entire chart and notation area (60 lines by 80 characters) can be displayed on the large display. With a 25-line display, 20 lines of the chart area are displayed, with the remainder of the chart available for viewing by using the cursor control keys.

A line drawing capability permits the operator to draw vertical and horizontal lines using the cursor control keys. These lines can be used to enhance charts or to create diagrams and forms.

Information can be viewed in different chart formats to see which kind of chart the operator can choose to display or print the same information in a line or bar chart format. Also, chart values can be printed separately in columnar format.

Charts can be printed individually on a page or merged with text documents when printing. The charts are designed to print in 12-pitch and, if previously stored on diskette, may be printed by either Textpack 4, Textpack 6, or Chartpack.

When using the Chartpack program with Textpack 6, the operator may utilize the stored keystroke procedure to store, recall, and execute a series of up to 500 keystrokes which are to be used repetitively. This function can be used, for example, to help draw predefined boxes for an organization chart.

Charts created and stored on diskette using the Chartpack program can be communicated in media image between Displaywriters using the Displaywriter Binary Synchronous Communications program (5608-SR2). The receiving Displaywriter must use a Chartpack program to display and revise charts that are transmitted. However, the charts may be printed by Textpack 4 or Textpack 6 without using the Chartpack program, provided a Chartpack printwheel is available.

Two specially designed 12-pitch printwheels, Letter Gothic (P/N 1439992) and Prestige Elite (P/N 1439994), are available to support the Chartpack licensed program. These 96-character printwheels, for use on the 5218 and 5228 Printwheel Printers, contain special graphic characters used to print charts. Numerals, upper-case alphabetic characters, and special characters are contained on these printwheels. Characters and symbols are also included on these two printwheels in order to support creating charts for languages other than U.S. English. Printwheels are available separately as supply items and can be obtained through normal IBM supplies ordering procedures.

A brief description of each type of chart supported by the Chartpack program is given below:

**Bar Chart** - The bar chart is particularly appropriate for comparing the magnitude, or size, of items or parts of the total. Chartpack allows for either a single component, a side-by-side, or a stacked bar chart, with the bars arranged either vertically or horizontally. Bar charts can have a maximum of 24 bars and corresponding labels, with up to four data items per bar in a stacked bar chart. The number of bars and label positions in a side-by-side bar chart depends on the number of bars (maximum of four) per label. The length of the individual bars is determined by the chart values.

**Line Chart** - The line chart is very useful when showing the change in a value over time. Up to four lines may be plotted on a single chart. A maximum of 24 labels for the horizontal axis can be entered along with the corresponding data values for each line. The labels will be equally spaced on the horizontal axis. The scaling for the vertical axis is determined by the information entered by the operator in response to menu options.

**Pie Chart** - The pie chart is used to portray the relative sizes of the component parts of a total. The operator enters data values (maximum of 24) and the section labels. The Chartpack program calculates and displays the relative percentages for each section of a three-inch diameter circle.

**Free-form Chart** - The free-form chart does not have a predefined format. The user can construct charts using the cursor keys to draw horizontal and vertical lines of any length. Special characters and shading can also be utilized when making free-form charts. Examples of free-form charts are organization charts, forms, and certain diagrams. The stored keystroke procedure in Textpack 6 can be used when constructing these charts.

Symbols and upper-case character notation can be added to any of the chart formats, within the chart or above and below the chart. Notation added to a displayed chart can overlay information created by the Chartpack program. Where an overlay appears, the added notation will be the information that is printed.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Chartpack licensed program is designed to operate with IBM 6580 Displaywriter System configurations with the following components:

- IBM 6580 Display Station with at least 256K memory (when used with Textpack 4) or at least 320K memory (when used with Textpack 6). The Display Station must include a Chartpack Display Adapter (feature #6955).
- IBM 6360 Diskette Unit
- IBM 5218 or IBM 5228 Printwheel Printer
- A special Letter Gothic (P/N 1439992) or Prestige Elite (P/N 1439994) printwheel (required for printing charts)

**SOFTWARE REQUIREMENTS**

The Chartpack licensed program has been designed to operate with the IBM Displaywriter System Textpack 4 (5608-TR4) or Textpack 6 (5608-TR6).

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (G544-2215) ... IBM Displaywriter System Chartpack User's Guide (S544-2212) ... IBM Displaywriter System Chartpack Keyboard Template (S544-2221).*

**RPQs ACCEPTED:** No





PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM  
EXTENDED SPELLING DICTIONARY - LEGAL  
5608-SRB**

**PURPOSE**

The 6580 Displaywriter System Extended Spelling Dictionary - Legal program adds approximately 16,000 legal terms to the IBM-supplied general usage dictionary of approximately 100,000 words for use with the spelling verification, hyphenation and correction aid tasks of the Displaywriter Textpack 6 program (5608-TR6).

**HIGHLIGHTS**

The Extended Spelling Dictionary - Legal program is specifically tailored to the needs of law firms, legal departments, and other frequent users of legal vocabulary. The primary sources for the spelling and hyphenation of the legal terms included in the Extended Spelling Dictionary - Legal are *Black's Law Dictionary*, Fifth Edition, and *Webster's Legal Speller*, 1978.

The Extended Spelling Dictionary - Legal adds approximately 16,000 legal terms to the approximately 100,000 general usage words in the extended spelling dictionary of Textpack 6. The Extended Spelling Dictionary - Legal program diskette is used in place of the Textpack 6, Volume 4 diskette when performing spelling verification. The diskette containing the dictionary must be resident in the diskette unit during the spelling verification process. The Extended Spelling Dictionary - Legal diskette can be combined with Textpack 6 diskettes volumes 1, 2 and 3 onto a single Diskette 2D for ease of handling.

The Extended Spelling Dictionary - Legal program is only available in English US and English UK versions.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this program, as well as the applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Extended Spelling Dictionary - Legal program is designed to operate on the following IBM 6580 Displaywriter System components:

- An IBM 6580 Display Station with at least 320K bytes of memory.
- An IBM 6360 Single or Dual Diskette Unit. (If a single diskette unit is used, it must support the IBM Diskette 2D.)
- An IBM 5215 Selectric Element Printer or IBM 5218 or 5228 Printwheel Printer. (A printer is recommended but not required.)

**SOFTWARE REQUIREMENTS**

The use of the enhanced Textpack 6 program (5608-TR6) is a prerequisite to the use of the Extended Spelling Dictionary - Legal licensed program (5608-SRB).

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specification for Extended Spelling Dictionary - Legal (G544-2366).*



## PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM  
ASYNCHRONOUS COMMUNICATIONS  
5608-SR1****PURPOSE**

The IBM 6580 Displaywriter System Asynchronous Communications program (5608-SR1) provides the functions necessary to send information to and receive information from other IBM Displaywriter Systems or other compatible communicating equipment.

**HIGHLIGHTS**

Information can be sent either from the keyboard or from diskette. Received information can be recorded on diskette for subsequent revision and/or printing.

All personalization of the communication facility is done through menus provided by the Displaywriter System Asynchronous Communications program (5608-SR1). The operator selects the proper menu, chooses the appropriate options from that menu, and then proceeds with the task. These choices can be stored as communication setups which can be used without the need for the operator to respecify the options for each communication session.

Displaywriter System Asynchronous Communications has three operating modes:

- IBM CMC, which emulates the IBM Communicating Mag Card Selectric® Typewriter, with line speeds of 134.5, and 1,200 bits per second
- IBM 2741, which emulates the IBM 2741 Communications Terminal, with line speeds of 134.5, 300, and 1,200 bits per second.
- TTY, which emulates Teletype® KSR models 33, 35, and 45, with line speeds of 110, 150, 200, 300, and 1,200 bits per second.

A Displaywriter System using Asynchronous Communications program (5608-SR1) also can communicate with a suitably programmed host computer.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this program, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM Displaywriter System Asynchronous Communications program (5608-SR1) requires the following IBM components or equivalents:

- An IBM Electronics Module with 192K or above memory, a Keyboard Module and a Display Module.
- An IBM 6360 Single or Dual Diskette Unit.
- An IBM 6580 Displaywriter System Communication feature (#3704, #3705, or #3707).
- A modem.
- A communication line.

An IBM 5215 Selectric® Element Printer, an IBM 5218 Printwheel Printer, or equivalent device is recommended but not required. (A Printer Sharing prerequisite, a logic card placed in a display station to designate printer control in a shared configuration, is necessary for any IBM 6580 Displaywriter System with a shared printwheel printer.)

**SOFTWARE REQUIREMENTS**

Use of an IBM 6580 Displaywriter System Textpack 2, 4 or 6 program (6508-TR2, 5608-TR4 or 5608-TR6, respectively) is a prerequisite to use of Asynchronous Communications program (5608-SR1).

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM  
BINARY SYNCHRONOUS COMMUNICATIONS  
5608-SR2****PURPOSE**

The IBM 6580 Displaywriter System Binary Synchronous Communications program (5608-SR2) provides the functions necessary to send documents to and receive documents from other 6580 Displaywriter Systems or other compatible communicating equipment. (Documents received by other compatible communications equipment may need additional editing or reformatting if revisions are necessary.)

**HIGHLIGHTS**

All personalization of the communication facility is done through menus provided by the Displaywriter System Binary Synchronous Communications program (5608-SR2). The operator selects the proper menu, chooses the appropriate options from that menu, and then proceeds with the communication. These choices can be stored as communication setups which can be used without the need for the operator to respecify the options for each communication session.

Displaywriter System Binary Synchronous Communications has 2770/3780 and 2780 emulation. Line speeds of 1,200, 2,000, 2,400, and 4,800 bits per second are available. Both emulation and line speeds are chosen in menus.

A Displaywriter System equipped with Binary Synchronous Communications can communicate with another Displaywriter System or with the following compatible communicating equipment:

- Mag Card II Typewriter - Communicating
- 6240 Mag Card Typewriter - Communicating
- 6640 Document Printer - Communicating
- Office System 6 - Communicating
- 6670 Information Distributor
- 5520 Administrative System

A Displaywriter System using Binary Synchronous Communications can communicate with a suitably programmed host computer.

The sending and receiving of IBM Level 3 Document Content Architecture (L3DCA) between Displaywriter Systems and appropriately programmed IBM host computer systems is supported.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this program, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Binary Synchronous Communications program (5608-SR2) requires the following IBM components or equivalents:

- An IBM Electronics Module with 256K or above memory, a Keyboard Module, and a Display Module.
- An IBM 6360 Single or Dual Diskette Unit.
- An IBM 6580 Displaywriter System Communication feature (#3704, #3705, #3707, or #1630).
- A modem.
- A communication line.

An IBM 5215 Selectric® Element Printer, an IBM 5218 Printwheel Printer, or equivalent device is recommended but not required. (A Printer Sharing prerequisite, a logic card placed in a display station to designate printer control in a shared configuration, is necessary for any IBM 6580 Displaywriter System with a shared printwheel printer.)

**SOFTWARE REQUIREMENTS**

Use of an IBM 6580 Displaywriter System Textpack 2, 3 or 4 program (5608-TR2, 5608-TR4, or 5608-TR6, respectively) is a prerequisite to use of Binary Synchronous Communications program (5608-SR2).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM  
MAGNETIC CARD CONVERSION  
5608-SR3**

**PURPOSE**

The IBM 6580 Displaywriter System Magnetic Card Conversion program (5608-SR3) provides the functions necessary to support the interaction between magnetic cards read or recorded in the 6580 Displaywriter 6361 Mag Card Unit and the 6580 Displaywriter System.

**HIGHLIGHTS**

Using the conversion functions, magnetic cards created on compatible mag card office equipment can be read and stored on a Displaywriter System diskette for revision, printing, or storage. Information created on the Displaywriter System can be recorded on mag card office equipment.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Magnetic Card Conversion program (5608-SR3) requires the following IBM components or equivalents:

- An IBM Electronics Module with 192K or above memory, a Keyboard Module and a Display Module.
- An IBM 6360 Single or Dual Diskette Unit.
- An IBM 6361 Mag Card Unit.

An IBM 5215 Selectric® Element Printer, an IBM Printwheel Printer, or equivalent device is recommended but not required. (A Printer Sharing prerequisite, a logic card placed in a display station to designate printer control in a shared configuration, is necessary for any IBM 6580 Displaywriter System with a shared printwheel printer.)

**SOFTWARE REQUIREMENTS**

Use of an IBM 6580 Displaywriter System Textpack 2, 4 or 6 program (5608-TR2, 5608-TR4 or 5608-TR6, respectively) is a prerequisite to use of the IBM 6580 Displaywriter System Magnetic Card Conversion program (5608-SR3).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM LANGUAGEPACK  
5608-SR4**

**PURPOSE**

The IBM 6580 Displaywriter System Languagepack program (5608-SR4) contains spelling dictionaries in eight languages for use with the spelling verification aid contained in the 6580 Displaywriter System Textpack 2 program (5608-TR2) and Textpack 3 program (5608-TR3).

**HIGHLIGHTS**

The Displaywriter System Languagepack program (5608-SR4) contains a spelling dictionary in each of the following languages:

- Danish
- Dutch
- English UK
- English US
- French Canadian
- German
- Italian
- National French
- Norwegian
- Spanish
- Swedish

After a document is typed or revised, the spelling verification aid helps check for possible spelling errors. The spelling verification aid compares the words in a document to:

- An IBM provided dictionary  
Each English US and English UK spelling dictionary is capable of checking approximately 50,000 words. Each dictionary for the other languages listed above is capable of checking in excess of 150,000 words.
- A customer-created supplemental dictionary unique to the customer's environment containing up to 4,500 words, for example 450 ten-character words or 900 five-character words.  
Eight supplemental dictionaries (one with each language) can be stored on the Languagepack program diskettes.

Any word not found in either dictionary is highlighted on the display. The operator can then correct the misspelled words and cancel the highlighting on unrecognized but correct words (a proper name, for example).

Only one dictionary and one supplemental dictionary can be used for spelling verification aid at one time.

**Note:** The spelling verification aid may occasionally verify a misspelled word which is formed from inappropriate combinations of root words, prefixes, and/or suffixes. For example, "destate", a combination of the prefix "de" and the root word "state", will not be highlighted.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this program, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Languagepack program (5608-SR4) requires the following IBM components or equivalents.

- An IBM 6580-A02 or 6580-A03 Electronics Module with a Keyboard Module and a Display Module.
- An IBM 6360 Single or Dual Diskette Unit.

An IBM 5215 Selectric® Element Printer, an IBM Printwheel Printer, or equivalent device is recommended but not required. (A Printer Sharing prerequisite, a logic card placed in a display station to designate printer control in a shared configuration, is necessary for any IBM 6580 Displaywriter System with a shared printwheel printer).

**SOFTWARE REQUIREMENTS**

Use of the IBM 6580 Displaywriter System Textpack 2 program (5608-TR2) or Textpack 3 program (5608-TR3) is a prerequisite to the IBM 6580 Displaywriter System Languagepack program (5608-SR4).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM REPORTPACK  
5608-SR5****PURPOSE**

The IBM 6580 Displaywriter System Reportpack program (5608-SR5) provides for the creation, maintenance, and printing of files.

**HIGHLIGHTS****File Creation And Maintenance**

The Reportpack Program allows the user to enter and revise the records that make up a file. The file functions are selected at the workstation through menus and control keys. For menu-supported tasks, the operator selects the proper menu, chooses and enters the appropriate options from that menu, and then proceeds with the task. For control key-supported tasks, the operator presses the proper key and then proceeds with the task.

File creation and maintenance activities supported by the Reportpack program include these activities:

- Records can be added to a file:
  - As the file is initially input, or
  - Any time after the file is created.
- The file can be revised by:
  - Adding or deleting entire records, and
  - Adding, revising, or deleting fields of information in a record.
- Records can be selected according to operator-specified parameters for revision or for viewing.
- Fields of information within a record can be temporarily rearranged to allow for easier access to certain fields during revisions.
- A file can be duplicated so that all the records or only selected records are duplicated. These duplicated records may be used to create a new file or be added to an existing file.

**File Output**

The information in the file can be printed from the file or it can be merged with a text document.

The file information can be printed:

- With the fields printing in a different order than they appear in the field.
- With some fields not printed.
- With all or some records printed.
- With the records sorted (placed in alphabetical or numerical order and in either ascending or descending order) according to operator-specified parameters.

The file can be merged with a shell document created using the Displaywriter System Textpack 4 program (5608-TR4) or Textpack 6 (5608-TR6). Record instructions in the shell document control what information from the file is merged into the shell document and the placement of that information.

Files can be merged with shell documents to produce:

- Repetitive letters, with one letter produced for each record or for selected records in the file.
- Printed lists of records with headings.
- Printed multi-column lists.
- Printed reports that incorporate groups of records.
- Information about groups of records, such as the total number of records in a group.

In addition to controlling the output format in the merge process, the operator can also select and sort the records to be merged.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this program, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Reportpack program (5608-SR5) requires the following IBM components or equivalents:

- An IBM 6580 Electronics Module with 256K or above memory, a Keyboard Module, and a Display Module (memory requirement dependent on Textpack program used).
- An IBM 6360 Single or Dual Diskette Unit.

An IBM 5215 Selectric® Element Printer, an IBM 5218 or 5228 Printwheel Printer, or equivalent is recommended but not required. (A Printer Sharing prerequisite, a logic card placed in a display station to

designate printer control in a shared configuration, is necessary for any IBM 6580 Displaywriter System with a shared printwheel printer.)

**SOFTWARE REQUIREMENTS**

Use of the IBM 6580 Displaywriter System Textpack 4 program (5608-TR4) or Textpack 6 (5608-TR6) is a prerequisite to use of the IBM 6580 Displaywriter System Reportpack program (5608-SR5).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM  
DATA STREAM COMPATIBILITY  
5608-SR6****PURPOSE**

The 6580 Displaywriter 3270 Data Stream Compatibility enables a properly configured 6580 Displaywriter System to appear as a specific configuration of a 3274 Control Unit to supported host systems. Those host systems currently supported are the S/370, 4331, 4341, 4361, 4381, 3031, 3032, 3033, 3081, and 8100. The 3274 configuration supported is the mdl 51C (with Configuration Support C), with a single 3278 mdl 2 or mdl 4 Display (with an 87-key EBCDIC typewriter keyboard).

SNA/SDLC communications may be by switched network at up to 4800 bps, or by nonswitched, point-to-point or multi-point at up to 9600 bps.

**HIGHLIGHTS****Transition To 3270 Mode**

Transition to 3270 mode is by feature overlay load from diskette followed by operator execution of normal 3270 SNA sign-on procedures. While in the 3270 mode, the operator can save 3270 display screens on diskette in the Displaywriter document format. Displaywriter background printing is also supported while in the 3270 mode.

**Native Textpack Mode**

Return to native textpack mode is by operator execution of normal 3270 SNA sign-off procedures. After returning to the text mode, all portions of the saved 3270 screens are available for use as Displaywriter text documents.

**Alternate Task**

By installing 128K bytes of memory in addition to that required for normal Textpack operation, the operator can alternate between Displaywriter Textpack applications and host system applications without terminating either operation. The operator receives messages and prompts about both modes while performing either operation.

**Enhancements**

- Support for 3287 mdls 1 and 2 printer emulation requires a 5218 or 5228 Printwheel Printer.
- Print operations may be either direct print to the printwheel printer or deferred print. In deferred print, the 6360 Diskette Unit can be selected as the destination for host print and host-initiated copy for subsequent operator editing and printing. Both the diskette unit and printer can be selected as destinations. Diskette cannot be selected as the destination for operator-initiated copy (SAVE is used for that function).

**Unsupported Features**

Displaywriter 3270 Data Stream Compatibility supports most commonly used 3270 features except for:

- Binary Synchronous Communications
- 3270 Cluster Emulation (multiple displays attached)
- Local Channel attachment
- Loop attachment to local or remote R-Loop
- 3270 Extended Data Stream
  - Extended Highlighting
  - Programmable Symbol Sets
  - Color
- Magnetic Card Reader
- Selector Light-Pen
- Character sets other than U.S. EBCDIC
- Keyboards other than 87-key EBCDIC typewriter
- Printing of English UK
- Certain 3270 keys
  - Alternate cursor
  - Click
  - Cursor blink
  - Extended function keys
  - Indent
  - Overbar
  - Print
- Dual Case/Mono Switch
- Up to 4 characters may not be available from the keyboard if the 92-character keyboard is selected
- Security Keylock

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this program, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum IBM 6580 Displaywriter system configuration required to support the IBM 6580 Displaywriter 3270 Data Stream Compatibility program product feature is:

- An IBM Electronics Module with at least 256K memory, a Keyboard Module, and a Display Module.
- An IBM 6360 Single or Dual Diskette Unit.
- Communications adapter (#3705 or #3707).
- Customer-supplied modems.
- Customer-supplied communications.

The support for the IBM 3278 mdl 4 Display requires an IBM 6580 Display Station mdl B04 or B06 with a large display.

Emulation of the IBM 3287 mdl 1 or 2 Printer requires a Displaywriter mdl 5218 or 5228 Printer. The 5215 Printer may be used with the Displaywriter background printing but will not support the host printer capability. Also, no single element for the 5215 Printer contains all of the characters which may appear in the saved 3270 screens.

Activating the Alternate Task function requires 128K bytes of memory in addition to that of the Textpack program used.

**SOFTWARE REQUIREMENTS**

Minimum requirement is IBM 6580 Displaywriter System Textpack 4 (5608-TR4). If screen save is used extensively, use of Textpack 6 (5608-TR6) may be preferred. Textpack 6 provides an enhanced keystroke store and recall capability which can simplify the process of converting the saved 3270 screens to the desired format.

**COMPATIBILITY**

Programming which operates on the S/370, 4331, 4341, 4361, 4381, 3031, 3032, 3033, or 3081 processors using a 3270 System function subset within that described above, will operate without modification in conjunction with Displaywriter 3270 Data Stream Compatibility.

Operation is on point-to-point switched, and nonswitched point-to-point SNA/SDLC communications facilities.

The most current version of the following SNA/SDLC host system environments will support Displaywriter 3270 Data Stream Compatibility.

- DPPX (for the IBM 8100 Distributed Office System only)
- IMS/VS with ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
- IMS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS)
- CICS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS)
- CICS/VS with ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
- CICS/VS with ACF/VTAM under DOS/VS or DOS/VSE\*\*
- CICS/VS with ACFVTAM E under DOS/VSE\*\*
- TSO\* with ACF/VTAM under OS/VS2 (MVS) TSO\* with ACT/TCAM under OS/VS2 (MVS)

\* TSO does not support printers.

\*\* On a 4331 with integrated communications adapter.

Most existing application programs written to the 3274 SDLC interface of the above listed host programming environment will run unchanged when using the Displaywriter 3270 Data Stream

RPOs ACCEPTED: No

## PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM LANGUAGEPACK 2  
5608-SR7****PURPOSE**

The IBM 6580 Displaywriter System Languagepack 2 program (5608-SR7) contains spelling dictionaries in eleven languages for use primarily with the spelling aid contained in 6580 Displaywriter System Textpack 4 program (5608-TR4) and Textpack 6 program (5608-TR6) to support the automatic hyphenation of these programs. Languagepack 2 will also support a level of spelling verification aid in Textpack 2 and Textpack 3.

**HIGHLIGHTS**

The Displaywriter System Languagepack 2 program (5608-SR7) contains a spelling dictionary in each of the following languages:

- Danish
- Dutch
- English UK
- English US
- French Canadian
- German
- Italian
- National French
- Norwegian
- Spanish
- Swedish

After a document is typed or revised, the spelling verification aid helps check for possible spelling errors. The spelling verification aid compares the words in a document to:

- An IBM provided dictionary.

Each English US and English UK spelling dictionary is capable of checking approximately 50,000 words. Each dictionary for the other languages listed above is capable of checking in excess of 150,000 words.

- A customer-created supplemental dictionary unique to the customer's environment containing up to 4,500 characters, for example, 450 ten-character words or 900 five-character words.

Eleven supplemental dictionaries (one with each language) can be stored on the Languagepack 2 program diskettes. (Only one dictionary and one supplemental dictionary can be used for spelling verification aid at one time.)

The function provided by the Displaywriter System Languagepack 2 program depends on the supporting Textpack program that is used.

**Languagepack 2 Used with Textpack 2 or Textpack 3**

When Languagepack 2 is used with Textpack 2 or Textpack 3, the spelling verification aid functions, which are described below, are the same as the spelling verification aid functions contained in Textpack 2 and Textpack 3.

After typing or revising the document, the operator can use spelling verification aid to help check for possible errors. After using the spelling verification aid, the operator returns to the revision mode. Any word not found in either dictionary is highlighted on the display. The operator can then correct the misspelled words and cancel the highlighting on unrecognized but correct words (a proper name, for example). If the operator wants to check the spelling corrections, the spelling verification aid must be used to check the entire document again.

**Languagepack 2 Used with Textpack 4 or Textpack 6**

When Languagepack 2 is used with Textpack 4 or Textpack 6, the spelling verification aid functions, which are described below, are the same as the spelling verification aid functions contained in Textpack 4 or Textpack 6. They include a prompted spelling check and either prompted or automatic hyphenation.

After creating or revising a document, the operator can choose to do a spelling check, make hyphenation decisions, and have the document paginated and printed in one operation. As a part of this task, the operator can choose to do:

- A prompted spelling check.
- Either prompted or automatic hyphenation.

If the operator chooses to use the spelling verification aid in this task, the spelling check will be prompted. Any word not found in either dictionary is highlighted on the screen. Some of the text surrounding the word is also shown. The operator can either indicate that the word is acceptable, or correct the misspelled word by typing it correctly on the prompt line on the display. The newly typed word is checked immediately. If it is spelled correctly, it replaces the misspelled word in the text. If it also is incorrect, the operator is alerted to try another possible spelling.

As a part of the pagination of the document, the lines of text are adjusted to fit within the margins. If there is a word that crosses the right margin, a hyphenation decision is necessary. There are two methods of making the hyphenation decision:

1. The operator can choose to have the system prompt when a hyphenation decision is necessary. Then the operator is shown the word to be hyphenated. Some of the text surrounding the word is also shown. The operator can hyphenate the word, move the entire word to the next line, or leave the entire word on the line it is on.
2. The operator can also choose automatic hyphenation. In this mode, the Displaywriter System will automatically hyphenate any word that crosses the right margin. It uses information from the spelling dictionary to determine the hyphenation points within a word.

During the spelling check, hyphenate, and paginate operation, the document can be trail printed.

**Note:** The spelling verification aid may occasionally verify a misspelled word which is formed from inappropriate combinations of root words, prefixes, and/or suffixes. For example, "destate", a combination of the prefix "de" and the root word "state", will not be highlighted.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Languagepack 2 program (5608-SR7) requires the following IBM components or equivalents:

- An IBM Electronics Module with at least 192K memory, a Keyboard Module, and a 25-line Display Module. (The memory size used depends on the memory size required for the supporting Textpack.)
- An IBM 6360 Single or Dual Diskette Unit.

An IBM 5215 Selectric® Element Printer, an IBM 5218 Printwheel Printer, or equivalent device is recommended but not required. (A Printer Sharing prerequisite, a logic card placed in a display station to designate printer control in a shared configuration, is necessary for any IBM 6580 Displaywriter System with a shared printwheel printer.)

**SOFTWARE REQUIREMENTS**

Use of the 6580 Displaywriter System Textpack 2 program (5608-TR2) (or a higher numbered Textpack program) is a prerequisite to the IBM 6580 Displaywriter System Languagepack 2 program (5608-SR7).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM  
ELECTRONIC DOCUMENT DISTRIBUTION  
5608-SR8**

**PURPOSE**

The IBM 6580 Electronic Document Distribution licensed program provides the IBM Displaywriter System with the functions required to perform the following in an IBM SNA/SDLC communications environment:

- Document distribution with remote Displaywriters and certain other IBM office systems within a communication network through the facilities of IBM Distributed Office Support System/370 (DISOSS/370) Version 3.
- Access to the IBM DISOSS/370 Version 3 document library services.
- Direct exchange of documents with another Displaywriter via SNA telecommunications without the need for host assistance.

**HIGHLIGHTS**

- SNA/SDLC transmission at up to 9,600 bps.
- Use of Document Interchange and Document Content architectures.
- Interaction with IBM DISOSS/370 Version 3 Document Distribution and Library Services functions.
- Direct document exchange with other similarly configured Displaywriters.
- Final form document interchange with certain other IBM office systems in an IBM DISOSS/370 network.

**DESCRIPTION**

The Electronic Document Distribution licensed program allows the IBM Displaywriter System to attach to document distribution networks and provides the following functions:

- Distributing and receiving text and records documents through DISOSS/370 (Document Distribution).
- Filing and retrieving text and records documents in DISOSS/370 Host Document Library (Library Services).
- Exchanging text and records documents directly with other IBM Displaywriter Systems (Document Exchange).

**Document Distribution:** Document Distribution allows the IBM Displaywriter operator to perform a wide range of distribution activities within a DISOSS/370 Version 3 host-based document distribution network. With Document Distribution, the Displaywriter becomes a terminal for distributing documents to and obtaining documents from other terminals via the document distribution network. These document distribution capabilities offer significant advantages over the traditional mail system.

In a document distribution network, each user or department is assigned a local address (user ID) which can be up to eight characters long and serve as the address to which documents can be sent. In addition to the address, each user can be assigned his own unique password for security.

Either before or during the actual communication session, the Displaywriter operator can create a queue of commands for distributing and obtaining documents via an IBM host computer with DISOSS/370 Version 3. When the Communication session is initiated, these commands are sent to DISOSS/370 to be processed. Documents destined for other network users are queued for distribution to their address destinations, and incoming documents are sent to the local Displaywriter.

Some of the Document Distribution capabilities are:

- Distributing documents to one or more specific addresses; to a previously stored distribution list containing one or more address; or to a combination of addresses and lists.
- Requesting DISOSS/370 to return confirmation that a document has been distributed.
- Including messages with distributed documents to provide additional information to the recipient(s). These messages can be used to describe any special printing or formatting requirements and for other comment.
- Changing the operator password maintained by DISOSS/370.
- Requesting delivery to the Displaywriter of all documents or specific documents queued in DISOSS/370 for selected users. In addition, the user can display a detailed or summarized list of the documents awaiting delivery from IBM DISOSS/370.
- Deleting documents in the DISOSS/370 distribution queue.

**Library Services:** Library Services allows the Displaywriter user to file documents electronically in the IBM DISOSS/370 Version 3 Host Document Library, and to search the library to locate and retrieve previously stored documents. Parametric searches are performed based on criteria the operator selects, and can include documents

stored by other library users. The additional capabilities provided by the Library Services function are:

- Filing a document and/or document profile (a description of the document that includes information about the document but not the document itself) in the Host Document Library.
- Searching the Host Document Library for documents meeting user-selectable criteria. The user-selectable criteria are: Author, document date, document name, document class, recipients, and keywords.
- Retrieving documents from the Host Document Library.
- Distributing documents stored in the Host Document Library to certain other IBM office systems in the network.
- Deleting documents from the Host Document Library.

**Note:** The Displaywriter does not support the application processing functions of Document Interchange Architecture. Examples of these functions are the DISOSS support for adding search terms and printing on host printers.

**Document Exchange:** Document Exchange provides the IBM Displaywriter with capabilities for sending and receiving directly to and from other configured IBM Displaywriters. Both Displaywriters must have the Electronic Document Distribution licensed program installed.

In the Document Exchange function, each Displaywriter System can optionally be assigned a name (up to 8 characters long). These optional names, called Session IDs, serve as the addresses of the remote Displaywriter. When a Document is being distributed, the operator selects the Session IDs designated to receive the document. During the actual communication session, only the designated remote devices will receive the document. Any documents queued to other Session IDs will be sent only when the communication session is established with the correct remote Displaywriter. If a session ID is not specified for a document, then all locations will receive the document.

The capabilities offered by the Document Exchange function are:

- Sending documents to operator-selectable recipients(s).
- Sending an up to 80-character message to the remote Displaywriter. This message displays on the remote Displaywriter's display station when the communication session is active and can provide a form of interactive communication between operators.
- Receiving documents and messages sent from other Displaywriters.
- Providing backup capability for DISOSS/370 Network distribution.

**Architecture:** The Displaywriter System, using the Electronic Document Distribution licensed program, utilizes Systems Network Architecture and Office System Architectures.

**Systems Network Architecture** - The Displaywriter System, using the Electronic Document Distribution licensed program conforms to the Advanced Program-to-Program Communication (APPC) protocol of SNA.

**Office Systems Architectures** - The Office Systems Architectures supported by Displaywriter are:

- **Document Interchange Architecture (DIA)** - Document Interchange Architecture provides the framework for communicating commands in a document distribution network. The Document Distribution and Library Services functional subsets of DIA are supported between DISOSS/370 and Displaywriter. The Document Exchange function set of DIA is supported between Displaywriters.
- **Document Content Architecture (DIA)** - Displaywriter supports sending and receiving the Final Form and Revisable Form data streams. The Final Form (L2DCA) data stream is intended to insure print image fidelity and integrity in a document distribution network. With this data stream many commands characteristic of word processing systems (e.g., margin text, footnote and auto-outline instructions) are resolved prior to transmission. The Revisable Form (L3DCA) data stream contains text formatting commands and can be revised at a compatible recipient device.

Refer to the Marketing Announcement Letter, Systems and Architectures, and IBM publication *Information Interchange Architecture Concepts* (GC23-0765, planned availability February 28, 1983) for further information on Office Systems Architectures.

**Personalization:** The tailoring of the Electronic Document Distribution licensed program to meet specific communication needs is called personalization. All personalization is performed through menus. The modem and line options selected are stored as a part of the program diskette and will not require future operator intervention unless the modem or line option is changed. In addition, the various operating options available to conform to a remote communication device are also defined through menu selection and retained on the program diskette.

## PROGRAM PRODUCTS

**6580 Electronic Document Distribution (cont'd)**

Specifying operating options (personalization) is a one-time task. Therefore, subsequent communication sessions simply require recalling the stored profiles. These profiles are a key to the simplicity of operation of Displaywriter System communication. Up to eight operational profiles can be defined for Electronic Document Distribution. These profiles are used to define the functions required (Document Distribution, Library Services, Document Exchange), as well as other specific tailoring requirements.

**Communication Characteristics:** The Displaywriter System, with the Electronic Document Distribution licensed program, provides the ability to communicate at a range of speeds depending on the facility and modem. Either point-to-point, switched communication at speeds from 1200 to 4800 bps or multipoint, nonswitched communication at speeds from 1200 to 9600 bps can be utilized.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM Displaywriter Electronic Document Distribution licensed program is designed to operate with the following configurations of IBM Displaywriter System components:

- An IBM 6580 Display Station with a least 320K memory.
- An IBM 6360 Diskette Unit
- Communications adapter (feature code #3704, #3705, or #3707)
- IBM 5218 or IBM 5228 Printwheel Printers, or the IBM 5215 SELECTRIC® Element Printer. (Use of a printer is optional).

The customer is responsible for providing modems (such as the IBM 3863, 3864, 3865, or equivalent) and other communications facilities.

**SOFTWARE REQUIREMENTS**

IBM Displaywriter System Textpack 4 (5608-TR4) or Textpack 6 (5608-TR6) is required to operate the Electronic Document Distribution licensed program on the Displaywriter.

The Electronic Document Distribution program diskette can be combined onto a single 2D diskette with the Textpack 4 Program diskettes. However, with Textpack 6, it may be necessary to omit the Electronic Spelling Dictionary diskette (textpack 6, volume 4) in order to combine the Electronic Document Distribution and the other three Textpack 6 Program diskettes onto a single 2D diskette.

**NETWORK REQUIREMENTS**

A suitably configured and programmed IBM System/370 computer with IBM DISOSS/370 Version 3 provides support for the Displaywriter Electronic Document Distribution licensed program. Refer to Programming Announcement Letter for details of the IBM DISOSS/370 Version 3 operating environment.

The following IBM office systems can attach to IBM DISOSS/370 Version 3:

- IBM Displaywriter with Electronic Document Distribution licensed program.
- IBM 8100 Information System with Distributed Office Support Function (DOSF) Release 3 and DISOSS/8100.
- IBM Scanmaster I.
- IBM 5520 Administrative System with the Administrative Processing Program Release 2.

**Network Interchange Considerations:** The following describes the potential relationship of the Displaywriter System with the above systems through DISOSS/370 Version 3. The *Displaywriter System Electronic Document Distribution Compatibility Guide* (G544-2185, planned availability April, 1983) will provide a detailed description of Displaywriter compatibility with other devices through DISOSS/370.

**IBM Displaywriter** - The Displaywriter System, using the Electronic Document Distribution licensed program, can send and receive Final Form (L2DCA), Revisable Form (L3DCA), and records documents through DISOSS/370 Library Services and Distribution Services.

Displaywriter will receive the Final Form documents and store them on diskette. Subsequently, the documents can be printed or viewed on the display. In addition, if minor revisions are required, Final Form documents can be converted to Displaywriter internal editable form. Because many of the work processing commands, such as margin text, are resolved in Final Form documents, repagination of a converted document may not have satisfactory results and other revisions may be cumbersome.

Revisable Form documents are converted to Displaywriter internal editable form and stored on diskette when received by Displaywriter. Subsequently, the documents can be viewed on the display, edited with similar ease and facility to that possessed by the originator, and repaginated.

Records documents transferred between Displaywriters through DISOSS/370 can be processed by the Reportpack licensed program at the receiving Displaywriter.

**IBM 8100/DOSF** - Both 8100/DOSF and Displaywriter Systems have the ability to utilize both the Distribution Services and Library Services functions of DISOSS/370 Version 3. When the 8100/DOSF system files or distributes a document through IBM DISOSS/370, the 8100/DOSF internal data stream is sent. If the document is subsequently routed to a Displaywriter, DISOSS/370 will transform the document to the Final Form (L2DCA) data stream. The document can then be printed, viewed, or converted for limited editing on the Displaywriter. The Displaywriter can file or distribute Final Form documents through DISOSS/370 for subsequent printing on an 8100/DOSF Release 3 System with the 5210 models E1 or E2 printers (with EC996869). Thus, through DISOSS/370 Version 3, the Displaywriter can interchange Final Form documents with IBM 8100/DOSF systems having 5210 printers.

**IBM Scanmaster I** - A Scanmaster I has the ability to print a subset of the Final Form (L2DCA) data stream. Thus, Displaywriter Systems can distribute Final Form documents through DISOSS/370 Version 3 for subsequent printing on a Scanmaster I. In addition, Scanmaster I can file Image documents in the DISOSS/370 Host Document Library. The Displaywriter attached to the DISOSS/370 network can direct the distribution of these Image documents from the Host Document Library to locations with the Scanmaster I.

**IBM 5520** - The 5520 Administrative System, using the 5520 Administrative Processing Program (5611-SS2) Release 2 can file but not retrieve Final Form (L2DCA) documents in the DISOSS/370 Host Document Library. Final Form documents can be transferred one-way (5520 to Displaywriter) through the DISOSS/370 Host Document Library. In addition, both Displaywriter and the 5520 can file or retrieve records document in the DISOSS/370 Host Document Library, providing a two-way interchange. IBM has announced its intent to enhance this data interchange capability to include both Final Form and Revisable Form text interchange between the 5520 and Displaywriter.

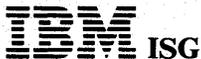
**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Displaywriter System General Information Manual* (G544-0851) ... *IBM Displaywriter System Electronic Document Distribution Licensed Program Design Objectives* (G544-2139) ... *IBM Displaywriter System Electronic Document Distribution Planning Guide* (G544-2138) ... *IBM Displaywriter System Electronic Document Distribution Programming Guide* (G544-2135) ... *IBM Displaywriter System Electronic Document Distribution Compatibility Guide* (G544-2185) ... *IBM Displaywriter System Electronic Document Distribution Operator Training Guide, Books 1-5* (S544-2179 through S544-2183) ... *IBM Displaywriter System Electronic Document Distribution Operator Reference Manual* (S544-2184) ... *IBM Displaywriter System Electronic Document Distribution Communication Link Problem Determination Guide* (S544-2136) ... *IBM Displaywriter System Electronic Document Distribution Template* (S544-2137) ... *IBM Displaywriter System Electronic Document Distribution Licensed Program Specifications* (G544-2141)

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM  
3270 ATTACHED WORKSTATION  
5608-SR9**

**PURPOSE**

The IBM 6580 Displaywriter System 3270 Attached Workstation licensed program provides the user the convenience of both Displaywriter and 3270 host system functions in a single workstation. This program allows the Displaywriter to emulate functions of the 3278 Display and the 3287 Printer when the Displaywriter workstation is attached through coaxial cables to a 3274 Control Unit or 3276 Control Unit Display Station.

Displaywriters may also attach to the 4321 and 4331 Processors and the 4701 Finance Communication Controller through the integrated adapters supporting the 3278 Display mdl 2 and the 3287 Printer mdls 1 and 2.

In addition to providing 3270 emulation, documents can be transferred in either direction between the Displaywriter diskette and an appropriately programmed host system. Also, with a simple keystroke operation, the user can alternate between Displaywriter text functions and 3270 applications.

**HIGHLIGHTS**

- Coaxial cable attachment of Displaywriter to:
  - 3274 Control Units
  - 3276 Control Unit Display Stations
  - 4321 Processors
  - 4331 Processors
  - 4701 Finance Communication Controller with Device Cluster Adapter
- Emulation of 3278 Display mdls 2 or 4
- Emulation of 3287 Printer mdls 1 or 2
- Similar user interface and functions as the Displaywriter 3270 Data Stream Compatibility program, including screen save, deferred print, and compress print
- Alternate task capability between 3270 applications and Textpack or Reportpack applications (except program diskette tasks)
- Document transfer capability with the Host Displaywriter Document Interchange Program (PRPQ #P09054, 5799-BKE)

**DESCRIPTION**

The Displaywriter System 3270 Attached Workstation licensed program supports the direct coaxial cable attachment of Displaywriter workstations to 3274 Control Units, 3276 Control Unit Display Stations, 4321 Processors, 4331 Processors, and 4701 Finance Communication Controllers. With the 3270 Attached Workstation program, an appropriately configured Displaywriter can emulate a subset of the functions of the 3278 Display mdls 2 or 4 and the 3287 Printer mdls 1 and 2.

**Expanded Information Handling:** The 3270 functions emulated by Displaywriter are expanded with the following information handling capabilities:

- **Screen save:** Transferring of individual 3270 screens to Displaywriter diskette. Local screen print using the print key is also available using a Displaywriter printwheel printer.

**Deferred print:** Routing host session print and host-initiated screen print output to the Displaywriter diskette unit, printwheel printer, or both.

**Compress print:** Reformatting host system printer output by changing the pitch (to 12 or 15 characters-per-inch) and by reducing the interline spacing for the printout on the Displaywriter printwheel printer.

**Alternate Task:** Two modes of operation can be maintained concurrently using the alternate task capability of the 3270 Attached Workstation program. An operator may alternate between Displaywriter Textpack/Reportpack applications (except program diskette tasks) and host system applications without terminating either operation. The operator receives message prompts about both modes while performing either operation. The use of this alternating capability for concurrent operations requires 128K bytes of memory in addition to that required for the Textpack program used. Without this additional memory, either Textpack or 3270 applications may be performed in a nonconcurrent mode by loading the appropriate program diskettes and performing normal start-up and termination procedures.

**Document Transfer:** In addition to the emulated 3278 and 3287 functions, the 3270 Attached Workstation program provides document transfer capability. Documents can be transferred in either direction between the Displaywriter diskette and an appropriately programmed host system. The Host Displaywriter Document Interchange program (PRPQ P09054, 5799-BKE), announced on November 18, 1982, is a host system program designed to support document transfer using the

Document Content Architecture, revisable form text, level three (L3DCA) data stream.

The following application scenarios depict possible uses of the document transfer capability:

- A Displaywriter user can take advantage of the power of the Professional Office System (PROFS) to view, edit, store, retrieve, mail, and print a document.
- Documents pre-recorded on diskette can be transmitted through the host network to other similarly attached Displaywriters, where the documents may be recorded on diskette, viewed, edited, and printed.
- Documents from Displaywriter diskette can be transferred to a suitably programmed host where they may be viewed and edited on 3270 displays.
- Documents created at the host can be transferred to the Displaywriter diskette for subsequent viewing, editing, or printing.
- The host data base may be utilized for archiving documents, thus reducing the need for diskette storage at the Displaywriter.

Customers requiring the document transfer function within their own host programming environment should refer to the following documents:

- *Document Content Architecture, Revisable Form Text, Level Three (L3DCA)* (SC23-0758), planned availability June 1983 - specifies the elements in a text data stream for interchange of revisable form documents.
- *Displaywriter 3277 Device Emulation/Document Transfer Host Programming Guide* (SC09-1038), planned availability August 1983 - describes the document transfer programming interface.

**Displaywriter 3270 Emulation Options:** Displaywriter Systems can now be used to participate in all 3270 networks. With the appropriate programs installed, the Displaywriter can support 3270 emulation with a host system and provide additional text/data functions. Either communication lines (e.g., from a remote location) or direct cable attachment to a control unit or host system may be used. The following chart provides a comparison of the four Displaywriter 3270 emulation programs:

	3270 DSC (5608-SR6)	3270 AW (5608-SR9)	3277 DE (5799-BHT) and 3277 DE/DT (5799-BKG)
<b>Characteristics/Support</b>			
3270 Display Emulation	3278-2/4	3278-2/4	3277-2
3270 Printer Emulation	3287-1/2	3287-1/2	N/A
3270 Control Unit Emulation	3274-51C	N/A	N/A
Control Unit Attachment	N/A	3276 3274 (A adapter)	3271/3272 3274 (B adapter)
Direct System Attachment	N/A	4701/4321/ 4331	N/A N/A
Document Transfer with Host	No	Yes	Yes (3277 DE/DT only)
Alternate Task Capability	Yes	Yes	Yes
<b>Text/Data Functions:</b>			
Screen Save	Yes	Yes	No
Direct Print	Yes	Yes	No
Deferred Print	Yes	Yes	No
Compress Print	Yes	Yes	No
Modem Dependent (SNA/SDLC)	Yes	No	No
Control Unit Dependent (SNA/SDLC, BSC, NON-SNA)	No	Yes	Yes
<b>Memory Required (Textpack 4)</b>			
Alternate Task NOT Active	256K	256K	256K
Alternate Task Active	384K	384K	320K
<b>Memory Required (Textpack 6)</b>			
Alternate Task NOT Active	320K	320K	320K
Alternate Task Active	448K	448K	384K

PROGRAM PRODUCTS

**3270 Attached Workstation Program (cont'd)**

**3270 Features:** The 3270 Attached Workstation program supports most commonly used 3270 features and capabilities except for the following:

- Emulation of 3278 Display mdl 5
- Magnetic Stripe Readers
- Mono/Dual Case Switch
- Selector Pen
- 3274 Entry Assist Capability
- Certain 3278 keys:
  - Alternate Cursor
  - Click
  - Cursor Blink
  - Attribute select keys: Color, programmed symbols, extended highlighting
- Display of color, programmed symbols, and extended highlighting
- Certain 3287 Printer capabilities:
  - Mono/Dual case printer switches and indicators
  - Programmed symbols
  - SCS support for structured fields or attribute processing
  - X print error indication
  - Attribute-specified underscores
  - Test, Setup, and Index switches
  - Test, and CU signal lights

The 3270 Attached Workstation program supports only 3278 87-key EBCDIC Typewriter Keyboards. The Text, Data Entry, and APL keyboards and the following language-related keyboards are not supported:

- Brazilian/Portuguese
- Portuguese
- Finnish
- World Trade EBCDIC
- International
- Japan (English and Katakana)

Coaxial cable attachment to Port 0 on a 3274 Control Unit is not supported.

Refer to the *Displaywriter 3270 Emulation General Information Manual* (G544-2049), for additional information on the 3270 features supported, restrictions, and the 3270 features supported differently when using the Displaywriter 3270 Attached Workstation program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter 3270 Attached Workstation licensed program is designed to operate with IBM Displaywriter System configurations with the following components:

- IBM 6580 Display Station with the 3275/3276 Attached Workstation Adapter (feature #8332), with a minimum memory size as indicated below:

Memory Requirement/Program:	Textpack 4	Textpack 6
- Alternate Task NOT Active	256K bytes	320K bytes
- Alternate Task Active	384K bytes	448K bytes

Emulation of the IBM 3278 Display mdl 4 requires an IBM 6580 Display Station model with a Large Display.

- IBM 6360 Diskette Unit
- IBM 5218 or 5228 Printwheel Printer (required for IBM 3287 Printer emulation).

**Additional Hardware Considerations:** In a shared printer environment, the 3274/3276 Attached Workstation adapter may be installed in secondary workstations. The 3270 Attached Workstation program can execute local screen print and host system print by requesting the shared printer. The adapter can not be installed in the workstation(s) containing the printer sharing prerequisite (feature #7997).

The 3274/3276 Attached Workstation adapter may be installed in Displaywriter workstations (either 25-Line Display or Large Display models) with communications features (e.g., #3705 and #3707), but can not coexist with the 3277 Device Emulation RPQ (#8D0098).

Cables and/or associated parts to attach the Displaywriter to the 3274 Control Unit and the 3276 Control Unit/Display Station may be purchased from IBM or from customer-selected source. For proper identification, installation, and application of these cables and parts, see *IBM 3270 Installation Manual - Physical Planning* (GA27-2787). The customer is responsible for installation and maintenance of these cables and their associated parts.

For 3270 emulation of both the display and the printer, two coaxial cables must connect the Displaywriter to the terminal type A adapter of the selected control unit. Only one coaxial cable is needed if printer emulation is not required. When attaching Displaywriter to the IBM 4321/4331 Processors, the specify code #9842 must be ordered for the 4321/4331.

The following printwheels are available as supply items and will support the 3270 character set for use with the Displaywriter 3270 emulation programs:

	Courier 10	Artisan 10	Letter Gothic 12	Courier 15
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US EBCDIC (ID 101)	1439900	1439932	1439916	1314671
Spanish (ID 309)	1439915	1439947	1439931	1353357

See your IBM marketing representative for information regarding printwheels available to support the 3270 character set in other languages.

**SOFTWARE REQUIREMENTS**

The IBM 6580 Displaywriter 3270 Attached Workstation licensed program is designed to operate with IBM Displaywriter System Textpack 4 (5608-TR4) or Textpack 6 (5608-TR6).

The 3270 Attached Workstation licensed program can not be operated concurrently with any other Displaywriter communication programs.

**PERFORMANCE CONSIDERATIONS**

Since the capability to send pre-recorded information with Displaywriter permits a greater rate of information transmission than normal 3270 applications, operations involving document transfer applications may affect the performance of other devices attached to the same 3270 Control Unit. In addition, deferred print allows a higher transmission rate of host printout to the Displaywriter than to a 3287 Printer. This may also affect the performance of other devices attached to the same control unit. Contact your IBM Marketing Representative for additional details on performance implications concerning document transfer and deferred print.

Alternate Task provides concurrent text and 3270 emulation operations. Concurrent batch types of operations, such as pagination (a text operation), and document transfer (a 3270 operation), will increase the individual elapse time for each operation.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Displaywriter System General Information Manual* (G544-0851) ... *IBM Displaywriter System 3270 Emulation General Information Manual* (G544-2049) ... *IBM Displaywriter System 3270 Attached Workstation Host Attachment Programming Guide* (G544-2205) ... *IBM Displaywriter System 3270 Attached Workstation Licensed Program Operator's Guide* (S544-2202) ... *IBM Displaywriter System 3270 Attached Workstation Licensed Program Specifications* (G544-2207) ... *IBM Displaywriter System 3270 Attached Workstation Licensed Program Keyboard Templates* (S544-2203, 2364, and 2204).

RPQs ACCEPTED: No



PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM TEXTPACK E  
5608-TRE**

**PURPOSE**

The IBM 6580 Displaywriter System Textpack E program (5608-TRE) provides the functions for text processing and operator assistance.

**HIGHLIGHTS**

**Text Processing**

The Textpack E program provides for entry and revision of text. Printed output is also controlled by this program. The text processing functions are selected by the operator at a workstation through menus and control keys. For menu-supported tasks, the operator selects the proper menu, chooses the appropriate options from that menu, and then proceeds with the task. For control key-supported tasks, the operator presses the proper key and then proceeds with the task.

Text processing functions for a document can be divided into these basic activities:

- Creating
- Paginating
- Printing
- Revising or reviewing
- Duplicating a document onto another diskette or onto the same diskette
- Deleting a document
- Incidental typing using key-to-print.

**Operator Assistance**

The operator assistance functions control many repetitive actions and tasks of the Displaywriter System. Some areas of operator assistance are:

- Display aids that provide the workstation operator with helpful reference information such as menus and messages.
- Personalization that allows standard information, such as document formats, to be entered in the system one time for repetitive use by the operator.
- Work diskette tasks that allow the operator to:
  - Delete a document from a diskette.
  - Duplicate a document.
  - Change a document name or a diskette name.
  - Duplicate an entire diskette.
  - Print an index of a diskette's contents.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this program, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Textpack E program (5608-TRE) requires the following IBM components or equivalents:

- An IBM 6580 (25-line) Display Station or an IBM 6580 (66-line) Display Station including at least 128K memory, and a keyboard.
- An IBM 6360 Single or Dual Diskette Unit.
- An IBM 5215 Selectric® Element Printer or an IBM 5218 or 5228 Printwheel Printer or equivalent is recommended, but not required.

**SOFTWARE REQUIREMENTS**

Only this licensed program is required for the IBM 6580 Displaywriter System.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual for the IBM 6580 Displaywriter System (G544-0851).*

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM TEXTPACK 1  
5608-TR1**

*No longer available.*

**PURPOSE**

The IBM 6580 Displaywriter System Textpack 1 program (5608-TR1) is designed to operate on the IBM Displaywriter System. The Textpack 1 program provides for text entry, revision and a Spelling Verification Aid (English version programs only) through the use of a workstation. Printed output is also controlled by this program.

**HIGHLIGHTS**

Menus on the screen list operator choices to simplify task selection. The operator chooses a task and is presented with a menu from which to select options.

Examples of text processing tasks supported by the Displaywriter System Textpack 1 program are:

- Create a document
- Revise or review a document
- Print a document
- Paginate a document
- Delete a document
- Store documents on diskette
- Copy a document or a diskette

**Spelling Verification Aid For English Version Programs Only**

In addition to these tasks, a Spelling Verification Aid helps identify possible errors. The Spelling Verification Aid compares the words in a document to an IBM-provided dictionary containing approximately 50,000 words and to a customer-created supplemental dictionary unique to the customer's environment containing up to 4,500 words, for example, 450 ten-character words or 900 five-character words. Any word not found in either dictionary is highlighted on the display.

**Note:** The Spelling Verification Aid may occasionally verify a misspelled word which is formed from inappropriate combinations of root words, prefixes, and/or suffixes. For example, "destate", a combination of the prefix "de" and the root word "state", will not be highlighted.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of the Displaywriter System Textpack 1 program, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Textpack 1 program (5608-TR1) requires the following IBM components or equivalents:

- An IBM 6508-A01, 6508-A02, or 6508-A03 Electronics Module with a Keyboard Module and a Display Module
- An IBM 6360-010 or 6360-011 Diskette Unit

An IBM 5215 Selectric® Element Printer, an IBM 5218 Printwheel Printer, or equivalent device is recommended, but not required.

**SOFTWARE REQUIREMENTS**

No other program besides this licensed program is required to perform the listed text management and system operations on the IBM 6580 Displaywriter System.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM TEXTPACK 2  
5608-TR2****PURPOSE**

The IBM 6580 Displaywriter System Textpack 2 program is designed to operate on the IBM 6580 Displaywriter System. The Textpack 2 Program provides for text entry, revision, and a Spelling Verification Aid. Printed output is also controlled by this program.

**HIGHLIGHTS**

This program can be used on the display stations in any Displaywriter System that has one or more workstations (up to a maximum of three) sharing an IBM 5218 or 5228 Printwheel Printer. This program can also be used to support feature programs such as the Displaywriter System Asynchronous Communications program (5608-SR1), the Displaywriter System Binary Synchronous Communications program (5608-SR2), the Displaywriter System Magnetic Card Conversion program (5608-SR3), and the Displaywriter System Languagepack program (6508-SR4).

Menus on the screen list operator choices to help simplify task selection. The operator chooses a task and is presented with a menu from which to select options.

Examples of text processing tasks supported by the Displaywriter System Textpack 2 program:

- Create a document
- Revise or review a document
- Print a document
- Paginate a document
- Delete a document
- Store documents on diskette
- Copy a document or a diskette
- Display codes
- Key-to print

**Spelling Verification Aid**

In addition to these tasks, a Spelling Verification Aid helps identify possible spelling errors. The Spelling Verification Aid compares the words in a document to an IBM-provided dictionary containing approximately 50,000 words (English language version) and to a customer-created supplemental dictionary unique to the customer containing up to 4,500 characters, for example, 450 ten-character words or 900 five-character words. Any word not found in either dictionary is highlighted on the display.

**Note:** The Spelling Verification Aid may occasionally verify a misspelled word which is formed from inappropriate combinations of root words, prefixes, and/or suffixes. For example, "destate", a combination of the prefix "de" and the root word "state", will not be highlighted.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of Displaywriter programs, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Textpack 2 program (5608-TR2) requires the following IBM components or equivalents:

- An IBM 6580 Electronics Module with at least 192K or above memory, 2 Keyboard Modules and a 25-line Display Module.
- An IBM 6360-010, 6360-011, 6360-020, or 6360-022 Diskette Unit.
- A Printer Sharing Prerequisite (a logic card placed in one display station in a shared environment to designate printer control) is necessary for any IBM 6580 Displaywriter System with a shared printwheel printer.

An IBM 5215 Selectric® Element Printer, an IBM 5218 Printwheel Printer, or equivalent device is recommended, but not required.

**SOFTWARE REQUIREMENTS**

No other program besides this licensed program is required in order to perform the listed text management and system operations on the IBM 6580 Displaywriter System.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**6580 DISPLAYWRITER SYSTEM TEXTPACK 3  
5608-TR3**

*No longer available.*

**PURPOSE**

The IBM 6580 Displaywriter Textpack 3 program (5608-TR3) provides for text processing, a spelling function verification aid, and statistical typing.

**HIGHLIGHTS**

This program can be used on an IBM 6580 Displaywriter System that has one to three workstations sharing an IBM 5218 Printwheel Printer, as well as on an IBM Displaywriter System with an IBM Selectric® Element Printer. This program can support the following Displaywriter System licensed programs:

- Asynchronous Communications program (5608-SR1)
- Binary Synchronous Communications program (5608-SR2)
- Magnetic Card Conversion program (5608-SR3)
- Languagepack program (5608-SR4)

**Text Processing**

The Textpack 3 program supports the entry, revision, and printing of text. The text processing functions are selected at the workstation through menus and control keys. For menu-supported tasks, the operator selects the proper menu, chooses and enters the appropriate options from that menu, and then proceeds with the task. For control key-supported tasks, the operator presses the proper key and then proceeds with the task.

Text processing functions supported by the Textpack 3 program include:

- Creating, paginating, and printing documents, including
  - Merge processing for the preparation of repetitive documents
  - Alternating headers and footers
- Revising or reviewing a document, including
  - Global replace/delete
  - Block overstrike
- Duplicating a document or a diskette
- Deleting a document

**Spelling Verification Aid**

After a document is typed or revised, the spelling verification aid helps check for possible spelling errors. The spelling verification aid compares the words in a document to:

- An IBM-provided dictionary capable of checking approximately 50,000 words.
- A customer-created supplemental dictionary unique to the customer's environment containing up to 4,500 characters, for example, 450 ten-character words or 900 five-character words.

Any word not found in either dictionary is highlighted on the display. The operator can then correct the misspelled words and cancel the highlighting on unrecognized but correct words (a proper name, for example).

**Note:** The spelling verification aid may occasionally verify a misspelled word which is formed from inappropriate combinations of root words, prefixes, and/or suffixes. For example, "destate", a combination of the prefix "de" and the root word "state", will not be highlighted.

**Statistical Typing**

In addition to the text functions, Textpack 3 offers statistical typing functions. These include:

- Column processing functions, which include column layout, column revision, column delete, column move, and column copy
- Four-function math, which allows the operator to add or subtract rows or columns of numbers or constants that have been typed on the Displaywriter System. The result can be displayed or inserted in the text.
- Four-function math, which allows the operator to multiply or divide numbers or constants that have been typed on the Displaywriter System. The results can be displayed or inserted in the text.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of Displaywriter programs, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Textpack 3 Program (5608-TR3) requires the following IBM components or equivalents:

- An IBM Electronics Module with a 224K or above memory, a Keyboard Module, and a Display Module.
- An IBM 6360 Single or Dual Diskette Unit.

An IBM 5215 Selectric® Element Printer, an IBM 5218 Printwheel Printer, or equivalent device is recommended but not required. (A Printer Sharing prerequisite, a logic card placed in a display station to designate printer control in a shared configuration, is necessary for any IBM 6580 Displaywriter System with a shared printwheel printer.)

**SOFTWARE REQUIREMENTS**

Only this licensed program is required for the IBM 6580 Displaywriter System.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM TEXTPACK 4  
5608-TR4****PURPOSE**

The IBM 6580 Displaywriter System Textpack 4 program (5608-TR4) provides functions for text processing, a spelling verification aid, statistical typing, and records instructions [used with the IBM Displaywriter Reportpack program (5608-SR5)].

**HIGHLIGHTS**

This program can be used on a Displaywriter System that has one to three workstations sharing an IBM Printwheel Printer, as well as on a Displaywriter System with an IBM Selectric® Element Printer. This program can support the following Displaywriter System licensed programs:

- Asynchronous Communications program (5608-SR1)
- Binary Synchronous Communications program (5608-SR2)
- Magnetic Card Conversion program (5608-SR3)
- Reportpack program (5608-SR5)
- 3270 Data Stream Compatibility program (5608-SR6)
- Languagepack 2 program (5608-SR7)

**Text Processing**

The Textpack 4 program supports the entry, revision, and printing of text. The text processing functions are selected at the workstations through menus and control keys. For menu-supported tasks, the operator selects the proper menu, chooses and enters the appropriate options from that menu, and then proceeds with the task. For control key-supported tasks, the operator presses the proper key and then proceeds with the task.

Text processing functions supported by the Textpack 4 program include:

- Creating, paginating, and printing documents, including
  - Merge processing for the preparation of repetitive documents
  - Merging files/text for the preparation of documents that include information from a file (created using Reportpack)
  - Alternating headers and footers
- Revising or reviewing a document, including
  - Global replace/delete
  - Block overstrike
- Duplicating a document or a diskette
- Deleting a document

**Spelling Verification Aid**

After a document is typed or revised, the spelling verification aid helps check for possible spelling errors. The spelling verification aid compares the words in a document to:

- An IBM-provided dictionary capable of checking approximately 50,000 words.
- A customer-created supplemental dictionary unique to the customer's environment containing up to 4,500 characters, for example, 450 ten-character or 900 five-character words.

After creating or revising a document, the operator can choose to do a spelling check, make hyphenation decisions, and have the document paginated and printed in one operation. As part of this task, the operator can choose to do a prompted spelling check. Any word not found in either dictionary is highlighted on the display. Some of the text surrounding it is also shown. The operator can either indicate that the word is acceptable or correct the misspelled word by typing it correctly on the prompt line on the display. The newly typed word is checked immediately. If it is found in either dictionary, the newly typed word replaces the highlighted word in the text. If it also is not found in either dictionary, the operator is alerted to try another possible spelling.

As a part of the pagination of a document, the lines of text are adjusted to fit within the right margin. If there is a word that crosses the right margin, a hyphenation decision is necessary. There are two methods of making a hyphenation decision:

1. The operator can choose to have the system prompt when a hyphenation decision is necessary. Then the operator is shown the word to be hyphenated. Some of the text surrounding that word is also shown. The operator can then hyphenate the word, move the entire word to the next line, or leave the entire word on the line it is on.
2. The operator can also choose automatic hyphenation. In this mode, the Displaywriter System will automatically hyphenate a word that crosses the right margin or will move the entire word to the next line. It uses information from the spelling dictionary to determine the hyphenation points within a word.

During the spelling check, hyphenate, and paginate operation, the document can be trail printed.

**Note:** The spelling verification aid may occasionally verify a misspelled word such as one formed from inappropriate combinations or root words, prefixes, and/or suffixes. For example, "destate", a combination of the prefix "de" and the root word "state", will not be highlighted.

**Statistical Typing**

In addition to the text function, Textpack 4 offers statistical typing functions. These include:

- Column processing functions, which are column layout, column revision, column delete, column move, and column copy.
- Four-function math, which allows the operator to add or subtract rows or columns of numbers or constants that have been typed on the Displaywriter System. The results can be displayed or inserted in the text.
- The operator can add a row or column of numbers by simply pressing a typamatic row add key or column add key.
- Four-function math, which allows the operator to multiply or divide numbers or constants that have been typed on the Displaywriter System. The results can be displayed or inserted in the text.
- The number or items added or subtracted in a row or column is displayed for the operator, as is the total of the math calculations. If an average is needed, the operator can use the system to automatically compute the average by dividing the number in the total by the number of items.
- The math function can also be used to automatically calculate percentages and to add, subtract, multiply, or divide a percentage of a number from that number.

**Records Instructions**

Records instructions support the Merge File/Text capability of the Displaywriter System Reportpack Program (5608-SR5). The records instructions are used in shell documents created using Textpack 4. The records instructions, which are selected by the operator, are:

- Control what information from a file, created using Reportpack, is merged into a shell document.
- Allow the operator to set up arithmetic calculations using numbers from a file and/or constant numbers. The results can be inserted into the text or used as a part of a group total or average.

**Combined Program Diskette**

Textpack 4 includes the ability for the operator to create a combined program diskette. This capability permits the operator to combine the Textpack 4 program diskettes and at least one feature program diskette, or one of the eleven languages from Languagepack 2, onto a 2D diskette. The feature programs are:

- Reportpack
- Asynchronous Communications
- Binary Synchronous Communications
- Mag Card Conversion
- 3270 Data Stream Compatibility

Any remaining space on the combined program diskette can be used for customer data. The amount of space remaining may be reduced or eliminated by software maintenance updates.

Use of this facility requires either an IBM 6360-020 or 6360-022 Diskette Unit (both use IBM Displaywriter diskettes 1 and 2D).

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this program, as well as applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Textpack 4 program (5608-TR4) requires the following IBM components or equivalents:

- An IBM 6580 Electronics Module with 256K or above memory, a Keyboard Module, and a 25-line Display Module.
- An IBM 6360 Single or Dual Diskette Unit.

An IBM 5215 Selectric® Element Printer, an IBM 5218 or IBM 5228 Printwheel Printer, or equivalent is recommended, but not required. (A Printer Sharing prerequisite, a logic card placed in a display station to designate printer control in a shared configuration, is necessary for any IBM 6580 Displaywriter System with a shared printwheel printer.)

**Textpack 4 (cont'd)****SOFTWARE REQUIREMENTS**

No other licensed program is required as a prerequisite for using Textpack 4 program (5608-TR4) with the IBM 6580 Displaywriter System.

The IBM 6580 Displaywriter System Reportpack program (5608-SR5) is required to enter and revise the files used with records instructions.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**6580 DISPLAYWRITER SYSTEM TEXTPACK 6  
5608-TR6**

**PURPOSE**

The 6580 Displaywriter System Textpack 6 program provides functions for text processing, operator assistance, a spelling verification aid, statistical typing, automatic footnote processing, automatic outlining, automatic column reference/column heading display, key-to-print, menu bypass enhancement, keystroke storage, recall, editing, an extended spelling dictionary and records instructions.

**HIGHLIGHTS**

This program can be used on a Displaywriter System that has one to three workstations sharing a 5218 or 5228 Printwheel Printer, as well as a standalone Displaywriter System with a Selectric® Element Printer. This program supports the following Displaywriter System licensed programs:

- Asynchronous Communications program (5608-SR1)
- Binary Synchronous Communications program (5608-SR2)
- Magnetic Card Conversion program (5608-SR3)
- Reportpack program (5608-SR5)
- 3270 Data Stream Compatibility program (5608-SR6)
- Languagepack 2 program (5608-SR7)
- Electronic Document Distribution program (5608-SR8)
- 3270 Attached Workstation program (5608-SR9)
- Chartpack (5608-SRA)
- Extended Spelling Dictionary - Legal (5608-SRB)

**Text Processing**

The Textpack 6 program supports the entry, revision, and printing of text. The text processing functions are selected at the workstation through menus and control keys. For menu-supported tasks, the operator selects the proper menu, chooses and enters the appropriate options from that menu, and then proceeds with the task. For control key-supported tasks, the operator presses the proper key and then proceeds with the task.

Text processing functions supported by the Textpack 6 Program include:

- Creating, paginating, and printing documents, including
  - Merge processing for the preparation of repetitive documents
  - Alternating headers and footers
  - Delete a document from a diskette
  - Duplicate a document
  - Change a document name or a diskette name
  - Duplicate an entire diskette
  - Erase or initialize (name a diskette)
  - Print an index of a diskette's contents
- Revising or reviewing a document, including
  - Global replace/delete
  - Block overstrike
- Duplicating a document or diskette
- Deleting a document
- Incidental typing using key-to-print

**Operator Assistance**

The operator assistance functions control many repetitive actions and tasks of the Displaywriter System. Some areas of operator assistance are:

- Display aids that provide the workstation operator with helpful reference information such as menus and messages.
- Personalization that allows standard information, such as document formats, to be entered in the system one time for repetitive use by the operator.

**Spelling Verification Aid**

After a document is typed or revised, the spelling verification aid, using either the standard or the extended dictionary, helps check for possible errors. The spelling verification aid compares the words in a document to:

- An IBM-supplied standard dictionary consisting of approximately 50,000 words or, if selected by the user, an IBM-supplied extended dictionary of approximately 100,000 words.
- A user-created supplemental dictionary unique to the user's environment. Maximum size of supplement is: 4,500 characters if the standard dictionary is used and 16,000 characters if the extended dictionary is used.

After creating or revising a document, the operator can choose to do a spelling check, make hyphenation decisions, and have the document paginated and printed in one operation. As part of this task, the operator can choose to do:

- A prompted spelling check. Any word not found in either dictionary is highlighted on the display. Some of the text surrounding it is also shown. The operator can either indicate that the word is acceptable or correct the misspelled word by typing it correctly on the prompt line on the display. The newly typed word is checked immediately. If it is spelled correctly, it replaces the highlighted word in the text. If it also is incorrect, the operator is alerted to try another possible spelling.
- As a part of the pagination of a document, the lines of text are adjusted to fit within the right margin. When a word crosses the right margin, a hyphenation decision is necessary. There are two ways to make this decision:

1. The operator can choose to have the system prompt when a hyphenation decision is necessary. Then the operator is shown the word to be hyphenated. Some of the text surrounding that word is also shown. The operator can then hyphenate the word, move the entire word to the next line, or leave the entire word on the line it is on.
2. The operator can also choose automatic hyphenation. In this mode, the Displaywriter System automatically hyphenates any word that crosses the right margin. It uses information from the spelling dictionary to determine the hyphenation points within a word.

During the spelling check, hyphenate, and paginate operation, the document can be trail printed.

**Note:** If the standard dictionary is selected by the user, the spelling verification aid may occasionally verify a misspelled word formed from inappropriate combinations of root words, prefixes, and/or suffixes. For example, 'destate', a combination of the prefix 'de' and the root word 'state', will not be highlighted. The Extended Spelling Dictionary will only verify as correct those words that are included in the IBM-supplied dictionary or the user-created dictionary.

**Extended Spelling Dictionary**

Extended Spelling Dictionary helps the Displaywriter operator correct misspelled words. Specialized dictionary and search techniques are used to present on the display a list of likely candidate words. The operator may select a word from the list to replace a misspelled word when found by the Spelling Verification Aid. This capability is available in the Check Document Task when the promoted spelling option has been selected. Extended Spelling Dictionary will be available in English US and English UK languages only. Both the IBM-supplied extended dictionary and the user-created supplemental dictionary are used to provide candidate words.

**Statistical Typing**

In addition to the text function, Textpack 6 offers statistical typing functions. These include:

- Column processing functions, which are column layout, column revision, column delete, column insert, column move, and column copy.
- Four-function math, which allows the operator to add or subtract rows or columns of numbers or constants that have been typed on the Displaywriter System. The operator also can multiply or divide numbers or constants that have been typed on the Displaywriter System. The results can be displayed or inserted in the text.
- The operator can add a row or column of numbers by simply pressing a typematic row add key or column add key. The system continues to add the numbers in a row or column until the key is released.
- The number of items added or subtracted in a row or column is displayed for the operator, as is the total of the math calculation. If an average is needed, the system automatically computes the average by dividing the number in the total by the number of items.

**Textpack 6 (cont'd)**

- The math function can also be used to calculate percentages automatically and to add, subtract, multiply, or divide a percentage of a number from that number.

**Automatic Footnote Processing**

Textpack 6 offers the ability to type footnotes. The process includes:

- Automatic renumber
- Automatic tie-in
- Automatic placement/repagination
- Spill across pages

The final results will be a formatted and paginated document which can be printed by any other Textpack program.

**Automatic Outline/Section Numbering**

The feature allows sections of a document to be numbered/renumbered automatically in several different ways, including:

- Upper and lowercase Roman Numerals
- Upper and lowercase alphabetic
- Integer and decimal numerals

Each section level may be indented as desired. The leading and trailing text may be automatically supplied with the outline or section number. The final results will be a formatted and paginated document which can be printed by any other Textpack program.

**Automatic Column Reference And Heading Display**

Textpack 6 supports this feature as a means of enhancing the creation and revision capability for statistical applications. When an operator wishes to revise or type a table containing multiple columns, the Displaywriter System can automatically display a single column with that column's heading and the first column of the table for reference purposes.

**Keystroke Store, Recall, and Editing**

This enhancement provides the ability to store on diskette a series of keystrokes (characters, controls, commands, etc.) known to be used repetitively, to recall them, and to have the keystrokes executed by pressing a single key. The program is captured as the keystrokes are executed and may be altered in a single step mode.

**Key-to-Print**

Key-to-print is an operator-selectable task which provides for incidental typing and interactive forms fill-in support, like using a typewriter. This task can be invoked from the Task Selection menu and interrupts the printer at a page boundary if the job is being printed when key-to-print is requested. The suspended print job is resumed when key-to-print is ended. The keyed text is neither displayed nor stored on a diskette while in key-to-print mode.

**Records Instructions**

Records instructions support the Merge File/Text capability of 6580 Displaywriter System Reportpack program (5608-SR5). The records instructions are used in shell documents created using Textpack 6. The records instructions:

- Control what information from a file, created using Reportpack, is merged into a shell document.
- Allow the operator to set up arithmetic calculations using numbers from a file and/or constant numbers. The results can be inserted into the text or used as a part of a group total or average.

**Combined Program Diskette**

Textpack 4 includes the ability for the operator to create a combined program diskette. This capability permits the operator to combine the Textpack 4 program diskettes and at least one feature program diskette, or one of the eleven languages from Languagepack 2, onto a 2D diskette. The feature programs are:

- Reportpack
- Asynchronous Communications
- Binary Synchronous Communications
- Mag Card Conversion
- 3270 Data Stream Compatibility

Any remaining space on the combined program diskette can be used for customer data. The amount of space remaining may be reduced or eliminated by software maintenance updates.

Use of this facility requires either an IBM 6360-020 or 6360-022 Diskette Unit (both use IBM Displaywriter diskettes 1 and 2D).

**Multipass Equation Printing**

Multipass equation printing on the 5218/5228 Printers provides an optional procedure for printing documents which require multiple printwheel changes. The document can be printed in multiple passes using a different printwheel on each pass. A list of the specified printwheels (up to twelve) for any document and the range of pages on which each printwheel is used can also be printed.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this program, as well as the applicable problem determination activities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM 6580 Displaywriter System Textpack 6 program (5608-TR6) requires the following IBM components or equivalents:

- An IBM Electronics Module with 320K or above memory, a Keyboard Module, and a Display Module (25-line or 66-line).
- An IBM 6360 Single or Dual Diskette Unit.

An IBM 5215 Selectric® Element Printer, an IBM 5218 or 5228 Printwheel Printer, or its equivalent is recommended, but not required. (A printer-sharing prerequisite, a logic card placed in a display station to designate printer control in a shared configuration, is necessary for any IBM Displaywriter System with a shared printwheel printer.)

**SOFTWARE REQUIREMENTS**

Only this IBM licensed program, Textpack 6 (5608-TR6), is required for the IBM 6580 Displaywriter System. The IBM 6580 Displaywriter System Reportpack program (5608-SR5) is required to enter and revise the files used with records instructions.

RPQs ACCEPTED: No

## 5520 ADMINISTRATIVE PROCESSING PROGRAM 5611-SS1

### PURPOSE

The 5520 Administrative Processing Program provides support to relieve the user of any programming requirement on the 5525 mdls 20, 30, 40 and 50.

### HIGHLIGHTS

- Text processing
- Electronic document distribution
- Files processing\*\* and stored procedures\*\*
- System Services (including system management)

### DESCRIPTION

#### Text processing

- Display scale line showing margins, tabs, columns, paper edge and shadow cursor
- Vertical scrolling and horizontal segmenting to review all parts of a stored page
- Functions to create, revise, delete, duplicate, print, store, archive, retrieve, and change profile of documents
- Text manipulation facilitated by:
  - Block movement of text and/or columns with nine save areas per operator
  - Stored formats
  - Auto carrier return
  - Inclusion of margin text (headers and footers)
  - Date, document name and page symbols (margin text)
  - Paragraph adjust
  - Background or interactive paginate functions
  - Background or interactive global functions
- Statistical typing facilitated via:
  - Automatic column alignment (decimal, right, left, center)
  - Column exceptions
  - Column manipulation
  - 'Keep' function (to avoid splitting over page boundary)
  - 'Skip' lines (to reserve space for drawings, etc.)
  - 'Skip to' (for forms fill-in)
- Repetitive document preparation (standard letters, etc.) facilitated via:
  - Document sharing (read or revise)
  - Use of 'instruction symbols' (for later expansion into phrases or long names)
  - Assembly of letters from stored paragraphs
  - Interactive keying of variables with personalized prompts to stored letters or documents
  - Background merging of stored paragraphs and variables
- Scientific report writing facilitated by the support of Greek alphabet and other symbols\*\*\*
- Access to documents in a System/370 data base (requires user programming and appropriate IBM licensed programming support)
- Security Support
  - Operator ID plus selective password check on sign-on
  - Selective designations of 'private' or 'shared-read' for documents

#### Files Processing\*\*

In the descriptions that follow, files should be regarded as groups of like records, each record containing user-described 'fields' of information such as the name, department, and telephone number entries in an internal phone directory. From the user's standpoint, a file is a special (structured) form of a document on which the files processing functions may act.

Some of these functions act either on all records within a file or, at the user's option, on selected records only; that is, on only those qualifying records meeting user-defined criteria.

The files themselves are stored on the 5525 and all files processing functions are invoked by the operator at a 5253 or 5254 Display Station.

#### File Characteristics

Record length may be up to 1000 characters to include:

- Character fields: 1-80 alpha, numeric or special characters
- Arithmetic fields: 1-15 digits plus sign and decimal indicator

\*\* Denotes availability of the function(s) with 5611-SS1 Release 3 only.

\*\*\* See Note 5 following "Service Aids".

† See Note 1 following "Service Aids".

- Up to two text field identifiers (of 16 characters each) that link to associated text fields, each text field containing up to 500 characters (including control characters)

A file is a special form of a document that can be:

- Protected by allowing private, shared-read, shared-revise access
- Archived to/retrieved from diskette
- Distributed (as a document)

File sequence is defined by up to six fields, up to 100 characters maximum (ascending or descending) and may provide direct access to the file by optional unique index field

Record selection (where indicated) may also be based on up to 12 qualifiers. Each qualifier compares field content (or its arithmetic/character derivation) to a constant, a list, a range, or another field/expression

#### File Organization

Files can be:

- Created directly by keying through a 5253/5254 Display Station
- Acquired from a host System/370 (with appropriate programming support)
- Obtained as a document from any remote device on a 5520 Administrative System document distribution network (see "Electronic Document Distribution Communications Support" later in this text)

A convert function is also provided to change the format of many list documents into the 5520 file format for further processing. These lists may have been created locally in a 5520 System or remotely in the document distribution network.

#### File Creation (on the 5253/5254 Display Station)

- Tabular format designed for straightforward list entry
- Field prompting format designed for more comprehensive checking or operator training on more involved files.

- Prompts and/or field names
- Designation of fields as text, character, or arithmetic
- Field level edit-checking which includes minimum length, maximum length, range check, list check, character compare mask, and unique entry
- Field entry may be required, optional, or conditioned by a prior field in the record

- File maintained in sequence (by sequence field content) irrespective of sequence of creation
- Compatible records may be merged in from another file on the system

#### Delete Records (by qualifiers)

- Selected records eliminated (after optional operator verification) to free up storage space

#### Query File

- Display of individual record content on 5253/5254 screen
- Direct access via sequence field or via optional unique index field
- Repeated query to ascending/descending records via sequence field
- Optional file 'lock' (to prevent alteration) during query operation

#### Display/List File (directly or by qualifiers)

- Sequential search for one or multiple records meeting described selection criteria
- Qualifying records may be displayed or stored in the 5525 as a document for further processing such as printing

#### Update File

- Records added, changed, or deleted (directly or by qualifiers)
- Optional printout of proof list for all types of alterations
- Added records automatically inserted in correct position within the sequence
- Same checks and messages on fields/characters as for File Creation

#### Copy Records (directly or by qualifiers)

- Reproduce file; with user choice of new index if desired
- Resequencing of entire file or of selected records
- Merge an entire file (or selected subset) with a second file
- Create a subset file of selected records

#### Duplicate File

- Reproduce file (for temporary use)

#### List File (directly or by qualifiers)

- Background search of file for multiple records meeting selection criteria
- Creates a text document for later viewing, printing, etc.

**5520 Administrative Processing Program (cont'd)**

- Counts the number of records selected
- Merge File/Text
  - User-specified document 'template' controls repetitive variable inserts from records
  - User-specified report 'template' controls summarized input from records
  - Document and report templates can be used at the same time
  - Information can be:
    - Extracted from single file or
    - Additionally, at user choice, extracted from a parallel file linked by a common field (two files processed concurrently)
  - Record information can be extracted from:
    - All records or
    - Selected records (by qualifiers)
  - Record information can be included:
    - As is, or
    - After arithmetic operations on single or multiple fields and/or
    - After editing with decimals/currency/sign indicators, etc.
  - Embedded instructions available to the operator are designed to enable such operations as:
    - Conditional insertion of variables and paragraphs
    - Accumulating multi-level totals
    - Skipping to a given line number (for example, for forms fill-in)
  - File/text output can be:
    - Printed and/or
    - Stored (for display or later use)
  - File update (where permitted)

**Stored Procedures\*\***

- Operator-created by linking and storing file processing functions via menu-selection
- May contain:
  - Open parameters to be completed by operator
  - Closed parameters completed beforehand and used for each execution of this procedure
- Executed as a single task in the prescribed sequence of steps while file(s) employed are locked for procedure duration

**Electronic Document Distribution**

**Functions**

- Distribution addressing:
  - Multiple individual destinations
  - Distribution list
  - Combination of the two
- Scheduling of delivery (transmission):
  - Priority (by sender)
  - On request (by receiving system operator)
  - Normal (automatic batching) based on:
    - Time of day (up to 3 times per day)
    - Number of documents (economic quantity)
    - Combination of the two
- Document receipt alternatives
  - Print (with deletion from storage)
  - Copy to online library (for further use)
  - Print and copy to library (for example, further copies required)
  - Cancel (after viewing at display, implies receipt)
- Addressee options
  - Destination group (for example, a secretary is authorized to receive documents for members of a department)
  - Addressee only (personal); may be combined with password
- Delivery advice
  - List of documents waiting, on request
  - Message if 'personal' documents waiting
- Confirmation of receipt at final destination if requested by sender
- Security Support
  - Device ID interchange (both BSC and SDLC)
  - Selective operator password sign-on check
  - 'Personal' documents may be restricted by addressee password

**Communications Support:** (in conjunction with the 5520 Administrative System with requisite hardware features)

- Distribute/Receive documents between 5520s (SNA/SDLC)
- Distribute documents to or receive documents from the following devices (with appropriate features)
  - An Office System 6 (BSC)††
  - A Displaywriter System (BSC)††
  - A Mag Card II Typewriter (BSC)††
  - A 6240 Communicating Mag Card Typewriter (BSC)††
  - A 6640 Document Printer (BSC)††
  - A 6670 Information Distributor (BSC)††
  - A System/32 with Word Processing Feature #6002 plus appropriate hardware and programming
  - A System/370 (with user programming and ACF/VTAM or ACF/TCAM) (SNA/SDLC)†
  - A System/370 (with user programming and ACF/TCAM) (BSC)†\*\*
- Use of the System/370 as a store-and-forward node in a 5520 distribution network (requires user programming and ACF/VTAM or ACF/TCAM Version 2 Release 1 or 2††† (SNA/SDLC)†)
- Option for auto-call (auto-answer is standard choice)
- Call-in device list (for control of traffic on switched line)
- Call-out line list (for optimum use of available lines)
- Retry option with number of times and intervals

**Production Statistics (when selected by the user)**

- Automatic recording of statistics as they occur by:
  - Text document access and type
  - Distribution connect time and volume
- Reports printable on request by:
  - Document charge number
  - Operator charge number
  - Document distribution
  - Destination
- Report convertible to a file for subsequent processing

**System Services (including systems management) via:**

- User-created profiles (descriptions), changeable as needs develop
  - System components (configuration)
  - Operators (type, authority, etc.)
  - Documents (including files\*\*)
- System resource sharing and usage measurements
- Error checking, retry, and recording
- Program maintenance facilities

The following facilities are also provided:

**Task initiation and control**

- Menu approach to initiate tasks (with menu bypass)
- Online interactive HELP facilities to guide and assist the operator in many areas on request
- Display/List job status available at all times
- Automatic facilities for print queue management (via set-ups)
- Print queue management override for exceptional situations
- Print, archive/retrieve in background
- Operator messages, immediate or queued as appropriate
- Special 'Device Service' messages to alert the operator to required actions (for example, the replenishment of a printer with paper)
- Broadcast messages to all or selected operators
- Defaults at system, operator, and document level for the more common user-defined procedures and standards

**Installation Aids:** To install the licensed program, the user (with guidance via a display station) establishes the system program library, describes required I/O device definitions and authorized users, and starts the

\*\* Denotes availability of the function(s) with 5611-SS1 Release 3 only.  
 † See Note 1.  
 †† See Notes 2 and 3 for limitations.  
 ††† or later releases. This does not imply that such later releases will occur.

## 5520 Administrative Processing Program (cont'd)

program. The system is ready for use at this point but the user may wish to do some additional system personalization such as:

- Describing additional I/O devices
- Defining additional authorized users
- Modifying the supplied default parameters

This additional system personalization can be done any time.

**System Resource Management:** Under control of the licensed program, the system processes the job requests, acquires system resources for the jobs, executes the jobs and terminates the jobs. The system manages disk space allocation and controls the contention resulting from multiple jobs competing concurrently for system resources. In order to accomplish this, it manages the scheduling and queuing necessary to share the system resources among all jobs.

**Archive and Retrieve Facility:** The archive and retrieve facility provides the following functions via the system compact diskette drive supporting Diskette 2D:

- Archive/retrieve repetitive documents (including files\*\*)
- Provide backup for the document library (including files\*\*)
- Keep seldom used or sensitive information offline
- Provide authorized data exchange between 5520 Administrative Systems including documents and profiles so that, for example, one 5520 system may be personalized on another (with equal or higher model number or the 5525).

**I/O Management:** The program supports the following locally attached devices:

- 5253 Display Station
- 5254 Dual Display Station
- 5258 Printer
- 6670 Information Distributor (SDLC) (see note 6)
- 5321 Mag Card Unit (see note 4)
- 5219 Printer

**Service Aids:** This program contains system level diagnostic function designed to assist with concurrent maintenance of a 5253, 5254, and 5257, 5219 or a 5258 attached to the 5525, while the customer continues to use other parts of the system. Absence of these diagnostic functions (or their full equivalent) will result in reduced system availability to the user.

**Note 1:** In communicating with a System/370 the following interface rules apply:

- The 5525 System Unit (with SNA/SDLC) is supported by ACF/VTAM or ACF/TCAM Version 2, Release 1 or Release 2†††, as an LU Type 1.
- The 5525 System Unit (with BSC)\*\* is supported by ACF/TCAM Version 2, Release 1 or Release 2††† as a 2770-like device.
- Access to CICS/VS 1.4 Subsystem (SNA/SDLC) is via the supported levels of ACF/VTAM and ACF/TCAM LU-to-LU facilities. The 5525 will be supported as a 3790 full function LU, Type O.
- Access to CICS/VS 1.4 Subsystem (BSC)\*\* is via the supported levels of ACF/TCAM, BTAM, or BTAM-ES, where the 5525 is supported as a 2770-like device.
- Access to IMS V1 R1.5††† Subsystem (SNA/SDLC) is via the supported levels of ACF/VTAM and ACF/TCAM LU-to-LU facilities. The 5525 will be supported as an LU, Type P.

**Note 2:** For communications with remote devices and also the reading or writing of mag cards in the 5321, the following U.S. and country keyboard I.D.s are supported: 1, 2, 3, 4, 5, 6, 7, 8, 17, 19, 24, 25, 26, 28, 29, 31, 32, 33, 36, 37, 38, 39, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 66, 67, 80, 100, 101, 103, 251, 252, 253, and 254. In the same environment, format feature protocols (as optionally used on the Mag Card II typewriter and also other IBM devices) are supported.

**Note 3:** Documents prepared on BSC-supported devices, such as members of the OS/6 family, may contain formatting and other control codes (OCL). These are not recognized by the 5520 Administrative Processing Program. Where Document Distribution is between like devices, document content including OCL (formatting and other control codes) is transmitted transparently. However, for distribution with one of these devices, to or from a 5253 or 5254 Display Station, additional operator intervention may be necessary and special procedures implemented.

**Note 4:** The 5321 Mag Card Unit is used for reading and/or recording of Mag Cards, with limitations. These limitations relate to the use of Operator Control Language Statements which, when read, are treated as text by the 5520 Administrative Processing Program. Also, if OCL statements are required on mag cards prepared on the 5321, they must be inserted by the operator. Writing to mag card is in 'page image' format. This is suitable for printing on mag card devices only and not for further editing.

**Note 5:** Symbol character support is only available in conjunction with SNA/SDLC protocols. Documents containing symbols may be distributed within a single 5525, or to or from another 5525, for printing on a 5258, a 6670 used as an output printer, or possibly 5219 or 5257 Printers as appropriate; or to or from a host System/370 (appropriately programmed) using SNA/SDLC communications.

**Note 6:** 6670 Information Distributor may be used as a printer locally attached by an LDC line. Printer support is also provided for a remotely located 6670 Information Distributor (SDLC) attached by a nonswitched SDLC communications line. Similar support for locally or remotely attached 6670 Mdl IIs will also be provided. Contact IBM for hardware schedules.

### CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI section of the sales manual, in the installation of IBM licensed programs. However, the responsibility of providing accurate ordering information, personnel selection and training, and continued day-to-day operations lies solely with the customer. Installation of the IBM 5520 Administration Processing Program, all subsequent releases and Program Temporary Fixes (PTFs) are the customer's responsibility.

Customers should be reminded that they are responsible for conforming the use of the system to applicable statutes or regulations relating to the distribution of information both in their own country and also to, from or between other countries.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The minimum system configuration is:

- IBM 5525 mdl 20, 30, 40, or 50
- 1 - IBM 5253 or 5254 Display Station located in the same room as, and within 6.1 cable meters (20 cable feet) of, the 5525 System Unit.

**SOFTWARE REQUIREMENTS:** None.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Licensed Program Design Objectives* (GC23-0734).

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

5611-SS2 - 5520 ADMINISTRATIVE PROCESSING V2

PURPOSE

The 5520 Administrative Processing Program Release 2 and Release 3 provides support for the 5525 mds 21, 31, 32, and 51, without the requirement of any user programming on the 5525.

HIGHLIGHTS

- Text processing
- Files processing and stored procedures
- Electronic document distribution and interchange
- Electronic message distribution
- 3270 Emulation
- DISOSS/370 user interfaces
- System Services (including system management)

DESCRIPTION

Text Processing

- Display scale line showing margins, tabs, columns, paper edge, and shadow cursor
- Vertical scrolling and horizontal segmenting to review all parts of a stored page
- Functions to create, display, revise, delete, duplicate, print, store, archive, retrieve, and change profile of documents
- Text manipulation facilitated by:
  - Block movement of text and/or columns with nine save areas per operator
  - Stored formats
  - Auto-carrier return
  - Directional and contextual cursor movement
  - Replace and/or insert mode
  - Inclusion of margin text (headers and footers)
  - Date, document name and page symbols (margin text)
  - Line numbering
  - Paragraph adjust and join/split page functions
  - Background or interactive paginate functions
  - Background or interactive global functions
- Dictionary Services:
  - System-supplied English, Medical and Legal Dictionaries
  - Users may add supplemental lists for special words
  - Automatic hyphenation in pagination or merge file/text
  - Spelling check and aid with correctly spelled possibilities
  - Synonym aid gives lists of words with similar meaning
- Notes and References\*
  - Supports footnotes, references and inline notes
  - Reference may be numeric, alphabetic or special characters
  - Text-like flexibility in creation and pagination of notes
  - Automatic placement and renumbering after editing
  - Support for note overflow and text/note distinguishing characteristics
- Technical Writing Support\*\* facilitated via:
  - Extensive symbols set includes math functions and operators, Greek characters, scientific symbols and business and advanced text signs
  - Flexible display screen cursor control (5253 and attached IBM PC)
  - Multi half-line visualization technique
  - Printing via auto font change printers such as 5258
- Statistical typing facilitated via:
  - Automatic column alignment (decimal, right, left, center)
  - Column exceptions
  - Column manipulation
  - 'Keep' function (to avoid splitting over page boundary)
  - 'Skip' lines (to reserve space for drawings, etc.)
  - 'Skip to' (for forms fill in)
  - Long line entry with 17-inch wide print
  - Advanced math in text through shell document instructions
- Repetitive document preparation (standard letters, etc.) facilitated via:
  - Document sharing (read or revise)
  - Use of 'instruction symbols' (for later expansion into phrases or long names)
  - Assembly of letters from stored paragraphs
  - Interactive keying of variables with personalized prompts to stored letters or documents
  - Background merging of stored paragraphs and variables
  - Conditional insertion of text through file processing functions
- Access to documents in a S/370 data base (requires user programming and appropriate IBM licensed programming support

• Security Support

- Operator ID plus selective password check on sign-on
- Selective designations of 'private', 'shared-revise' or 'shared-read' for documents
- User access lists to separate groups of users\*

Files Processing

In the descriptions that follow, files should be regarded as groups of like records, each record containing user-described 'fields' of information such as the name, department, and telephone number entries in an internal phone directory. From the user's standpoint, a file is a special (structured) form of a document on which the files processing functions may act.

Some of these functions act either on all records within a file or, at the user's option, on selected records only – that is on only those qualifying records meeting user-defined criteria.

The files themselves are stored on the 5525 and all files processing functions are invoked by the operator at a 5253 or 5254 Display Station.

• File Characteristics

Record length may be up to 1000 characters to include:

- Character fields: 1-80 alpha, numeric or special characters
- Arithmetic fields: 1-15 digits plus sign and decimal indicator
- Up to two text field identifiers of 16 characters each that link to associated text fields. Each text field contains up to 500 characters (including control characters)

A file is a special form of a document that can be:

- Protected by allowing private, shared-read, shared-revise access
- Archived to/retrieved from diskette
- Distributed (as a document)

File sequence is defined by up to six fields, up to 100 characters maximum (ascending or descending) and may provide direct access to the file by optional unique index field

Record selection (where indicated) may be based on up to 12 qualifiers. Each qualifier compares field content (or its arithmetic/character derivation) to a constant, a list, a range or another field/derivation.

• File Organization

Files can be:

- Created directly by keying through a 5253/5254 Display Station
- Acquired from a host S/370 (with appropriate programming support)
- Obtained as a document from any remote device on a 5520 Administrative System document distribution network [see "Electronic Document Distribution" (Communications Support) later in this text]

A Convert Function is also provided to change the format of many list documents into the 5520 file format for further processing. These lists may have been created locally in a 5520 system or remotely in the document distribution network.

• File Creation (on the 5253/5254 Display Station)

- Tabular format designed for straightforward list entry
- Field prompting format designed for more comprehensive checking or operator training on more involved files.
  - Prompts and/or field names
  - Designation of fields as text, character, or arithmetic
  - Field level edit-checking which includes minimum length, maximum length, range check, list check, character compare mask, and unique entry
  - Field entry may be required, optional, or conditioned by a prior field in the record
- File maintained in sequence (by sequence field content) irrespective of sequence of creation
- Compatible records may be merged in from another file on the system

• File Description Editing

• Delete Records (by qualifiers)

- Selected records eliminated (after optional operator verification) to free up storage space

• Query File

- Display of individual record content on 5253/5254 screen
- Direct access via sequence field or via optional unique index field
- Repeated query to ascending/descending records via sequence field

\* With Release 3 of the program only.

\*\* See Note 5 following "Service Aids".

† See Note 1 following "Service Aids".

PROGRAM PRODUCTS

5520 Administrative Processing Program (cont'd)

- Optional file 'lock' (to prevent alteration) during query operation
- Display/List File (directly or by qualifiers)
  - Sequential search for one or multiple records meeting described selection criteria
  - Qualifying records may be displayed or stored in the 5525 as a document for further processing such as printing
- Update File
  - Records added, changed or deleted (directly or by qualifiers)
  - Optional printout of proof list for all types of alterations
  - Added records automatically inserted in correct position within the sequence
  - Same checks and messages on fields/characters as for File Creation
- Copy Records (directly or by qualifiers)
  - Resequencing of entire file or of selected records
  - Merge an entire file (or selected subset) with a second file
  - Create a subset file of selected records
- Duplicate File
  - Reproduce file (for temporary use)
- Duplicate File Description (FD)
  - Newly duplicated FD is fully editable
  - Allows changes to FDs that have been used to create a file
- List File (directly or by qualifiers)
  - Background search of file for multiple records meeting selection criteria
  - Creates a text document for later viewing, printing, etc.
  - Counts the number of records selected
- Merge File/Text
  - User-specified document 'template' controls repetitive variable inserts from records
  - User-specified report "template" controls summarized input from records
  - Document and report templates can be used at the same time
  - Information can be:
    - Extracted from single file or
    - Additionally, at user choice, extracted from a parallel file linked by a common field (two files processed concurrently)
    - Fast path option when pagination at output document is not required
  - Record information can be extracted from:
    - All records or
    - Selected records (by qualifiers) or
    - Designation of 'start' and 'stop' record range
  - Record information can be included:
    - As is, or
    - After arithmetic operations on single or multiple fields and/or
    - After editing with decimals/currency/sign indicators, etc.
  - Embedded instructions available to the operator are designed to enable such operations as: (some of these instructions preclude the use of the fast path option)
    - Conditional insertion of variables and paragraphs
    - Accumulating multi-level totals
    - Skipping to a given line number (for example, for forms fill-in)
    - Records can be optionally resequenced (up to 6 fields on output)
  - File/text output can be:
    - Printed and/or
    - Stored (for display or later use)
  - File update (where permitted)

Stored Procedures

- Operator-created by linking and storing file processing functions via menu-selection
- May contain:
  - Open parameters to be completed by operator
  - Closed parameters completed beforehand and used for each execution of this procedure
- Executed as a single task in the prescribed sequence of steps while file(s) employed are locked for procedure duration

Electronic Document Distribution and Interchange

With Release 3 of the program, the 5520 has implemented the SNA Distribution Services (SNADS) architecture which describes the SNA store-and-forward function. In conjunction with the DISOSS/370 V3.2 implementation of the same architecture, the two systems may co-exist in the same SNA store-and-forward network and perform as end and intermediate nodes for purposes of distribution of documents through the network.

Functions

- Distribution to and from any DISOSS/370 V3.2 node and 5520 node in a network of the two systems.
- Distribution addressing
  - Multiple individual destinations
  - Distribution list
  - Combination of the two
- Scheduling of delivery (transmission)
  - Priority (by sender)
  - On request (by receiving system operator)
  - Normal (automatic batching) based on
    - Time of day (up to 3 times per day)
    - Number of documents (economic quantity)
    - Combination of the two
- Document receipt alternatives
  - Print (with deletion from storage)
  - Copy to online library (for further use)
  - Print and copy to library (for example, further copies required)
  - Cancel (after viewing at display; implies receipt)
- Addressee options
  - Destination group (for example, a secretary is authorized to receive documents for members of a department)
  - Addressee only (personal); may be combined with password
- Delivery advice
  - List of documents waiting, on request
  - Message if 'personal' documents waiting
- Confirmation of receipt at final destination if requested by sender
- Security Support
  - Device ID interchange (both BSC and SDLC)
  - Selective operator password sign-on check
  - 'Personal' documents may be restricted by addressee password

Communications Support (in conjunction with the 5520 Administrative System with requisite hardware features)

- Distribute/Receive revisable and final form documents between 5520s (SNA/SDLC) and also 6580 Displaywriter (SNA/SDLC) and other devices and subsystems supported by DISOSS/370 Version 3 Release 2.
- Distribute documents to or receive documents from the following devices (with appropriate features)
  - An Office System 6 (BSC)††
  - A Displaywriter System (BSC)††
  - A Mag Card II Typewriter (BSC)††
  - A 6240 Communicating Mag Card Typewriter (BSC)††
  - A 6640 Document Printer (BSC)††
  - A 6670 Information Distributor (BSC)††
  - A System/32 with Word Processing feature #6002 plus appropriate hardware and programming
  - A System/34 with appropriate hardware and programming
  - A System/36 with appropriate hardware and programming
  - An S/370 (with user programming and ACF/VTAM or ACF/TCAM) (SNA/SDLC)†
  - An S/370 (with user programming and ACF/TCAM) (BSC)
- Use of the S/370 as a store-and-forward node in a 5520 distribution network (requires user programming and ACF/VTAM or ACF/TCAM Version 2 Release 1 or 2††) (SNA/SDLC)† or using DISOSS/370 V3.2 and other appropriate programming
- Option for auto-call (auto-answer is standard choice)
- Call-in device list (for control of traffic on switched line)
- Call-out line list (for optimum use of available lines)
- Retry option with number of times and intervals

Electronic Message Distribution: \* Messages (up to 256 characters long) may be distributed across a 5520 SNA network using the same communications facilities as document distribution:

- To one or many recipients
- Locally or across the network
- By themselves or attached to accompanying document
- Using priority or other forms of scheduling

†† See Notes 2 and 3 for limitations.

\* With Release 3 of the program. See Note 1 following "Service Aids".

† See Notes 2 and 3 for limitations.

††† or later releases. This does not imply that such later releases will occur.

## 5520 Administrative Processing Program (cont'd)

### 3270 Emulation

3270 Emulation is a 5520 function that is accomplished by means of a hardware emulation feature on supported 5253 Display Stations or appropriately configured attached IBM PCs\* in 5253 emulation mode, and the Administrative Processing Program Release 2 or 3 (5611-SS2) on the 5525 (mdls 21, 31, 32, and 51) System Unit.

3270 Emulation supports a subset of the functions and keys of the 3278 mdl 2 Display Station with the 87-key EBCDIC typewriter keyboard as it would appear when communicating through a 3274 mdl 1C or 51C Control Unit (using a subset of the functions and options available) to an appropriately programmed S/370 or 4300 Processor in half-duplex mode using Synchronous Data Link Control (SDLC) over duplex or half-duplex communications facilities. Direct attach and/or loop attach to host processors is not supported.

Alternatively, BSC lines\* may be used which must be nonswitched, multi-drop with the 5525 (emulating a 3274) acting as a tributary station, and operating in control mode, text mode or transparency mode (for monitoring purposes only). A single BSC line is supported for 5525 mdls 21, 31 and 32, and two lines for mdl 51 (with two distribution controllers).

#### Highlights

- A single-featured 5253 Display Station or appropriately configured attached IBM PCs\* in 5253 emulation mode can now support both 5520 functions and, via SNA/SDLC or BSC\* communications, a subset of 3270 functions
- 5520 operators initiate 3270 mode, selecting host and applications through menu selections
- Data displayed in 3270 mode may be selectively copied and saved for use in 5520 text functions
- 5520 operators may suspend 3270 mode, perform 5520 functions, then return to 3270 mode without re-initiating the communication session; the 3270 screen information is saved and redisplayed.
- 5520 operators may update the host data base using host applications support
- Multiple appropriately featured 5253 Display Stations or attached IBM PCs\* in 5253 mode on a 5520 System may use 3270 Emulation concurrently, with the same or different hosts

**Basic Features:** The 3270 Copy function support is emulated through use of a 5520 system-generated full screen block copy operation for both the print key and host-initiated requests. This data may then be printed as a 5520 function.

Functions selectable during the 3274 customization process are not supported.

#### Limitations/Restrictions

- **Display Station and Keyboard:** The 5520 Administrative System 3270 Emulation function utilizing the 5253 Display Station with the Function Extension feature (#3270) supports a subset of the functions and keys of the 3278 mdl 2 Display Station with the 87-key EBCDIC Typewriter Keyboard (#4627) and Audible Alarm (#1090). The following limitations should be noted:
  - The 5253 Keylock feature (#4655) may be used for the same purposes as the Security Keylock feature (#6340) of the 3278 mdl 2 Display Station
  - The 3278 capability to display indicator symbols is not supported.
- In 3270 emulation mode, all keyboard characters are printable on the 5219, 5229, and 5257 and 5229 impact printers with the following print wheels:
  - For 5257 - #1257613 supporting EBCDIC keyboard 101
  - For 5219 and 5229 - #1439653 supporting EBCDIC keyboard 101
  - No other special features or options of the 3278 mdl 2 Display Station are supported
  - The following 87-key EBCDIC typewriter keyboard (#4627) keys and/or functions are not supported: IDENT, TEST, Device Cancel, Alternate Cursor, Cursor Blink, Double Speed Cursor, Click
  - Additionally, the location of some control keys are in different positions on the 5253 keyboard. A keyboard overlay is provided for aid in identifying the key locations.
- **Configuration Support:** The 5520 Administrative System 3270 Emulation Support provides support equivalent to a subset of a 3274 mdl 1C or 51C Control Unit for the following functions:
  - Pacing of inbound message traffic
  - Automatic session recovery in both single and multi-domain networks
  - Host notification of changes in power-on/off status at attached terminals

- Support for solicitation of summary maintenance statistics through the use of Network Problem Determination Application (NPDA) is provided with the following exception:
  - RECFMS Type 5 is supported as a 5525 not a 3274.

- **Host Support:** To use the 3270 Emulation with a 5520 communicating with an S/370 or 4300 host, the user must provide appropriate programming for that host.

Host software support may require certain 3270 functions in order to operate properly. Customers must refer to the description of their host programs to determine if this emulation support meets the requirements.

- **Host Support Limitations:**

- The 3274 mdl 1C or 51C Control Unit functions that are selectable during the 3274 customization process are not supported by the 5520 Administrative System 3270 Emulation Support

- **Special Features:** No other special features or options are supported.

#### Communications Support (in conjunction with the 5520 Administrative System with requisite hardware features)

- **Communications:** The 5520 Administrative System 3270 Emulation Support provides communication capability with an appropriately programmed host S/370 or 4300 Processor in half-duplex mode using Synchronous Data Link Control (SDLC) or BSC over duplex or half-duplex communications facilities using:
  - IMS/VS with ACF/VTAM or ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
  - CICS/VS with ACF/VTAM or ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
  - CICS/VS with ACF/VTAM-E under DOS/VSE on a 4331 with a communications adapter
  - CICS/VS with ACF/VTAM under DOS/VSE
  - TSO with ACF/VTAM or ACF/TCAM under OS/VS2 (MVS)
  - PROFS or CMS under VM (BSC only)
  - Direct attach and/or loop attach to host processors is not supported

- **Communications Facilities:** In 3270 Emulation mode, the 5520 Administrative System operates in half-duplex point-to-point or multipoint mode over half-duplex or duplex facilities using SDLC or multi-drop nonswitched using BSC at transmission speeds of 2400 or 4800 bps on switched (point-to-point only) or 2400, 4800, or 9600 bps on nonswitched facilities.

- **Limitations/Restrictions:**

**BSC:**  
- The 5525 controller must be the byte type

**SNA:**  
- Only teleprocessing, non-loop, SNA/SDLC communications is supported by the 5520 Administrative System 3270 Emulation function  
- The 5253 Display Station should be defined to the host as an LU Type 2, and the 5525 System Unit should be defined to the host as a PU Type 2.

#### DISOSS/370 V2.1.1, V3.1 and V3.2\*

The 5520 user interface is to the IBM Distributed Office Support System (DISOSS) licensed programs, Version 2 Release 1 and Version 3 Releases 1 and 2.

**HIGHLIGHTS:** This licensed program function support provides the capability of the 5520 to communicate with the DISOSS/370 Host Document Library for:

- Increased online document storage space. Permits archiving, retrieving, searching (with a subset of search arguments), and deleting a 5520 document in the IBM DISOSS/370 Host Document Library.
- Sharing 5520 revisable form and final form\* documents with other 5520 or other compatible DISOSS/370 Host Document Library users connected to the same S/370 host.
- Printing via the host system. Printable (final form) text documents may be printed on a host printer via DISOSS/370 and the host operating system. Printable documents may also be transformed into a STAIRS format and stored in a STAIRS document library, assuming STAIRS is properly installed on the same S/370 host.
- Requesting a program to be scheduled by the host operating system facilities with output at the host.

\* With Release 3 only.

### 5520 Administrative Processing Program (cont'd)

- Image Document Printing via DISOSS/370 (Version 3.1 and 3.2\* only).

The 5520 user can search for and print an image document from the Host Document Library on a host-attached Scanmaster I.

- These functions are available only in the hardware, software and communications environment described in the "Specified Operating Environment" section.

**DESCRIPTION:** The 5520 user interface to DISOSS/370 Version 2 Release 1 and Version 3 Releases 1 and 2\* is through 5520 menus. These menus provide the 5520 operator with access to the following DISOSS/370 services at the host: Application Processing Services, Document Library Services and the Host Document Library.

Application Processing Services available include the capability to:

- Request programs at the DISOSS/370 host to be scheduled for execution by, and with output at, the host.
- Print a Printable (final-form) document, via the DISOSS/370 host operating system, on a host printer.
- Transform a 5520 document stored in the DISOSS/370 Host Document Library to STAIRS Format, when STAIRS is operational at the host.
- Store the transformed document in a STAIRS data base at that host.

Document Library Services available include the capability to search 5520 documents in the Host Document Library by:

- 5520 document name
- 5520 document date
- 5520 document originator
- 5520/DISOSS document owner
- Out-of-context keywords
- Combinations of the above

Search arguments not supported by the 5520 include:

Document class  
Document recipient  
Document subject

**Filing, retrieving and deleting:** The user can file revisable form or final form\* documents created at or stored in the 5520 into the host DISOSS/370 Host Document Library via the 5520 archiving function. When filing a document, the user can specify filing information that indexes the document for later use in search. This filing information consists of search arguments, such as the document name, author, date, or keywords describing the contents of the document. In addition, access codes can be added to help control the document-access authorization.

The DISOSS/370 Host Document Library will permit a 5520 operator to file multiple documents having the same 5520 document name, as DISOSS/370 will assign a unique name to each document archived in the library. This Library-Assigned Document Name (LADN) is returned to the 5520 operator for subsequent access to the document.

A 5520 operator may retrieve a document directly by specifying the LADN, or indirectly by specifying a document list, such as a DISOSS/370 Search Descriptor Document or a 5520 Status Log.

A 5520 user may wish to search the DISOSS/370 Host Document Library for all documents which match a specified combination of search arguments; the resultant DISOSS/370 search descriptor document includes the LADNs of those documents which met the search criteria and may be used as a retrieval list document, or may be edited at the 5520 for use in requesting retrieval of selected documents. Once a document has been identified by its LADN, it can be retrieved from the DISOSS/370 Host Document Library, restored in the 5520 Document Library, displayed at the 5520, shared with other operators on the same 5520 system, distributed or deleted from the 5520 Document Library. A 5520 operator may delete a document from the DISOSS/370 Host Document Library by requesting Erase Archived Document and specifying the Library-Assigned Document Name (LADN), or a list containing multiple LADNs.

**Printing at the S/370 Host:** This facility allows final form 5520 documents that are stored in the DISOSS/370 Host Document Library by a 5520 operator to be printed on a host-attached printer. For DISOSS/370 Version 3 only: The 5520 user can search for and print an image document from the Host Document Library on a host-attached Scanmaster I.

**STAIRS input formatting:** Using the 5520 interface to DISOSS/370 Version 2 Release 1 and Version 3, the 5520 operator can cause a final form 5520 document stored in the DISOSS/370 Host Document Library to be transformed to STAIRS format. The transformed document may be used by a S/370 host application to update a STAIRS data base.

\* With Release 3 only.

**Job submission:** The job-submission capability allows the 5520 operator to request the S/370 host to schedule programs resident at the host system for batch execution, with output at the host.

This capability can also be used to submit a document from the 5520 to the host along with the job-submission request. A user-written program, at the host, can place this document into a data set for subsequent host-application processing.

**Document Security:** The 5520 user interfaces to DISOSS/370 Version 2 Release 1 and Version 3 Releases 1 and 2 are designed to help provide data security based on the interaction of:

- Document ownership
- Level of document privacy through access codes

Access codes are assigned to users centrally at the host and to documents during filing. To access a filed document, a user must be assigned an access code that matches one access code of the document to be retrieved. The 5520 user interfaces to DISOSS/370 Version 2 Release 1 and Version 3 Releases 1 and 2 provide the capability to assign document access codes in the following manner for security assistance purposes:

Private - Only the document owner's authorization can be used to access the document.

Shared Private - Only the authorization codes of predefined user groups can be used to access the document.

Public - All valid DISOSS/370 users authorization codes can be used to access the document.

The facilities for controlling access to protected resources are effective only within the context of DISOSS/370 itself. Access control within VSE or OS/VS1 outside the scope of DISOSS/370 is not provided. For IMS/VS or CICS/VS systems under MVS, the Resource Access Control Facility (5740-XXH) can be used to help control access to DISOSS/370 or user-written DLS/APS libraries. For applications in which sensitive data is sent over external communication facilities, user management may augment these facilities with external line modems which support cryptography. User management is responsible for the selection, implementation, and adequacy of these security features for their environment.

#### System Services (including systems management) via:

- User-created profiles (descriptions), changeable as needs develop
  - System components (configuration)
  - Operators (type, authority, etc.)
  - Documents (including files)
- System resource sharing and usage measurements
- Error checking, retry, and recording
- Program maintenance facilities

The following facilities are also provided:

#### Task initiation and control

- Menu approach to initiate tasks (with menu bypass)
- Online interactive HELP facilities to guide and assist the operator in many areas on request
- Display/List job status available at all times
- Automatic facilities for print queue management (via set-ups)
- Print queue management override for exceptional situations
- Print, archive/retrieve in background
- Pagination, global search/replace, merge file/text, and Files jobs in background
- Background job priority queue
- Operator messages, immediate or queued as appropriate
- Special 'Device Service' messages to alert the operator to required actions (for example, the replenishment of a printer with paper)
- Broadcast messages to all or selected operators
- Defaults at system, operator, and document level for the more common user-defined procedures and standards

#### Production Statistics (when selected by the user)

- Automatic recording of statistics as they occur by:
  - Text document access and type
  - Distribution connect time and volume
- Reports printable on request by:
  - Document charge number
  - Operator charge number
  - Document distribution
  - Destination

### 5520 Administrative Processing Program (cont'd)

- Report convertible to a file for subsequent processing

**Installation Aids:** To install the licensed program, the user (with guidance via a display station) establishes the system program library, describes required I/O device definitions and authorized users, and starts the program. The system is ready for use at this point but the user may wish to do some additional system personalization such as:

- Describing additional I/O devices
- Defining additional authorized users
- Modifying the supplied default parameters

This additional system personalization can be done any time.

**System Resource Management:** Under control of the licensed program the system processes the job requests, acquires system resources for the jobs, executes the jobs and terminates the jobs. The system manages disk space allocation and controls the contention resulting from multiple jobs competing concurrently for system resources. In order to accomplish this, it manages the scheduling and queuing necessary to share the system resources among all jobs.

**Archive and Retrieve Facility:** The archive and retrieve facility provides the following functions via the system compact diskette drive supporting Diskette 2D:

- Archive/retrieve repetitive documents (including files)
- Optional automatic delete after archive
- Provide backup for the document library (including files)
- Keep seldom used or sensitive information offline
- Provide authorized data exchange between 5520 Administrative Systems including documents and profiles so that, for example, one 5520 system may be personalized on another (with equal or higher model number or the 5525).

**I/O Management:** The program supports the following locally attached devices:

- 5253 Display Station
- 5254 Dual Display Station
- 5257 Printer
- 5258 Printer
- 6670 and 6670 mdl II Information Distributors (SDLC) (see note 6)
- 5321 Mag Card Unit (see note 4)
- 5219 Printer
- 5229 Wide Carriage Printer
- IBM Personal Computer (see note 7)

#### Service Aids

This program contains system level diagnostic function designed to assist with concurrent maintenance of a 5253, 5254, and 5257, 5219, 5229 or a 5258 attached to the 5525, while the customer continues to use other parts of the system. Absence of these diagnostic functions (or their full equivalent) will result in reduced system availability to the user.

**Note 1:** In communicating with an IBM S/370 the following interface rules apply:

- The 5525 System Unit (with SNA/SDLC) is supported by ACF/VTAM or ACF/TCAM Version 2, Release 1 or Release 2†††, as an LU Type 1.
- The 5525 System Unit (with BSC) is supported by ACF/TCAM Version 2, Release 1 or Release 2††† as a 2770-like device.
- Access to CICS/VS 1.4 Subsystem (SNA/SDLC) is via the supported levels of ACF/VTAM and ACF/TCAM LU-to-LU facilities. The 5525 will be supported as a 3790 full function LU, Type O.
- Access to CICS/VS 1.4 Subsystem (BSC) is via the supported levels of ACF/TCAM, BTAM, or BTAM-ES where the 5525 is supported as a 2770-like device.
- Access to IMS V1 R1.5††† Subsystem (SNA/SDLC) is via the supported levels of ACF/VTAM and ACF/TCAM LU-to-LU facilities. The 5525 will be supported as an LU, Type P.

**Note 2:** For communications with remote devices and also the reading or writing of mag cards in the 5321, the following U.S. and country keyboard IDs are supported: 1, 2, 3, 4, 5, 6, 7, 8, 17, 19, 25, 26, 28, 29, 31, 32, 33, 36, 37, 38, 39, 41, 42, 43, 44, 45, 46, 47, 48, 49, 51, 52, 53, 54, 55, 56, 57, 66, 67, 80, 100, 101, 103, 251, 252, 253, and 254. In the same environment,

format feature protocols (as optionally used on the Mag Card II typewriter and also other IBM devices) are supported.

**Note 3:** Documents prepared on BSC-supported devices such as members of the OS/6 family may contain formatting and other control codes (OCL). These are not recognized by the 5520 Advanced Administrative Processing Program. Where Document Distribution is between like devices, document content including OCL (formatting and other control codes) is transmitted transparently. However, for distribution with one of these devices, to or from a 5253 or 5254 Display Station, additional operator intervention may be necessary and special procedures implemented.

**Note 4:** The 5321 Mag Card Unit is used for reading and/or recording of Mag Cards, with limitations. These limitations relate to the use of Operator Control Language Statements which when read are treated as text by the 5520 Advanced Administrative Processing Program. Also, if OCL statements are required on mag cards prepared on the 5321, they must be inserted by the operator.

**Note 5:** Symbol character support is only available in conjunction with SNA/SDLC protocols. Documents containing symbols may be distributed within a single 5525, or to or from another 5525, for printing on a 5258 or possibly 5219, 5229 or 5257 Printers as appropriate; or to or from a host S/370 (appropriately programmed) using SNA/SDLC communications.

**Note 6:** Printer support is also provided for a remotely located 6670 Information Distribution (SDLC) attached via a nonswitched SDLC communications line\*\*\*. Similar support for locally or remotely attached 6670 mdl IIs will also be provided.

**Note 7:** If IBM Personal Computers are connected to the 5525 System Unit, Program Code #2888, IBM 5520/Personal Computer Attachment Program, must be provided to the Personal Computer user.

#### CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI section of the sales manual, in the installation of IBM licensed programs. However, the responsibility of providing accurate ordering information, personnel selection and training, and continued day-to-day operations lies solely with the customer.

Installation of the 5520 Administrative Processing licensed program Release 2 (5611-SS2), all subsequent releases, and Program Temporary Fixes (PTFs) are the customer's responsibility.

Customers should be reminded that they are responsible for conforming the use of the system to applicable statutes or regulations relating to the distribution of information both in their own country and also to, from, through, or between other countries.

#### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

##### HARDWARE REQUIREMENTS

The minimum system configuration is:

- 1 - IBM 5525 mdl 21, 31, 32 or 51
- 1 - IBM 5253 or 5254 Display Station (must be located in the same room as, and within 6.1 meters (20 feet) of the 5525).

3270 Emulation requires:

- IBM S/370 or IBM 4300 Processor host attached via teleprocessing, non-loop, SNA/SDLC communications
- Function Extension feature (#3270) for each supported IBM 5253 Display Station

SOFTWARE REQUIREMENTS: None.

##### DISSO USER INTERFACE SPECIFIED OPERATING ENVIRONMENT

##### HARDWARE REQUIREMENTS

This function is supported by the IBM 5525 models 21, 31, 32 and 51, in conjunction with the licensed program, IBM 5520 Administrative Processing Program (5611-SS2). The IBM 5520 Administrative System used for this function must be equipped with the appropriate SNA communications facilities.

\*\*\* Contact IBM for hardware schedules.

††† or later releases. This does not imply that such later releases will occur.

## PROGRAM PRODUCTS

**5520 Administrative Processing Program (cont'd)****SOFTWARE REQUIREMENTS**

The IBM 5520 user interface to DISOSS Version 2.0 is provided by means of licensed programs executing in either an OS/VS or DOS/VSE (DISOSS/370 Version 3 only) IBM host system environment.

- IBM Distributed Office Support S/370 Version 2 Release 1.
- IBM Distributed Office Support S/370 Version 3 Releases 1 and 2.

**COMMUNICATIONS REQUIREMENTS**

Communications must be with an IBM S/370 running DISOSS/370 Version 2 Release 1 or Version 3 and their pre-requisite and co-requisite access methods and operating system programs. Communication is via SNA/SDLC teleprocessing using switched or nonswitched half-duplex lines at speeds of 2400/4800 bps for switched or 2400/4800/7200/9600 bps for nonswitched lines. Direct attach and/or loop attach to the host processor is not supported.

**DATA SECURITY, AUDITABILITY and CONTROL**

Data security aids are provided through the interaction of document ownership, level of document privacy and document access codes assigned by the 5520 operator when filing documents in the DISOSS/370 Host Document Library. The 5520 Administrative Processing Program (5611-SS2) utilizes the same security and auditability assistance features of the 5520 Administrative Processing Program (5611-SS1). In addition, when the 5520 is communicating with DISOSS/370, the security features of DISOSS/370 are also utilized. User management is responsible for evaluating, selecting, applying, and implementing such features, and is also responsible for the appropriate administrative and application controls.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5520 Administrative Processing Program (5611-SS2) Licensed Program Specifications (GC23-0729) ... IBM 5520 Administrative System: Installation Manual/Physical Planning (GA23-1011) ... Implementation Planning (SC23-0713) ... Licensed Program Installation and Implementation (SC23-0745) ... Reference Manual, Part 1. General Reference (SC23-0726) ... Reference Manual, Part 2. Menu Reference (SC23-0727) ... Operator's Guide (SC23-0747) ... Messages and Recovery Aids (SC23-0733) ... Document Distribution Planning Considerations and Management Guide (SC23-0716) ... IBM System/370 Host Attach Programmer's Guide (SC23-0710).*

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
DISTRIBUTED PRESENTATION SERVICES  
VERSION 1, DPPX/DPS V1 (5760-XR1)  
VERSION 2, DPPX/DPS V2 (5660-264)**

**PURPOSE**

These program products form an upward compatible family of ease-of-use aids for programmers of the 8100 Information System with Distributed Processing Programming Executive Base (DPPX/BASE) which provide a set of device and format independent application functions. These functions simplify the programming of a wide range of I/O devices available on the 8100: Displays and their associated keyboards, line printers and, for output only, keyboard printers. All aspects of programming can benefit - design, implementation, testing and maintenance.

**DESCRIPTION**

The description of DPPX/DPS that follows is oriented towards the most recent offerings of DPPX/DPS Version 1.

DPPX/DPS V1 is used as an abbreviation for DPPX/DPS Version 1.

DPPX/DPS V2 is used as an abbreviation for DPPX/DPS Version 2.

DPPX/DPS is used as a generic term applying to both versions unless explicitly stated.

DPPX/DPS Format Management (FM), the run time component, can be invoked from applications written in DPPX COBOL, DPPX assembler language or Distributed Processing Development System (DPDS) - Programming Language for Distributed Systems (PL/DS), including those running under Data Base and Transaction Management System (DPPX/DTMS). The application passes a destination identifier and the address of control and application data areas in the application. The structure of the control area is supplied by IBM with the DPPX/DPS code. The structure for the application data area is generated by IMD (see below). The functions required by the application are defined partly by previously defined maps and partly dynamically by the control and application data areas.

DPPX/DPS provides as an optional feature Interactive Map Definition (IMD), the program development time component. This feature is an online programming aid, enabling the application programmer to create and update a library of maps containing panel formats for display devices. IMD provides a full screen context editing capability, compatible with the DPPX/BASE interactive editor command syntax and semantics, and uses DPPX/DPS FM as well as standard DPPX I/O facilities. Following the creation or modification of a map by IMD, before it can be used by an application program and FM, a special IMD generate process must be invoked, the result of which is:

- An application data structure for the appropriate application language (DPPX COBOL, DPPX assembler language or PL/DS) placed on a "source copy library".
- One or more object map load modules placed on a "map module library".

The key to the transfer of data between application and display device is the map which FM loads and which contains the following information:

- The structure of the input and/or output logical record as viewed by the application.
- A definition of the constant data in the panel.
- The size and position (row, column or floating), within the partition, of the panel.
- The relative position and length of fields within the panel.
- Device attributes to be associated with the defined fields.
- Device control information (e.g., alarm, free keyboard).

Maps are grouped together into a map group, containing information required for several I/O requests and panels. The map group includes device dependent information including screen size. At any instant during run time, several panels may appear in a screen layout.

DPPX/DPS provides support for advanced functions:

Multiple partitions with or without scrolling.

Scrolling.

Field validation in maps.

- Trigger field.
- Mandatory fill.
- Mandatory field.

Extended field attributes, via maps or dynamically via the application program interface (API).

- Highlighting.
- Programmed symbols.
- Extended color.

Character attributes, dynamically via character attributes embedded in data.

- Highlighting.
- Programmed symbols.
- Extended color.

DPPX/DPS code is reentrant and reusable; at the installation's option it may be transient.

**DPPX/DPS INTERACTIVE MAP DEFINITION SUMMARY:** At program development time or during maintenance, the application programmer invokes the DPPX/DPS IMD feature to describe a run time panel format including constant data, variable data to be presented to or by the end user, partition identification, some editing characteristics of the data presented by the end user and detectable fields. IMD uses FM to control interactions with the screen during definition.

IMD aids the application programmer in describing the DPPX display device interface with the end user. It facilitates map specification by virtue of the following programmer oriented interactive design concepts:

- Full screen context editing capability for entry of display and printer panel formats.
- Horizontal and vertical software driven scrolling capability.
- Menu driven processes.
- Help facility.
- Compatibility with DPPX/BASE interactive editor commands and SDF/CICS editor commands.
- Restart capability - changes can be automatically recovered.
- Default values for map characteristics.
- The ability for existing DPPX/DPS IMD map specifications to be copied as initial specifications for a new map.
- Library management utilities.
- Generate process, providing a structure for application data and reducing need for recompilation.
- Print utility.

**The DPPX/DPS IMD Feature Allows an Application Programmer to Describe Online DPPX Display Device Interfaces With The End User**

When IMD is invoked, or on completion of a process, the Initial Selection Menu is displayed. The user may select one of the following processes or terminate IMD. Each process is also menu driven.

**Map Editor Process:** Defines the device types supported by the map, the size and position of the panel in the partition, the programming language and whether there are to be user mapping exits and device control functions such as alarm and keyboard lock. A flexible interactive technique for defining the panel format is provided, and then field attributes are added (for devices which support field attributes); a field qualification step is used to identify variable fields which are to appear in the application data area.

At any time during the process, the programmer may terminate the process, and the changes made will be saved in a map specification library (MSL). Only one terminal can use a given map specification library at one time, but there may be several such libraries.

The entire map editor process is highly interactive. The test command enables the panel, as so far defined, to be viewed.

**Map Group Process:** Interactively defines the grouping of maps for several I/O requests and panels. Includes specification of output only displays, floating area and partition definition.

A partition in the IBM 8775 is defined as a rectangular viewport on the screen together with a buffer called a presentation space. Up to eight partitions may be defined. In general, a partition looks to the application like a display device whose characteristics may be defined or modified by IMD. The size of the partition and the origin of the viewport on the screen are defined.

**Library Management Process:** Provides utility functions for managing the map specification library; list directory, copy, rename, and delete. An audit trail is kept of map modifications, and when the generate process was last invoked.

**DPPX/DPS (cont'd)**

**Generate Process:** Before maps can be used by an application program, the map specifications have to pass through the generate process. There are two types of output from this process:

- Each map generates an application data structure (for the specified application language) which is cataloged on a source copy library.
- Each map group generates one object map module per device type supported which is cataloged on a map module library.

A report is also produced. When the application data structure is not changed, recompilation of the application program is not necessary as a result of the generate process (e.g., change of panel format or addition of an extra device type for the map).

**Utility Process:** Used to print, import and export members of the map specification library.

**Tutorial Process:** Online documentation of DPPX/DPS IMD. This facility is modeled on the TSO/SPF tutorial mode.

The *HELP Facility* allows the user to obtain additional information about any error message displayed, or general information about a subcommand or options, by entering the Tutorial process at the appropriate chapter.

IMD commands are compatible with DPPX/BASE interactive editor commands with respect to syntax and semantics.

In the event of a system failure, IMD will automatically save any changes that have been made and optionally recover (providing the map specification index is still usable - IMD will not attempt recovery of the index).

Horizontal and vertical software driven scrolling is provided by program function key; other program function keys and commands may result in automatic scrolling.

The *Multiple Device Map* allows the same map to be defined to support a selection of devices, including various models and features, which are supported by DPPX/DPS FM. The panel format on these different devices does not have to be the same. The major requirement for a multiple device map is that the application data area has the same structure for each device panel:

MAP

Application Data Structure	Panel Format for Device Type 1	Panel Format for Device Type 2
----------------------------------	--------------------------------------	--------------------------------------

The device list may be modified at will. Inapplicable device dependent features (e.g., blink when the device does not support extended highlighting) will be ignored. In this manner, the programmer need have little concern for device dependent features. An existing DPPX/DPS IMD map on a library can be used in the knowledge that it will give reasonable results - the application can thus be format as well as device independent. Nor need there be concern with device configuration - a particular device is invoked by name from the application program interface at application run time.

A multiple device map may:

- Have different panel positions on the various devices.
- Have a panel of different width and depth, and have a differing number of displayed characters for the various devices.
- Contain different constant data in different device panels.
- Have different default attributes.
- Have fields in a different order in different device panels. The same set of fields do not have to be specified for all devices (data destined for a field not specified for a particular device will be suppressed).
- Have different field lengths in different device panels.

Application program development is completed by:

1. Compilation/assembly of the source program with a copy from the source copy library of
  - a. The-IBM supplied control structure and
  - b. IMD generated application data structure
 and
2. Compilation/assembly of any user mapping exit code.

The map group corresponding to the device type in use is loaded by DPPX/DPS FM at application run time.

**DPPX/DPS FORMAT MANAGEMENT SUMMARY:**

**DPPX/DPS FM Provides the Application Run-Time Support and Interacts with the End User at a Terminal**

Functions provided by DPPX/DPS FM are: Basic mapping (selector fields ... adjunct fields ... menu selection ... floating panels ... device control ... feedback information ... printer support ... output only support ... browsing), built-in procedures, user mapping exits.

*Basic Mapping* function of FM allows the application to send and receive data in a device independent manner, using maps previously generated by IMD. The map contains device dependent information required for the manipulation of the data stream. Extensive alterations of a map (panel format or devices supported) can be made without change to the application data structure, and hence without the need to recompile the application program and copy a new data structure.

A selector field can optionally be associated with a data field. On output, the application can set the selector fields to indicate which of the associated data fields are to be transmitted. On input, FM sets the selector to indicate which associated data fields were modified on the screen.

Adjunct fields can optionally be associated with a data field. At run time, the application can override map defined field attributes by attributes set in the adjunct.

Menu selection panels for cursor or light pen selection can be defined.

Floating panels permit multiple instances of the same panel to be displayed or read; thus reports containing repetitive, or identical format, may be more readily defined.

The device control function provides support for device characteristics and field attributes specified either in the map or dynamically in the application data area:

- Protected/unprotected fields.
- Freeing keyboard.
- Constant field in panel.
- Modified data tag.
- Field selector tag.
- Program access and attention keys.
- Program function keys.
- Alarm.
- Multiple partitions.
- Intensity.
- Extended highlighting.
- Character highlighting.
- Field validation.
- Light pen selection.
- Cursor positioning.
- Programmed symbols.
- Extended color.

Feedback information is provided through the control area, indicating a class of error and details within that class.

Printer support is provided for line printers and keyboard printers as output only devices:

- DPPX/DPS will allow sharing of printers between applications (using the SNA bracket protocol), but does not use the DPPX/BASE printer sharing function.
- DPPX/DPS supports printer forms control either through the current (DPPX/DPS IMD-defined) mapgroup, or by an installation specified - at device connect time - table, or by using defaults. Printer forms control includes margin setting, page depth and line density.
- The same maps may be written to a printer as were written to a screen (but there are limitations in appearance since, for example, panels which appear side-by-side on a screen will appear sequentially on a printer because the printer cannot backspace having printed the first panel). This support should not be confused with the hardware copy function. It is invoked by the application program passing to FM the same data as it passed to the display but specifying the destination as a printer. The application may choose to use different maps to reformat the data.

Output only support is for applications where there is no terminal operator or no terminal keyboard. The end user views a display which might:

- Show timetable and status of transportation
- Display status of an operation or process, and highlight abnormal situations or sound an alarm.
- Repeat broadcast instructions.
- Show production status and schedules.

End user browsing is provided, output only, forward only, a page at a time. FM paginates the output according to the partition size.

*DPPX/BASE Interactive Debug* can be used to monitor an application which is using DPPX/DPS FM to drive screens; this requires a separate screen. The interactive debug screen may need to be physically located beside the application screen.

PROGRAM PRODUCTS

DPPX/DPS (cont'd)

*Built-in procedures* are functions provided in addition to Basic Mapping functions for users who need a high degree of device control. They enable dynamic screen field manipulation and cursor positioning without the use of maps through the application program interface (e.g., change of an attribute). Built-in procedures also enable the application to obtain device and map characteristics; for example, a user paging application may need to know screen and panel size.

*User Mapping Exits* provide a capability for the user to write his own programs in DPPX COBOL, DPPX assembler language or PL/DS. These programs will use a subset of program language facilities. Typical uses on output are conversion and editing of encoded fields and provision of device specific control information to the application. On input, the user program can interact with the display operator, handling IBM 8775 trigger fields, validating the data at source, and requesting reentry of erroneous data (e.g., by issuing error messages and highlighting errors). Following validation, the user may wish to convert character values to encoded values, translate attention definition bytes (e.g., IBM 3643 function keys), classify the input, etc.

RELATIONSHIP BETWEEN DPPX/DPS IMD AND DPPX/DPS FM

Programmer at terminal (program development time)

- Uses – IMD (which utilizes FM)
  - to create – Map specifications
  - to generate – Application data structures on source copy libraries
  - and – Maps on map module libraries
- Uses – DPPX/BASE interactive editor
  - to create – Source program
  - User mapping exit code
- Uses – DPPX/COBOL, DPPX Assembler (DPPX/ASM) or PL/DS
  - a) with – Source program input and copies
  - Control and application data structures
  - to create – Program modules
  - b) with – User mapping exit code
  - to create – User mapping exit load module

End user at terminal (application run time)

- invokes– Application (program modules) which in turn invokes
  - FM, passing
  - The destination
  - Address of the application data area
  - Address of the control area
- interacts– with Application through FM panels and User Mapping Exit code.

The Application Program Interface (API) is the Means of Invoking DPPX/DPS FM at Application Run-Time

The functions required by the application are defined partly by previously defined maps and partly dynamically at the API by setting fields in the control and application data areas. DPPX/DPS FM can be invoked from applications.

- The destination (a file name representing a device).
- (The address of) the control area.
- (The address of) the application data area.

The control area is used to indicate the type of request (built-in procedure or basic mapping, new or modified record), names (map, map group, built-in procedure), feedback, and other control information.

HIGHLIGHTS OF VERSION 2

- Improved programmer productivity, particularly in handling programmed symbols, editing maps and simplified application programming for data arrays.
- Distributed processing support through outboard formatting for CICS/VS basic mapping support (BMS) applications on SNA/SDLC connections can reduce telecommunications line loading.
  - The constant portion of maps is held outboard in the IBM 8100 and merged with the variable portion received from the (now smaller) BMS generated data stream. The host application does not need to be changed. The BMS map must have a flag set to indicate outboard formatting is required, and the CICS TCT

(terminal control table) must be changed to specify that the terminal accepts outboard maps.

- Validation can be added locally on the IBM 8100 (by coding user exit routines) thereby reducing line traffic to the host. The user exit routines can be coded in COBOL, ASM or PL/DS at the DPS logical record application program interface (API).
  - In user validation routines, advantage can be taken of the advanced features of IBM 8775 displays, e.g., highlighting, mandatory enter and mandatory fill.
  - Some CICS-to-operator dialog could be moved to a DPPX/DPS V2-to-operator dialog.
- Aid for moving BMS maps outboard is provided through Release 2 of the Screen Definition Facility (SDF/CICS) licensed program. Alternatively, the BMS map can be reproduced by the programmer using DPPX/DPS IMD.
- New application functions in user exits may now become economically feasible with minimal impact on line and host, e.g., use of programmed symbols.
- Additional support for existing devices and LU 1 printer extensions.
    - 3268-1 condensed print via data stream control.
    - 3287 extended highlighting (underscore), programmed symbols and color.
    - Enhanced magnetics feature support for displays at the DPS built-in procedure level is documented.
  - Enhanced support for devices with programmed symbols (PS).
    - Interactive PS definition and generation enables the application programmer to create and edit an enlarged representation of a symbol within a named set, while comparing it side by side with a reference symbol ... color is supported ... on suitable devices a life size test can be carried out ... some characteristics can be changed for all symbols in a set, e.g., color ... PS sets can be manipulated as any object ... device-dependent PS set modules are generated for run-time use.
    - PS set load and management facilities provide run-time loading of PS sets as required by the map.
  - Improvements to operational characteristics.
    - Directory-driven IMD processing reduces the amount of keying required in selecting objects and menus during editing. The displayed map specification library (MSL) directory is itself used as a menu to invoke directly most IMD function.
  - Improvements to Application Prn Identifier (AID) byte in the input stream may now be translated into a character string, typically a DPPX/DTMS transaction code.
    - Folding (to uppercase), and justification (left or right) with a user defined pad character.
    - Validation adjunct fields permit run-time change of the IBM 8775 field validation attributes (mandatory enter, mandatory fill and trigger fields).
  - Improvements to performance support for line printers.
    - DPPX/DPS V2 will allow line printers to run closer to rated speeds.
  - Serviceability and error handling.
    - DPPX/DPS FM V2 has optional error trace facility.
  - Improvements to System Library and Service Library Publications. In particular, at DPPX/DPS V2 availability time, the *User's Guide* will be split into:
    - Application Development Guide.
    - Application Programming Reference.
    - Map Definition Reference.
    - System Programming Guide.
- Together with a Reference Card, this will significantly enhance DPPX/DPS V2 usability.

CUSTOMER RESPONSIBILITIES

To install and use DPPX/DPS the user must: Acquire a knowledge of the functions provided through reading the *DPPX/DPS User's Guide* and be familiar with DPPX/BASE ... Understand the use of the application program interface in DPPX COBOL, DPPX assembler language or PL/DS to invoke DPPX/DPS FM ... Understand the DPPX initialization and customization processes described in *DPPX Installation: Guide* (SC27-0401) and *DPPX/BASE Administration* (SC27-0403) as they relate to DPPX/DPS, and *DPPX/DPS User's Guide* (SC33-0092) ... Carry out approved problem determination procedures described in *DPPX/DPS Diagnosis and Logic Overviews* (LY33-6031 and LY33-6036) before contacting IBM for program service ... Install fix packages

PROGRAM PRODUCTS

DPPX/DPS (cont'd)

and service level updates as appropriate ... Provide environments for user mapping exits if they are to be used.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

DPPX/DPS hardware system configuration requirements (except for storage) are consistent with those of the DPPX/BASE licensed program.

The storage requirements of DPPX/DPS FM are dependent upon various configuration and workload parameters, including - device type, map size, message rates, number of resident maps, requested function, and the number of processing environments.

Note that DPPX/DPS IMD necessitates the use of DPPX/DPX FM, DPPX/BASE distributed indexed access method and relative sequential access method services and therefore additional storage is required for these services.

Sufficient direct access storage must be available to satisfy the user information storage requirements and may consist of any direct access facility supported by the DPPX/BASE distributed indexed access method unless otherwise stated.

Use of DPPX/DPS IMD requires a DPPX/DPS FM supported display with a screen width of at least 80 characters, depth of at least 24 lines and with a keyboard which has 12 or more program function keys.

Device Support: Table 1 below gives devices supported by DPPX/DPS V1 FM, including physical attachment. Terminals that are functionally equivalent to those specifically supported by DPPX/DPS V1 may also function satisfactorily; the customer is responsible for establishing equivalency. Table 2 below gives additional DPPX/DPS V2 FM device support.

TABLE 1

DPPX/DPS FM supports the following devices:

IBM Display Devices	Attachments
3104-B1,B2 3276-1,2,3,4	Display Terminal Control Unit Display Station
3276-11,12 13,14	Control Unit Display Station
3277-1,2	Keyboard Display
3278-1,2,3,4	Display Station
3278-1,2,3,4,5	Display Station
3279-2A,2B,3A, 3B	Color Display Station
3643-2,3,4	Keyboard Display
8775-1,2	Display Terminal
8775-11,12	Display Terminal

These displays are supported by DPPX/DPS using an LU2 protocol and 3270 or 3270 extended data stream as appropriate.

IBM Printer Devices	Attachments
3230-1 3230-2	Printer Printer
3232-1 3232-11 3262-2,12 3262-3 3262-13	Keyboard Printer Keyboard Printer Line Printer Line Printer Line Printer
3268-1 3268-2	Printer Printer
3284-1,2 3286-1,2 3287-1,1C, 2,2C 3287-11,12 3288-2 3289-1,2	Printer Printer Printer Printer Printer Line Printer Line Printer
3289-3 3645 3767-1,2,3	Line Printer Printer Communication Terminal

These printers are supported for output only using the DPPX LU1/SNA character string interface to DPPX/BASE Communication Services.

TABLE 2

IBM Printer Devices	Attachment
3268-1 3287-1C,2C	Printer Printer
	Loop 3274-51C

These printers are supported for output only using the DPPX LU1/SNA character string interface to DPPX/BASE Communication Services.

SOFTWARE REQUIREMENTS

This licensed program is designed to work with the DPPX/BASE licensed program.

DPPX/DPS is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX assembler language with most of the original PL/DS statements shown as comments. DPPX/DPS source code is available on magnetic tape and program listings on microfiche as related optional material.

The following licensed programs are required depending on application programming language used:

DPPX/BASE	5760-010
DPPX/COBOL Compiler	5760-CB1
DPPX/COBOL Run-Time Library	5760-LM1
DPPX/ASM	5760-AS1
DPDS (for PL/DS) (PRPQ P88016)	5799-AZL

The following licensed programs are required if the outboard formatting function of DPPX/DPS V2 is to be used:

DPPX/DSC	5760-RC1
CICS/OS/VS Version 1 Release 5	5740-XX1 (VS1, MVS)
CICS/DOS/VS Version 1 Release 5	5746-XX3 or (VSE)

The following licensed programs may optionally be used to assist moving CICS Basic Mapping Support maps outboard:

Screen Definition Facility/CICS (SDF/CICS) Release 2	5740-XXF (OS/VS) 5746-XXT (DOS/VSE)
Distributed Systems Executive (DSX) Release 2	5748-XXG (VSE, OS/VS)

DPPX/DPS FM is a prerequisite for DPPX/DPS IMD, which uses DPPX/DPS FM to control interactions with the programmer.

DPPX/DPS FM is a prerequisite for the DPPX/BASE interactive editor in full screen mode. DPPX/DPS IMD is a prerequisite for DMS/DPPX (Development Management System, 5760-XC2) application generation; DPPX/DPS FM is required to execute applications which use maps under DMS/DPPX Execution Facility (5660-265) or which use maps under DCMS/DPPX (5760-XR6) in execution mode. DPPX/DPS IMD is a prerequisite for DPPX/PS3640 (5660-267) Interactive Transaction Generator.

Some customers may need to transmit maps, object programs, etc., from the IBM 8100 where they were developed, to a destination IBM 8100 for execution. This can be done as follows:

- By the use of a S/370 or 4300 and the DSX (Distributed System Executive) Release 2 licensed program, 5748-XXG. The maps etc., are transmitted from an 8100 to a S/370 or 4300 DSX library and then DSX will retransmit to the destination 8100.
- The customer may write an application program in the originating (development) 8100 which connects to the DPPX/BASE command facility in the destination 8100; the program transmits a job stream which includes the commands necessary to catalog the map, as well as the object map module.
- A diskette may be produced with the desired maps, etc., to be loaded at the destination 8100.

DPPX/DPS is a part of the DPPX System IPO, 5750-BA1.

COMPATIBILITY

DPPX/DPS V2 is upward-compatible with the first version of DPPX/DPS, i.e., DPPX/DPS V2 will provide compatible DPPX/DPS V1 function as follows:

- Source and object programs.
- Source and object maps.
- Version 1 source maps are accepted by DPPX/DPS V2 IMD and converted irreversibly to Version 2 specifications to the map specification library. Customers should consider saving a back-up copy of a Version 1 source map before processing it by DPPX/DPS V2 IMD.
- Version 1 object maps are accepted by DPPX/DPS V2 FM.
- Syntax and semantics of the application program interface (API).
- Mapping function provided.
- Application data structures.
- Application control structures.



PROGRAM PRODUCTS

**DPPX/DPS (cont'd)**

**PERFORMANCE CONSIDERATIONS**

A systems programmer will be able to make trade offs of DPPX/DPS FM response time against storage. For details of response time characteristics see *DPPX System Design and Performance Guide* and *DPPX/DPS User's Guide*.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/DPS General Information (GC33-0090) ... DPPX/DPS Users Guide (SC33-0092) ... DPPX/DPS Licensed Program Specifications (GC33-0093) ... DPPX/DPS Messages (SC33-0094) ... DPPX/BASE General Information (GC27-0400) ... DPPX Installation: Guide (SC27-0401) ... DPPX/DPS V2 Program Summary (GC33-0120).*

In addition DPPX/DPS IMD online documentation is distributed automatically with the DPPX/IMD basic machine readable material.

**SYSTEM INTEGRITY:** Refer to section GI 23.2

**RPQs ACCEPTED:** No



PROGRAM PRODUCTS

**IBM 8100 INFORMATION SYSTEM  
DEVELOPMENT MANAGEMENT SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
DMS/DPPX FEP1  
DEFINITION (5760-XC2) - EXECUTION FACILITY (5660-265)**

**PURPOSE**

Development Management System/Distributed Processing Programming Executive provides an interactive interface for developing, testing, generating and executing application programs in an IBM DPPX environment. It is highly compatible with the DMS Cross-System Product for SSX/VSE, and for CICS/VS, TSO and VM/CMS.

- DMS/DPPX Definition includes the facilities for developing, testing and generating DMS/DPPX applications.
- DMS/DPPX Execution Facility provides for production execution of DMS/DPPX applications.

**HIGHLIGHTS**

- Interactive definition, test and execution of application programs.
- Trace/debug facility at development time.
- Direct execution of generated applications.
- Call and transfer linkage to other applications.
- Definition and execution in a DPPX environment.
- Portability of application definitions (within published restrictions) between DMS/DPPX, DMS/CSP, and DMS/DPCX.

**DESCRIPTION**

**Data Definition** - Allows the definition of data structures and the characteristics associated with that data. Single elements of data are defined as data items. Each data item name is unique within a library called the Member Specification Library (MSL). Data items are components of a record, table, map or working storage. After a data item has been defined once, it may be used in other records, tables, maps or working storage by entering the data item name. The associated characteristics of the data item, collected from the MSL, need not be reentered.

**Map Definition** - Allows the definition of a map for a terminal display or printer. Each map is given a unique name within a map-group (a group of maps for use in an application) and device. The variable fields defined on a map are named and characteristics are defined for each. Characteristics may be collected from data definitions on the MSL if an already defined data item name is used.

**Application Definition** - Provides for the definition of an application as a group of related processes. Processing statements can be used to define arithmetic operations, movement of data, use of tables, access to map fields and record data items, and logical testing and branching.

**Application Test** - Allows the user to verify the syntax and logic design of any DMS-defined application as well as to view the logical sequence of map displays as the user will see them in the production environment.

**List Processor** - Provides the capability to list all members of an MSL, or select subsets to be listed, and then invoke other DMS/DPPX functions against them. These functions are: Copy, rename, delete, print, change, where used, edit, view, export. Most utilities and editors can be invoked directly from the list processor.

**Utilities**

- **EXPORT** - Allows an MSL member to be moved out of an MSL.
- **IMPORT** - Allows a previously exported member to be moved into an MSL.
- **Member Maintenance** - Allows members in an MSL to be copied, deleted, renamed, or printed.
- **File Maintenance** - Allows the user to view or change data that is stored in a file that has been previously created and defined. If the change option is selected, the user may display, replace, delete, add or copy records to the file. File maintenance replaces the previously available File Inquiry facility.
- **Tutorial** - Can be used to learn about DMS/DPPX by reading it as a manual or by direct selection of certain sections. It can be accessed at any point in DMS/DPPX by pressing the HELP program function key.

**Modes of Operation:** DMS/DPPX operates in either of two modes during application development:

- **TUTOR** - An instructional or teaching mode for use by a new or learning DMS/DPPX user.
- **PROMPT** - An input assistance mode for the experienced DMS/DPPX user.

A change from TUTOR to PROMPT, or vice versa, can be made at any time by entering the subcommand MODE.

If a user requires assistance during the execution of DMS, the HELP function key may be pressed.

**Application Generation:** This process translates the defined application into a set of tables which may be executed in the DPPX environment. These execution tables may be distributed to a production system by tape, diskette, or communications facilities. Normal DPPX/BASE library services are used to enter the module (execution tables) into the program library of the production system. Once there, the application can be executed without reference to the MSL.

**Application Execution:** Once an application has been generated, it may be executed under the control of the DMS/DPPX Execution Facility product. DMS/DPPX Execution Facility retrieves the application definition from the DPPX library, initializes it to the run-time environment and manages the execution of the application.

**CUSTOMER RESPONSIBILITIES**

**INSTALLATION:** The DMS/DPPX installation procedure consists of loading programs and data files from the distribution diskettes to disk. All DMS programs are distributed in object module form and program assembly is not required.

The DMS/DPPX FEP1 installation package contains a complete set of replacement modules for DMS/DPPX and may be installed as a FEP or as a Service Level Update. Installation of the FEP rather than the Service Level Update is recommended for systems that have DMS already installed.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum configuration for DMS/DPPX is:

- One IBM 8100 Information System with 384K bytes of storage.
- One display terminal with a 1,920-character screen and 12 program function keys.
- One operator terminal (Execution Facility).

For system libraries, any appropriate storage devices supported by DPPX/BASE are allowed.

For user data storage and system data sets, at least one disk storage unit is required, which may be the same as required for DPPX/BASE system operation.

**SOFTWARE REQUIREMENTS**

DMS/DPPX (Definition) and DMS/DPPX Execution Facility require the following product:

Program Name	Program Number
DPPX/BASE	5760-010

DMS/DPPX (Definition) also requires:

Program Name	Program Number
DPPX/DPS (FM) V1 or DPPX/DPS (FM) V2	5760-XR1 5760-264
DPPX/DPS IMD V1 or DPPX/DPS IMD V2	5760-XR1 FC #6000 or 6001 5760-264 A, B or C

DMS/DPPX Execution Facility may use the following products:

Program Name	Program Number
DPPX/DTMS (interactive applications and if DTMS data bases are accessed)	5760-TD1
DPPX/DPS FM (if maps are used)	5760-XR1
DMS/DPPX (Definition) (if application modification is required)	5760-XC2

**Storage Requirements:** DMS/DPPX (Definition) requires a minimum of 48K real storage. Additional storage is required for multiple concurrent users.

DMS/DPPX Execution Facility requires a minimum of 38K bytes of real storage plus the size of the run-time application. DMS applications vary in size from 4K for a small application to 20K bytes or more for larger applications.

These storage requirements do not include data storage, or storage for other licensed programs or the concurrently resident application programs.

## PROGRAM PRODUCTS

**DMS/DPPX FEP1 (cont'd)****COMPATIBILITY and PORTABILITY**

**COMPATIBILITY with EARLIER RELEASES:** DMS/DPPX Execution Facility FEP 1 will execute applications generated with DMS/DPPX Fix Package 204 or later.

Applications generated with DMS/DPPX FEP1 will require FEP1 of the DMS/DPPX Execution Facility for execution.

**COMPATIBILITY with DMS/CSP:** DMS/DPPX and DMS/CSP provide a means for defining applications which, with little or no change, can be migrated between S/370, 30XX, 4300 and 8100 systems. This is achieved as follows:

The definition facilities, by which a user describes his application, maps, and data, are identical in DMS/DPPX and DMS/CSP. These definitions are stored in a Member Specification Library which can be moved from one DMS system to another. DMS/DPPX and DMS/CSP each include utilities for moving definitions between them.

The generation and execution facilities recognize differences between environments and allow use of certain facilities unique to the environment. While use of these facilities does not preclude portability, the user should be cautious in taking advantage of them during definition as they may introduce some extra effort into migrating between DMS-supported environments.

Additional information on application portability is included in the *DMS/DPPX General Information Manual* (GH20-2154).

**COMPATIBILITY with DMS/DPCX:** DMS/DPPX, DMS/DPCX and DMS/CSP are conceptually the same in the definition phase, however, DMS/DPPX and DMS/CSP offer functions that are not available with DMS/DPCX. Applications developed on DMS/DPPX or DMS/CSP which use these unique capabilities may require redesign or redefinition if the application is also to be generated for a DPCX system.

Applications defined using DMS/DPCX are portable to DMS/DPPX or DMS/CSP environments within previously published restrictions. For more information about DMS portability, see the *DMS/CSP General Information Manual*.

**COMPATIBILITY with DMS/3790:** An objective of DMS/DPPX is to provide user interface compatibility where functional properties are similar. A conversion aid program that executes under DPPX is provided to convert Display Management System/3790 (DMS/3790) panel (map) files into a format which is compatible with DMS/DPPX and DMS/DPCX. IBM 3790 function programs (FPs) that use these map definitions must be manually converted by the user. However, the user can use the DMS/DPPX or DMS/DPCX definition facilities to redefine his programs.

**CONVERSION:** Not applicable.

**DOCUMENTATION**

(available from Mechanicsburg)

*(Definition) General Information* (GH20-2154) ... *Execution Facility General Information* (GH20-2438) ... *(Definition) Program Reference and Operation* (SH20-2420) ... *Execution Facility Program Reference and Operation* (SH20-2473) ... *Messages and Codes* (SH20-2491) ... *(Definition) Licensed Program Specifications* (GH20-5298) ... *Execution Facility Licensed Program Specifications* (GH20-5317) ... *Reference Summary* (GX20-2379)

**TERMS and CONDITIONS:** See PP Index

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
PRESENTATION SERVICES for 3640 TERMINALS  
DPPX/PS3640 (5660-267)**

**PURPOSE**

This licensed program is an ease-of-use aid for users of the 8100 Information System with Distributed Processing Programming Executive Base (DPPX/BASE) or the Distributed Processing Programming Executive/System Product (DPPX/SP) which provides presentation services support, including transaction invocation, formatting, editing, message assembly, message buffering and time-of-day broadcasting, for selected 3640 terminals. These functions simplify the programming on the 8100 of the 3640 terminals, specifically the 3641, 3642, 3644, 3646 and the 3647. All aspects of programming can benefit - design, implementation, testing and maintenance.

**SPECIAL SALES INFORMATION**

8100 customers can benefit from the device-independent support provided by DPPX/PS3640 EM at application run time. DPPX/PS3640 ITG is of benefit where the 8100 is being used to write applications - this may be at a central 8100 in the DP center or a remote 8100 where programs to be run locally are developed.

**DESCRIPTION**

The DPPX/PS3640 Execution Manager (EM), the runtime component which uses the DPPX/BASE and DPPX/SP 3640 exit facility, can be invoked from applications written in DPPX COBOL, DPPX Assembler language or Distributed Processing Development System (DPDS) - Programming Language for Distributed Systems (PL/DS), including those running under Data Base and Transaction Management System (DPPX/DTMS). To utilize DPPX/PS3640, the application program passes the address of the application control header and the application data area when issuing a COBOL WRITE (or the equivalent macro instructions for Assembler language and PL/DS). Included in the application header are the transaction group name and the transaction step map name which is specified by the application program. The structure of the control area is supplied by IBM with the DPPX/PS3640 code. The application data structure area is generated by the Interactive Transaction Generator (ITG) feature of DPPX/PS3640. Transaction functions required by the application are defined in maps previously created through ITG.

DPPX/PS3640 provides, as an optional feature, the Interactive Transaction Generator (ITG) which is the program development time component. This feature is an online programming aid, enabling the application programmer to create and update a library of maps and tables. These maps, which are called transaction step maps, contain parameters which specify the type of media, variable fields and their attributes, prompt messages (if applicable), indicator controls (lights and buzzer), and edit tables if required. ITG uses the standard DPPX and DPPX/SP I/O facilities. In DPPX/SP environments, it also uses the Distributed Presentation Services (DPPX/DPS) components, Interactive Map Definition (IMD) feature and Format Management (FM), during its execution. In DPPX/SP environments, it also uses the FM component of DPPX/SP and DPPX/SP IMD licensed program. These components must therefore be available on the machine where ITG transaction definition takes place.

A transaction is created by the user defining or copying (previously defined) transaction step maps into a transaction group. Following the creation or modification of this transaction group by ITG, before it can be used by an application program and EM, a special ITG generate process must be invoked, the result of which is:

- An application data structure for the appropriate application language (DPPX COBOL, DPPX assembler language or PL/DS) placed on a source copy library.
- A transaction group object module which is placed on a map module library.

The key to the transfer of data between application and the 3640 terminal is the map which EM loads and which contains the following information:

- The structure of the input/output data when passed to/from the application program.
- A definition of the constant data and/or prompt message(s).
- The edit checks to be performed on the variables entered.
- Tables to provide functions such as range checking and variable flow control.
- Error control including operator guidance lights.
- Device control information (e.g., buzzer, enable keyboard).
- Message buffering.
- Time of day (TOD) formatting for the 3641 and 3647 terminals along with TOD broadcasting to 3641 terminals and synchronization with the 3647 terminals.

Transaction step maps are grouped together into a transaction group which basically links together the several steps required for a transaction. These usually are prompts followed by the terminal operator entering data via a fixed media such as a magnetic stripe or via a keyboard entry from a 3641.

DPPX/PS3640 code is reentrant and reusable; at the installation's option selected modules may be transient.

**DPPX/PS3640 INTERACTIVE TRANSACTION GENERATOR SUMMARY:**  
At program development time or during maintenance, the application programmer invokes the DPPX/PS3640 ITG feature to describe a run-time 3640 transaction including constant data, variable data to be presented to or by the end user, and edit characteristics and tables.

ITG aids the application programmer in describing the 3640 device interface with the end user. It facilitates transaction specification by virtue of the following programmer oriented interactive design concepts:

- Full screen context editing capability for entry of 3641 display and 3642 printer formats.
- Horizontal and vertical software driven scrolling capability.
- Menu driven processes.
- HELP facility.
- Restart capability - changes can be automatically recovered.
- Default values for map characteristics.
- The ability for existing DPPX/PS3640 ITG map specifications to be copied as initial specification for a new map.
- Library management utilities.
- Generate process to provide a structure for application data and to reduce the need for recompilation.
- Print utility.

**The DPPX/PS3640 ITG Feature Allows an Application Programmer to Describe Online Transactions for the 3640 Terminals**

When ITG is invoked, or on completion of a process, the initial selection menu is displayed. The user may select one of the following processes or terminate ITG. Each process is also menu driven.

**Map Editor Process**

The Map Editor allows the user to create new transaction step maps and to edit existing ones. The user may specify the map layout, field attributes and application data structure details. This process consists of a series of screens which ask the user to specify such items as:

- Type of media.
- Map exit program name (if desired).
- Error map flow.
- Light control.
- Map flow variable control.
- Buzzer control.
- Magnetic stripe creation specifications.
- Display layout including prompt messages (constants) and variable fields including edit attributes.
- Control map characteristics - Includes special device specifications for the 3641 and 3647 terminals.

**Library Management Process**

Provides utility functions for managing the map specification library: List Directory - Copy - Rename - Delete. An audit trail is kept of map modifications, and when the generate process was last invoked.

**Generate Process**

Before maps can be used by an application program, the map specifications have to pass through the generate process. There are two types of output from this process.

- a. Each transaction group generates an application data structure (for the specified application language) which is cataloged on a source copy library.
- b. Each transaction group generates one object map module which is cataloged on a map module library.

**DPPX/PS3640 (cont'd)**

A report is also produced. When the application data structure is not changed, recompilation of the application program is not necessary as a result of the generate process.

**Utility Process**

Used to print, import and export members of the map specification library.

**Transaction Group Editor**

Allows the user to review the application data structure that is defined for a transaction group and modify it if necessary. The user can delete, insert or reorder variables; their names and characteristics may be changed; and variables may be designated as subfields of other variables. In addition this process allows the user to review and modify the map flow control in a transaction group.

**Table Editor**

Table editor functions are used to create and modify the tables that control the transaction ID translation and direct map flow based on a transaction ID or function Key. It is also used for generating edit tables for input variable verification (such as range check) and specifying map flow.

**Time of Day Specification**

The time of day specification frames allow the user to create a new time of day table and to edit an existing one. The user may specify the type of clock to be displayed (12 or 24 hour), how often it is to be updated, the frequency of synchronization of the 3647's clocks with the 3641, and if the time to be displayed should be different from the 8100 timer value.

**Tutorial Process**

Online documentation of DPPX/PS3640 ITG. This facility is modeled on the TSO/SPF tutorial mode.

The HELP facility allows the user to obtain additional information about any error message displayed, or general information about a subcommand or options, by entering the tutorial process at the appropriate chapter.

In the event of a system failure, ITG will automatically save any changes that have been made and optionally recover (providing the map specification index is still usable - ITG will not attempt recovery of the index).

Application programs development is completed by

1. Compilation/assembly of the source program with a copy from the source copy library of
  - a. The IBM-supplied control structure and
  - b. ITG generated application data structure
 and
2. Compilation/assembly of any user exit code.

The transaction group/transaction step map specified in the control header is loaded by DPPX/PS3640 EM at application run time.

**DPPX/PS3640 EXECUTION MANAGER SUMMARY:** DPPX/PS3640-EM is designed to work under DPPX/BASE or DPPX/SP using the 3640 exit facility.

**IBM 3640 Devices Supported BY DPPX/PS3640 EM**

Device	Type
3641	Reporting Terminal
3642	Encoder Printer
3644	Automatic Data Unit
3646	Scanner Control Unit
3647	Time and Attendance Terminal

Note: Support for the 3643 and 3645 terminals is included in DPPX Distributed Presentation Services (DPPX/DPS) and DPPX/SP.

**DPPX/PS3640 EM Provides the Application Run-Time Support and Interacts with the End User at a 3640 Terminal**

Functions provided by DPPX/PS3640 EM are:

Basic mapping (media definition ... map characteristics ... variable field definition and edit characteristics ... table creation and modification ... feedback information) and user exits.

The *Basic Mapping* function of EM allows the application to send and receive data in a device independent manner, using maps previously generated by ITG. The map contains device dependent information required for the manipulation of the data stream. Changes to maps (using ITG) which do not change the application data structure can be made without the need to recompile the application program and copy a new data structure.

Media definition identifies the type of media the map will define: Display, magnetics, punched card, punched badge, print, DI, DO, 3644 or control.

Map characteristics defines various characteristics of the map and include: Map exit name, map flow, lights, buzzer, time of day and type of magnetic encoding.

Variable fields can be defined and associated with an application data structure. Edit characteristics can be specified to be performed upon data entry. These edit characteristics include: Literal check, range check, table check, field assembly (combining numeric fields entered one at a time via a "menu" card into a single field), folding, alphabetic/numeric check, length check and right/left justification.

Table creation/modification allows the user to define and change tables used for range checks, function key translation to a transaction ID, and variable map flow control.

Feedback information is provided through the control header, indicating a class of error and details within that class.

*User Exits* provide a capability for the user to write programs in DPPX COBOL, DPPX assembler language or PL/DS. These programs will use a subset of program language facilities. Typical uses on output are special conversion and editing and provision of device specific control information to the application on input.

**Relationship Between DPPX/PS3640 ITG and DPPX/PS3640 EM**

Programmer at terminal (program development time)

- Uses - ITG (which utilizes DPPX/DPS IMD and FM) or the FM component of DPPX/SP and DPPX/SP licensed programs
  - to create - Transaction step maps
  - to generate - Application data structures on source copy libraries
  - and - Transaction group maps on Map Module Libraries

Uses - DPPX/BASE or DPPX/SP interactive editor

- to create - Source program
- User exit code

Uses - DPPX COBOL, DPPX assembler (DPPX/ASM) or PL/DS

- a) with - Source program input and
- copies - Control header and application data structure
- to create - Program modules
- b) with - User mapping exit code
- to create - User mapping exit load module

End user at IBM 3640 terminal (application run-time)

- invokes - Transaction which in turn
  - Invokes the appropriate group of maps passing data both to and from the application data structure if required
- interacts - With application program and the user exit code via the application data structure and control header

**The Application Program Interface (API) is the Means of Invoking DPPX/PS3640 EM at Application Run-Time**

The functions required in a transaction are defined in maps which have been previously created using ITG. A transaction can be invoked by DPPX/PS3640 EM from applications written in DPPX/COBOL, DPPX assembler language or PL/DS which pass:

- The transaction group name and the transaction step map name (in the control header).
- (The address of) the control header and application data area.

The control header is used to indicate transaction group and step-names, feedback and other control information.

**DPPX/PS3640 (cont'd)**

**CUSTOMER RESPONSIBILITIES**

To install and use DPPX/PS3640 the user must:

Acquire a knowledge of the functions provided through reading *DPPX/PS3640 User's Guide*, and be familiar with DPPX/BASE and DPPX/DPS or DPPX/SP and DPPX/SP IMD ... understand the use of the application program interface in DPPX/COBOL, DPPX Assembler language or PL/DS to invoke DPPX/PS3640 EM ... understand the DPPX or DPPX/SP initialization and customization processes described in *DPPX or DPPX/SP Installation: Guide (SC27-0401)* as they relate to DPPX/PS3640 ... carry out approved problem determination procedures before contacting IBM for program service ... install fix packages and service level updates as appropriate.

**SPECIFIED OPERATING ENVIRONMENT**

**DPPX/PS3640 INTERACTIVE TRANSACTION GENERATOR**

**HARDWARE REQUIREMENTS**

The minimum configuration is:

IBM 8100 Information System with 512K bytes of processor storage.

IBM operator console or terminal.

IBM display terminal with 1920-character screen and at least 12 program function keys (can be operator console).

**Direct access:** For system libraries, any appropriate devices supported by DPPX/BASE or DPPX/SP are allowed. For DPPX/PS3640 user data storage and DPPX/PS3640 Interactive Transaction Generator system data sets, at least one disk storage unit is required, which can be the same device as required for DPPX/BASE system operation.

**SOFTWARE REQUIREMENTS**

DPPX/PS3640 ITG requires the following products:

DPPX/SP	5660-281
	or
DPPX/BASE	5760-010
DPPX/DPS V1	5760-XR1
	or
DPPX/DPS V2	5660-264

DPPX/PS3640 ITG is designed to work with the above products and subsequent modifications unless otherwise stated in a future program announcement.

**DPPX/PS3640 EXECUTION MANAGER**

**HARDWARE REQUIREMENTS**

The minimum configuration for application execution under EM is:

IBM 8100 Information System with 512K bytes of processor storage.

IBM operator terminal.

Selected IBM 3640 terminal (3641, 3642, 3644, 3646, 3647).

**Direct access:** For system libraries, any appropriate devices supported by DPPX/BASE or DPPX/SP are allowed.

For DPPX/PS3640 Execution Manager user data storage and DPPX/PS3640 Execution Manager system data sets, at least one disk storage unit is required, which may be the same device as required by DPPX/BASE or DPPX/SP system operation.

**SOFTWARE REQUIREMENTS**

The Execution Manager operates under the control of DPPX/BASE or DPPX/SP with the 3640 exit facility.

**PLANNING CONSIDERATIONS**

**Machine:** The storage requirements of DPPX/PS3640 Execution Manager are dependent upon various configuration and workload parameters including the number of devices, device types, number of resident transaction group maps and the amount of resident Execution Manager code. The following data does not include the resident DPPX or DPPX/SP exit manager storage requirement; neither does it include the exit environment work area because this is not used by the Execution Manager.

In a production, response oriented, environment of 20 terminals (consisting of a mixture of 3641s, 3642s, 3644s, 3646s and 3647s) supporting 25 different transactions, including time of day to 3641/3647s, the storage requirement for DPPX/PS3640 Execution Manager would be approximately 126K bytes. This figure includes DPPX/PS3640 Execution Manager code (80K bytes), control blocks and dynamic storage (33.8K bytes), and transaction group map storage (12.2K bytes).

The minimum storage requirement for a single 3641 terminal system supporting 10 transactions is approximately 6.2K bytes. This figure includes 3K bytes for DPPX/PS3640 Execution Manager code, 2.4K

bytes for control blocks and dynamic storage, and 750 bytes for transaction group map storage. Note that with DPPX/PS3640 Execution Manager, system programmers are able to make trade-offs of response time against storage consumption.

In an application development environment, where a single user is creating typical transaction step maps using DPPX/PS3640 Interactive Transaction Generator, approximately 39.5K bytes of storage is required. This consists of 18K bytes for permanently resident DPPX/PS3640 Interactive Transaction Generator code, 4.5K bytes for dynamically loaded DPPX/PS3640 Interactive Transaction Generator process code and 17K bytes for control blocks and dynamic storage. Note that in DPPX environments, DPPX/PS3640 Interactive Transaction Generator necessitates the installation of DPPX/DPS - Distributed Presentation Services - both the Interactive Map Definition and Format Management components, DPPX/BASE indexed access method and relative sequential access method services, and therefore additional storage is required these services. In DPPX/SP environments, it also uses the FM component of DPPX/SP and DPPX/SP IMD licensed program. The storage for control blocks and buffers for these services is included in the total of 39.5K bytes. Each additional user requires approximately 21.5K bytes for the DPPX/PS3640 Interactive Transaction Generator process code, control blocks and dynamic storage.

The configuration must include sufficient I/O devices to support the requirements for system residence and system data sets. Sufficient direct access storage must be available to satisfy the user information storage requirements and can consist of any direct access facility supported by the DPPX/BASE or DPPX/SP indexed access method, unless otherwise stated. DPPX/PS3640 Execution Manager object code requires approximately 225K bytes (900 256-byte blocks) of disk storage, DPPX/PS3640 Interactive Transaction Generator object code requires approximately 875K bytes (3,500 256-byte blocks) of disk storage plus 775K bytes (3,100 256-byte blocks) of disk storage for DPPX/PS3640 Interactive Transaction Generator online documentation.

Use of DPPX/PS3640 Interactive Transaction Generator requires a DPPX/DPS or DPPX/SP FM Format Management supported display with a screen width of 80 characters, depth of at least 24 lines and with a keyboard that has 12 or more program function keys.

DPPX/PS3640 EM supports the following IBM 3640 devices:

Device	Type
3641	Reporting Terminal
3642	Encoder Printer
3644	Automatic Data Unit
3646	Scanner Control Unit
3647	Time and Attendance Terminal

**Note:** Support for the 3643 and 3645 terminals is included in DPPX/DPS and in the FM component of DPPX/SP and DPPX/SP IMD.

These terminals may be attached either by a data link through a 3842 or 3843 Loop Control Unit or by the directly attached IBM Multiuse Communications Loop.

**Programming:** This licensed program is designed to work with the DPPX/BASE or DPPX/SP licensed program using the 3640 exit facility. DPPX/PS3640 also requires the DPPX/DPS licensed program on the system on which ITG is installed in DPPX environments. ITG uses the IMD and FM components of DPPX/DPS to control interactions with the display. In DPPX/SP environments, it also uses the FM component of DPPX/SP and DPPX/SP IMD licensed program.

The following programs are required depending on application programming language used:

DPPX/COBOL Compiler	5760-CB1
DPPX/COBOL Runtime Library	5760-LM1
DPPX/ASM	5760-AS1
DPDS (for PL/DS)	5799-AZL
	(Programming RQP
	P88016)

DPPX/DTMS or the DTMS component of DPPX/SP can be used optionally with DPPX/PS3640 to provide a more simple I/O interface between application programs and the 3640 terminals.

Some customers may need to transmit information, such as maps and object programs, from the 8100 where they were developed to a destination 8100 for execution. This can be done by:

1. Use of a S/370 or 4300 and the DSX (Distributed System Executive) Release 2 licensed program product, 5748-XXG. The maps etc. are transmitted from the 8100 to a S/370 or 4300 DSX library and then DSX will retransmit to the destination 8100.
2. A user written application program.
3. Use of diskette or other portable medium.



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PP 5660-267.4

Jul 83

PROGRAM PRODUCTS

DPPX/PS3640 (cont'd)

**DOCUMENTATION**  
(available from Mechanicsburg)

*DPPX/PS3640 General Information (GC31-0010) ... DPPX/PS3640  
User's Guide ... DPPX/PS3640 Licensed Program Specification ...  
DPPX/PS3640 ITG Diagnosis & Logic Overview ... DPPX/PS3640 EM  
Diagnosis & Logic Overview*

RPOs ACCEPTED: No

PROGRAM PRODUCTS

**DISTRIBUTED PROCESSING PROGRAMMING  
EXECUTIVE/  
INTERACTIVE PRODUCTIVITY FACILITY  
5660-271**

**PURPOSE**

The DPPX/Interactive Productivity Facility provides a simplified, full-screen, interactive interface to the DPPX command facility. It is designed to enhance the usability and productivity of 8100/DPPX systems by both central and remote site users.

**HIGHLIGHTS**

The DPPX/Interactive Productivity Facility supports three major functional areas, as well as tutorial information that clarifies each function.

- **System use**  
The system use dialogs are designed primarily for application developers and system analysts. They address data set, catalog and volume management and the submission of COBOL programs for background batch processing.  
The system use dialogs provide the capability to:
  - Define, delete and rename data sets.
  - Edit data sets.
  - Browse data sets.
  - Browse catalogs and display, edit and delete data sets.
  - Define, delete and display catalogs.
  - Initialize, activate and display data about volumes.
  - Copy or move data sets or catalogs.
  - Compile COBOL programs, link-edit programs and submit programs for execution in the background batch environment.
- **System operations**  
The system operations dialogs are designed primarily for remote site users who do not have a high level of data processing skills. They assist the user with the daily operation of the 8100.  
The system operation dialogs provide the capability to:
  - Display system status.
  - Use printer sharing.
  - Use batch processing.
  - Use remote job entry services.
  - Add, remove or initialize diskettes or tapes.
  - Set and verify the date and time stored in the system.
  - Maintain an operator log.
- **System management**  
The system management dialogs are primarily designed for system administrators and, in some instances, remote site operators. These dialogs are grouped under administrative services and an analyze function.  
The administrative services dialogs provide the capability to define and maintain:
  - DPPX user profiles.
  - DPPX environment profiles.
  - Printer sharing options.
  - DPPX/Interactive Productivity Facility user session options.
  - DPPX/Interactive Productivity Facility tables.
 The analyze dialogs assist with the problem determination process. These dialogs may be useful to operations or "help desk" personnel at the central site when used in conjunction with the Host Command Facility licensed program, or, in some instances, remote site operators. The analyze dialogs provide the capability to:
  - Print dump data sets.
  - Examine and print the error log.
  - Start, stop and display a system trace.
  - Test device operation.
- **Tutorials**  
The tutorial function is essentially an online user's manual. Tutorials can be invoked from the initial menu, any other menu, or data entry panel by pressing Program Function Key 1 (PF1) or entering "explain" on the command input line. The "First Use Tutorial" may be selected from the initial menu. This tutorial

describes the DPPX/Interactive Productivity Facility and how to use it. Inexperienced users should browse this tutorial before attempting any other activity.

When a tutorial is invoked by the PF1 key, an explain panel is displayed. These panels are structured so they reflect, panel for panel, the functions provided. Those at the highest level of the structure describe DPPX/Interactive Productivity Facility concepts and objectives. Tutorials for the function selection panels discuss the objectives and rationale of the particular function. Those that correspond to data entry panels offer considerations for the data to be entered, instructions for modifying an entry, and references to documents providing more detailed information. To leave any tutorial panel, the user presses the END key (PF3).

**CUSTOMER RESPONSIBILITIES**

To install and use the DPPX/Interactive Productivity Facility, it is the customer's responsibility to:

- Acquire sufficient knowledge of DPPX/BASE concepts and facilities necessary to utilize the DPPX/Interactive Productivity Facility.
- Use the installation process as described in the DPPX/Interactive Productivity Facility program directory.
- Acquire a knowledge of DPPX/Interactive Productivity Facility function by reading the *DPPX/Interactive Productivity Facility General Information* manual and the tutorials included in DPPX/Interactive Productivity Facility.
- Carry out the problem determination procedures described in the *DPPX/Command Facility Extensions Feature Diagnosis* guide before contacting IBM for program service.
- Install fix packages and service level updates.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on an IBM 8130 or 8140 Processor with 512K bytes of processor storage, with a diskette drive and with 58MB of disk storage capacity. Also required is a display supported by DPPX/DPS Format Management with a screen width of at least 80 characters and a depth of at least 24 lines. Up to 24 program function keys are supported if available on the display keyboard. Specific devices supported are:

Device Number	Device Name	Attachment
3276-12,13,14	Control Unit	
	Display Station	Loop or Data Link
3277-2	Display Station	Display/Printer Attachment
3278-2,3,4	Display Station	via 3276
3278-2,3,4,5	Display Station	via 3274-51C
3279-2A,2B,3A,3B	Color Display Station	via 3274-51C or 3276
8775-1,2	Display Terminal	Loop
8775-11,12	Display Terminal	Data Link
3104-B1, B2	Display Terminal	Loop

**Storage Requirements:** The storage requirements of this licensed program are dependent upon the various configuration and workload parameters. The parameters include: Device type, map size, message rates, number of resident maps, and the number of processing environments.

The DPPX/BASE Command Facility Extensions Feature (required for DPPX/Interactive Productivity Facility) executes in a standard DPPX interactive command facility environment (approximately 48K bytes of processor storage). Within the command facility address space, the approximate processor storage estimates for the DPPX/Command Facility Extensions Feature are:

Resident Programs (shared)	11,000 bytes
Control Blocks and Work Areas	8,000 bytes
Dynamic Variables	1,000 bytes
<b>Total</b>	<b>20,000 bytes</b>

DPPX/Interactive Productivity Facility and non-resident DPPX/BASE Command Facility Extension Feature programs are invoked as required on a temporary basis and deleted when no longer needed. They will operate within a standard command facility address space.



## PROGRAM PRODUCTS

**DPPX/Interactive Productivity Facility (cont'd)**

The DPPX/Interactive Productivity Feature requires 256-byte blocks of disk storage space in the System Program Catalog (SYSPGM) as follows:

Object Code	1500
Field Descriptor Tables	1100
Display Panel Maps	*

\* 1100 blocks of space are required for each of up to 14 selected device groups. See the *DPPX/Interactive Productivity Facility General Information* manual for further information.

The DPPX/Interactive Productivity Facility also requires 256-byte blocks of disk storage space in three catalogs for dialog scripts, tutorials, and tables.

**SOFTWARE REQUIREMENTS**

This licensed program is designed to work with the DPPX/BASE (5760-010) service level 0501, DPPX/BASE Command Facility Extensions Feature (5760-010, feature #6005, #6006 or #6007) service level 0100, and DPPX/DPS FM (5760-XR1) service level 0103. All subsequent service levels are supported unless otherwise stated.

The code portion of the licensed program is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX Assembler language with most of the original PL/DS statements shown as comments. Source code on magnetic tape and program listings on microfiche are available as optional material.

**DATA SECURITY, AUDITABILITY and CONTROL**

The DPPX/Command Facility Extensions Feature utilizes the system services of DPPX/BASE and therefore is governed by the security and auditability features within that environment. Customer management is responsible for the selection, implementation, and adequacy of these features.

**PERFORMANCE CONSIDERATIONS**

Performance of DPPX with the DPPX/Command Facility Extensions Feature and DPPX/Interactive Productivity Facility depends on a number of factors such as the system configuration, the available system resources, the number of concurrent user programs and their associated workloads and relative priorities, user data set characteristics and access methods.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/General Information (GC27-0400) ... DPPX/Interactive Productivity Facility Licensed Program Specifications ... DPPX/Interactive Productivity Facility Reference Summary .*

Users of this licensed program are encouraged to order the licensed document, *DPPX/Interactive Productivity Facility Diagnosis*. This document is available as an optional feature to the basic license.

**DPPX/BASE INTEGRITY**

IBM will accept APARS where the installation of DPPX/Interactive Productivity Facility introduces an exposure to the system integrity of DPPX/BASE.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**DISTRIBUTED PROCESSING PROGRAMMING  
 EXECUTIVE/  
 INTERACTIVE PRODUCTIVITY FACILITY  
 RELEASE 2  
 5660-271**
**PURPOSE**

The DPPX/Interactive Productivity Facility (IPF) provides a simplified, full-screen, interactive interface to the DPPX command facility. It is designed to enhance the usability and productivity of 8100/DPPX systems by both central and remote site users.

Release 2 is an enhancement to the current release of DPPX/Interactive Productivity Facility. Enhancements have been made to System Operations dialogs in the area of Printer Sharing and Diskette Volume utilities; System Use dialogs in the area of Browse, Edit, Dataset utilities, Catalog utilities and Copy utilities. A new dialog has been included to allow execution of DPPX Commands and CLISTs directly from DPPX/Interactive Productivity Facility.

The following paragraphs contain general information pertaining to DPPX/IPF Release 2. A subsequent section covers follow-on Functional Enhancement Package (FEP) Highlights to Release 2.

**HIGHLIGHTS**

The DPPX/Interactive Productivity Facility supports the functional areas of System Use, System Operations and System Management, as well as help information that clarifies each function.

- System use
 

The system use dialogs are designed primarily for application developers and system analysts. They address data set, catalog and volume management and the submission of COBOL programs for background batch processing.

The system use dialogs provide the capability to:

  - Define, delete and rename data sets.
  - Edit data sets.
  - Browse data sets.
  - Browse catalogs and display, edit and delete data sets.
  - Define, delete and display catalogs.
  - Initialize, activate and display data about volumes.
  - Copy or move data sets or catalogs.
  - Compile COBOL programs, link-edit programs and submit programs for execution in the background batch environment.

**RELEASE 2 ENHANCEMENTS**

**Browse data set** provides a new FIND command to search for a character string bounded by blanks (WORD), preceded by a blank (PREFIX) or followed by a blank (SUFFIX). The search can be started or ended at a specific column number. A new MARKER command will display column markers at the top and bottom of the display area. The capability has been added to set the SCROLL field to a specific number of lines instead of a half or full page.

**Edit data set** allows an initial CLIST to be specified that contains EDIT subcommand defaults.

**Data set utilities** support the building of index datasets, recovery of a data set and defining and deleting aliases. The copy/move function is now supported as part of data set utilities. A data set can now be defined by specifying a model data set.

**Catalog utilities** support copy/move function and copying of non-uniform catalogs.

**System Operations**

The system operations dialogs are designed primarily for remote site users who do not have a high level of data processing skills. They assist the user with the daily operation of the 8100.

The system operation dialogs provide the capability to:

- Display system status.
- Use printer sharing.
- Use batch processing.
- Use remote job entry services.
- Add or remove diskette or tape volumes to or from the system.
- Set and verify the date and time stored in the system.
- Maintain an operator log.

**Release 2 Enhancements**

- Submit Data Set for Printing supports the additional printer sharing options of hold, headers, FCB name, train, form and type.
- Print Data Set Selection supports the additional options of forms, hold and type.
- Data Sets Awaiting Printing supports hold and release of a data set display and changing print request characteristics.
- Change Print Request Options supports new printer sharing function which allows the user to change printer sharing submit options for a data set on the printer sharing queue. The options which can be changed are class, copies, delete, hold, job name, headers, suppression, FCB name, train name and form name.
- Override Printer Job Selection allows the redefinition of the job selection criteria for a printer.
- Printer Start Options allows additional start options RULOGMODE, wait, restart mode, restart scope and entry of a symbolic printer name.

**Volume Utilities**

- Diskette volume utility has been enhanced to reduce the amount of data entry required. The adapter and device name are the only data required. The dialog verifies if the adapter is active and activates it if required. The Volume ID and Volume Catalog name of the diskette is read from the diskette and if the volume catalog is not defined to DPPX, the Define Catalog command is issued. The activate volume command is issued and a message displayed identifying the volume ID and VOLCAT mounted.

**Command/CLIST Execution**

- This new function allows the user to enter a list of DPPX commands and CLIST, and selectively execute them. The list is retained across sessions. This reduces the times a user must use Suspend/Resume to execute DPPX commands and CLISTS.

**System Management**

The system management dialogs are primarily designed for system administrators and, in some instances, remote site operators. These dialogs are grouped under administrative services and an analyze function.

The administrative services dialogs provide the capability to define and maintain:

- DPPX user profiles.
- DPPX environment profiles.
- Printer sharing options.
- DPPX/Interactive Productivity Facility user session options.

The analyze dialogs assist with the problem determination process. These dialogs may be useful to operations or "help desk" personnel at the central site when used in conjunction with the Host Command Facility licensed program, or, in some instances, remote site operators. The analyze dialogs provide the capability to:

- Print dump data sets.
- Examine and print the error log.
- Start, stop and display a system trace.
- Test device operation.

**Help Facilities**

The help function is essentially an online user's manual. The help function can be invoked from the initial menu, any other menu, or data entry panel by pressing Program Function Key 1 (PF1) or entering "help" on the command input line.

The "First Use Tutorial" may be selected from the initial menu. This tutorial describes the DPPX/Interactive Productivity Facility and how to use it. Inexperienced users should browse this tutorial before attempting any other activity.

When a help function is invoked by the PF1 key, a help panel is displayed. These panels are structured so they reflect, panel for panel, the functions provided. Those at the highest level of the structure describe DPPX/Interactive Productivity Facility concepts and objectives. Help panels for the function selection panels discuss the objectives and rationale of the particular function. Those that correspond to data entry panels offer considerations for the data to be entered, instructions for modifying an entry, and references to documents providing more detailed information. To leave any help panel, the user presses the END key (PF3).

**DPPX/Interactive Productivity Facility R2 (cont'd)**

**CUSTOMER RESPONSIBILITIES**

To install and use the DPPX/Interactive Productivity Facility, it is the customer's responsibility to:

- Acquire sufficient knowledge of DPPX/BASE concepts and facilities necessary to utilize the DPPX/Interactive Productivity Facility.
- Use the installation process as described in the DPPX/Interactive Productivity Facility program directory.
- Acquire a knowledge of DPPX/Interactive Productivity Facility function by reading the *DPPX/Interactive Productivity Facility General Information* manual and the tutorials included in DPPX/Interactive Productivity Facility.
- Carry out the problem determination procedures described in the *DPPX/Command Facility Extensions Feature Diagnosis* guide before contacting IBM for program service.
- Install fix packages and service level updates.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on an IBM 8130 or 8140 Processor with 512K bytes of processor storage, with a diskette drive and with 58MB of disk storage capacity. Also required is a display supported by DPPX/DPS Format Management with a screen width of at least 80 characters and a depth of at least 24 lines. DPPX/Interactive Productivity Facility commands can be executed via program function keys if available on the display. All displays with an 80 character by 24 line screen supported by DPPX Version 1 and 2 are supported by DPPX/Interactive Productivity Facility.

**Storage Requirements:** The storage requirements of this licensed program are dependent upon the various configuration and workload parameters. The parameters include: Device type, map size, message rates, number of resident maps, and the number of processing environments.

The DPPX/BASE Command Facility Extensions Feature Level 2 (required for DPPX/Interactive Productivity Facility Release 2) executes in a standard DPPX interactive command facility environment. Within the command facility address space, the approximate processor storage estimates for the DPPX/Command Facility Extensions Feature are:

Resident Programs (shared address space)	11,000 bytes
Control Blocks and Work Areas (user address space)	8,000 bytes
Dynamic Variables (user address space)	1,000 bytes
Total	20,000 bytes

DPPX/Interactive Productivity Facility and non-resident DPPX/BASE Command Facility Extension Feature programs are invoked as required on a temporary basis and deleted when no longer needed. They will operate within a standard command facility address space.

DPPX/Base Command Facility Extensions Feature Release 2 and DPPX/Interactive Productivity Facility Release 2 requires the following 256-byte blocks of disk storage space in the System Program Catalog (SYSPGM):

	Programs and Messages	Display Panel Maps *
DPPX/Base Command Facility Extensions Release 2	2,500	60
DPPX/Interactive Productivity Facility Release 2	1,000	8
TOTAL	3,500	

\* Blocks of disk storage space for display panel maps are required for each one of up to 14 selected device groups using DPPX/DPS Version 1 or DPPX/DPS Version 2.

The DPPX/Base Command Facility Extensions Feature and DPPX/Interactive Productivity Facility also require disk storage in three DPPX/Base Command Facility Extensions Feature Release 2 user catalogs for dialog scripts, help panels and tables; 2,600 256-byte blocks are required for DPPX/Base Command Facility Extensions Feature Release 2 and 5,200 256-byte blocks are required for DPPX/Interactive Productivity Facility Release 2.

**SOFTWARE REQUIREMENTS**

This licensed program is designed to work with the DPPX/BASE (5760-010) FEP5 level, DPPX/BASE Command Facility Extensions Feature Level 2 (5760-010, feature #6005, #6006 or #6007), and DPPX/DPS Format Management (5760-XR1) or DPS Format Management Version 2 (5660-264).

The code portion of the licensed program is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX Assembler language with most of the original PL/DS statements shown as comments. Source code on magnetic tape and program listings on microfiche are available as optional material.

**DATA SECURITY, AUDITABILITY and CONTROL**

The DPPX/Base Command Facility Extensions Feature utilizes the system services of DPPX/BASE and therefore is governed by the security and auditability features within that environment. Customer management is responsible for the selection, implementation, and adequacy of these features.

**PERFORMANCE CONSIDERATIONS**

Performance of DPPX with the DPPX/Command Facility Extensions Feature and DPPX/Interactive Productivity Facility depends on a number of factors such as the system configuration, the available system resources, the number of concurrent user programs and their associated workloads and relative priorities, user data set characteristics and access methods. DPPX/Interactive Productivity Facility Release 2 performance will be equal to that of Release 1.

**FUNCTIONAL ENHANCEMENT PACKAGE to IPF RELEASE 2**

**HIGHLIGHTS**

The DPPX/Interactive Productivity Facility supports the major functional areas of system use, system operation, and system management, as well as help information that clarifies each function.

**System Use**

- The system use dialogs are designed primarily for application developers and system administrators. They address data set catalog, catalog, and volume management, and the submission of COBOL programs for background batch processing.
- Release 2 user catalogs for dialog scripts, help panels, and tables.

**SOFTWARE REQUIREMENTS**

IPF Release 2 is designed to operate with the DPPX/BASE (5760-010) FEP 6 level, DPPX/BASE Command Facility Extensions feature Release 2 (5760-010, feature #6005, #6006 or #6007), and DPPX/DPS Format Management (5760-XR1) or DPPX/DPS Format Management Version 2 (5660-264).

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/Interactive Productivity Facility Licensed Program Specifications* (GH20-5307) ... *DPPX General Information* (GC27-0400) ... *DPPX/Interactive Productivity Facility Summary* (GX20-2380).

Users of this licensed program are encouraged to order the licensed document, *DPPX/Interactive Productivity Facility Diagnosis* (LY20-2511). This document is available as an optional feature to the basic license.

**DPPX/BASE INTEGRITY**

IBM will accept APARS where the installation of DPPX/Interactive Productivity Facility introduces an exposure to the system integrity of DPPX/BASE.

**RPOs ACCEPTED:** No

**APAR Processing:** All APARs will be processed throughout the period during which central service is provided, regardless of the service level of DPPX/Interactive Productivity Facility Release 2 in use by the customer. Preventive service fixes, however, will only be developed for the latest available service level and may not be applicable to previous service levels, unless otherwise announced.

Corrective service will be developed for the last service level preceding DPPX/Interactive Productivity Facility Release 2 for 6 months from availability of DPPX/Interactive Productivity Facility Release 2. Customers remaining on the service level preceding Release 2 will receive this corrective service on request.

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**5660-272 - DPPX/PDA  
8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
PROBLEM DETERMINATION APPLICATION**

**PURPOSE**

DPPX/PDA program provides improved central network management for 8100 Information Systems. DPPX/PDA will reside in the 8100 and will work in conjunction with the Network Problem Determination Application Version 2 (NPDA V2) and the Network Communications Control Facility (NCCF) Release 2 or Version 2 in a host S/370 or 4300. DPPX/PDA will interface with the DPPX error log, analyze errors that have occurred, and notify the host NPDA V2 which in turn will notify the central network operator who can take appropriate action. DPPX/PDA will also accept alerts originated by devices attached to the 8100 as well as alerts generated by DPPX applications, and pass them through to the host NPDA V2.

**SPECIAL SALES INFORMATION**

The DPPX/PDA licensed program is particularly useful to those DPPX users who are part of an S/370 or 4300-based network and who want to manage that network from a central site through use of IBM-supplied network management tools such as NCCF Release 2 or Version 2 and NPDA Version 2, and especially to those who want the central-site control operator to be automatically informed about problem areas and potential problem areas in his network nodes.

**HIGHLIGHTS**

- Detects alert conditions by analyzing DPPX error log entries and sends unsolicited alerts (REFCMS type 00) to the host.
- Transmits to the host alerts received from user applications and from devices attached to the 8100, e.g., the 3600 Finance Communication System.

**DESCRIPTION**

**Functional Capabilities:** The DPPX/PDA licensed program acts as a sensor for central network management by scanning all error log records and reacting to those which require network management action. Additionally, DPPX/PDA forwards to the host alerts received from devices attached downstream. The specific functions provided by DPPX/PDA are:

- System alert processing. This function generates an alert RECFMS (type 00) for unsolicited transmittal to the host system (S/370 or 4300). The alerts are received by the Network Problem Determination Application Version 2 (NPDA V2). Alerts are produced from DPPX error log entries which indicate that:
  - An unrecoverable device or adapter error has occurred.
  - An SDLC primary adapter transmission counter threshold has been exceeded.
  - A program, either IBM-provided or user-written, which was running in a critical environment, has failed.
  - A user application or an authorized terminal operator has issued an alert command indicating that he wishes to notify the host of a condition in the 8100 system.

Alerts are also transmitted to the host when they are received from devices attached to the 8100, e.g., the 3600 Finance Communication System.

**CUSTOMER RESPONSIBILITIES**

The customer must install the Distributed Processing Programming Executive Base (DPPX/BASE) licensed program and provide sufficient real storage for DPPX/PDA.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

DPPX/PDA will operate on an IBM 8100 Information System with DPPX/BASE. All DPPX/PDA modules are transient and therefore do not require permanent allocation of main storage.

No unique input/output devices are required for DPPX/PDA to operate.

**SOFTWARE REQUIREMENTS**

DPPX/PDA is designed to run under control of the DPPX/BASE licensed program (5760-010), which provides facilities for its operation.

DPPX/PDA is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX Assembler language with most of the original PL/DS statements shown as comments.

DPPX/PDA operates with Network Problem Determination Application Version 2, which runs with the Network Communications Control Facility (NCCF) Release 2 or Version 2 on IBM S/370 or 4300.

**DATA SECURITY**

DPPX/PDA runs under DPPX/BASE and is subject to the controls that it provides. Customer management is responsible for the selection, application and adequacy of these controls for their environments. DPPX/PDA accesses hardware and software failure data but not customer data (or any sampling) involved in the failure. DPPX/PDA acquires no customer data which is not directly supplied to it by the customer.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX General Information Manual (GC27-0400) ... DPPX/PDA Licensed Program Summary (GC27-0631) ... DPPX/PDA Licensed Program Specification*

Other DPPX/BASE publications will updated as appropriate to reflect DPPX/PDA.

**DPPX/BASE SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No



## PROGRAM PRODUCTS

**IBM 8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
PROGRAMMED OPERATOR FACILITY  
5660-273****PURPOSE**

The DPPX/Programmed Operator Facility provides the ability to service messages directed to the system operator with programmed responses. It is designed to reduce the skills and effort required to operate an IBM 8100 Information System with DPPX/BASE at a remote site.

**DESCRIPTION**

The DPPX/Programmed Operator Facility will give the user of an IBM 8100 Information System the ability to intercept messages directed to the system operator and service them with pre-established program logic. Each message may have a unique programmed response associated with it, or it may be grouped with messages that have a common response. The programmed response can be specified by the user. An initial action statement file will be shipped with the licensed program. These defaults can be modified as the users determine the way in which they plan to customize the systems for their mode of operation.

Optionally, the DPPX Programmed Operator Facility may be used to intercept and handle RJE messages. It is recommended that this option be employed only when running RJE queued output.

An installation can select from the following actions to be taken by the Programmed Operator Facility when a message is received:

- Ignore the message.
  - Send a message to a DPPX/DTMS or Command Facility user who has been designated "lead operator".
  - Send a message to a user who has been designated "host operator" and who is logged on at the central host system through the Host Command Facility (HCF).
  - Broadcast a message to all logged on Command Facility and DTMS users.
  - Initiate the execution of a specific command list (CLIST).
  - Call a program.
  - Reply to a prompt from the system.
  - Solicit a response from a lead or host operator (System Prompt).
- In addition, the Programmed Operator Facility provides the user with the ability to:
- Build an indexed file of action statements that defines the desired response to messages.
  - Define and set timer event request.
  - Perform actions when a specified timer event occurs.
  - Monitor at a local or host terminal the messages and responses being received and sent by the Programmed Operator.

Messages and responses will be logged in the system operator session log.

Through the use of the Programmed Operator Facility, the requirement for a system operator attendant at a remote system may be minimized.

**CUSTOMER RESPONSIBILITIES**

To install and use the Programmed Operator Facility, the customer must be familiar with the operation and concepts of DPPX/BASE. This includes being knowledgeable in problem determination, installing fix packages, and other normal servicing functions for the operating system. In addition, the user must determine those messages that he wishes to handle in a way other than that defined in the initial action statement file, define his unique action statements, and prepare the corresponding programs, CLISTS, or messages.

**EDUCATION:** The current 8100 Information System education will be updated to reflect the new facilities of the DPPX/Programmed Operator Facility. See the *Customer Education Catalog and Schedule G320-1244* for information on 8100 Information System courses.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The DPPX/Programmed Operator Facility requires a hardware configuration capable of supporting the DPPX/BASE program product, with a minimum storage size of 512K bytes.

Most of the Programmed Operator Facility code will be transient. Storage of 12K bytes will be required for the duration of the Programmed Operator environment.

The DPPX/Programmed Operator Facility requires approximately 200K bytes (800 256-byte blocks) of disk storage in the System Program Catalog (SYSPGM). In addition, the message action statement data set and the timer event data set will each require 256 bytes per entry and indices.

**SOFTWARE REQUIREMENTS**

This program product is designed to operate with the DPPX/BASE (5760-010) service level that is current at the time of shipment, and subsequent service levels and versions unless otherwise announced. If the customer is using DPPX/Data Base and Transaction Management System (DPPX/DTMS) and/or DPPX/Distributed Presentation Services Version 2 (DPPX/DPS - V2), they also must be at the current service level at the time of shipment of DPPX/Programmed Operator Facility.

This program product is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX Assembler language with most of the original PL/DS statements shown as comments. Source code on magnetic tape and program listings on microfiche are available as optional material.

**DATA SECURITY, AUDITABILITY, and CONTROL**

The DPPX/Programmed Operator Facility utilizes the system services of the DPPX/BASE and is therefore governed by the security and auditability features within that environment. Customer management must be sensitive to system integrity considerations and is responsible for the selection, implementation and adequacy of these features.

**DOCUMENTATION:** (available from Mechanicsburg)

*DPPX/BASE General Information (GC27-0400) ...  
DPPX/Programmed Operator Facility: Guide and Reference (SC27-0649) ...  
DPPX/Programmed Operator Facility Diagnosis: Reference (LY38-3060) ...  
DPPX/Programmed Operator Facility: Messages and Codes (SC27-0646) ...  
Licensed Program Specifications.*

**SYSTEM INTEGRITY**

IBM will accept APARS where the installation of the DPPX/Programmed Operator Facility introduces an exposure to the system integrity of DPPX/BASE. This program is intended to run authorized.

**RPQs ACCEPTED:** No



**5660-281 - DPPX/SP R1  
8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
SYSTEM PRODUCT RELEASE 1**

**PURPOSE**

8100 Information System Distributed Processing Programming Executive/System Product (DPPX/SP) is a licensed program designed for distributed data processing applications running on 8100 Information Systems. It provides multi-programming, multi-user and multi-level system support for concurrent application environments. Interactive, batch, and plant floor applications are supported. DPPX/SP provides a variety of functions to communicate with S/370, 30XX, 4300, other 8100 systems, and terminals. There are facilities to simplify installation, application design, program development and system operation. DPPX/SP provides general usage system support which may be tailored or modified to suit unique requirements. DPPX/SP includes a Migration Aid feature to assist users in migrating from DPPX/BASE.

**SPECIAL SALES INFORMATION**

All IBM customers with distributed system applications are candidates for DPPX/SP. DPPX/SP is an advanced programming system designed to span a wide variety of distributed data processing environments, providing extensive function to simplify development, installation and operation of distributed systems. The 8100/DPPX/SP customer has a wide range of choices in how data processing capability is to be distributed.

**DESCRIPTION**

DPPX/SP may operate alone or with the following related licensed programs (described separately):

**DPPX Licensed Programs**

Presentation Services for 3640 Terminals (DPPX/PS3640)  
COBOL Compiler (DPPX/COBOL Compiler)  
FORTRAN Compiler (DPPX/FORTRAN Compiler)  
FORTRAN Library (DPPX/FORTRAN Library)  
Assembler (DPPX/ASM)  
Parameter Table Generation Facility for 3644 Automatic Data Unit (DPPX/GEN3644)  
Development Management System (DMS/DPPX)  
Data Capture and Management System (DCMS/DPPX)  
Performance Tool (DPPX/PT)  
APL (DPPX/APL)  
PL/I Compiler (DPPX/PL/I)  
PL/I Library (DPPX/PL/I Library)

**DPPX/SP Licensed Programs**

DPPX/SP Interactive Map Definition (DPPX/SP IMD)

**S/370, 30XX and 4300 Licensed Programs**

Distributed Systems Executive (DSX) Version 2  
Host Command Facility (HCF)

The DPPX/System Product (DPPX/SP) is a licensed program which extends the proven DDP capabilities of the DPPX/BASE operating system to provide improved usability and additional functional and connectivity enhancements. It combines and enhances the functional benefits of DPPX/BASE FEP6 (Functional Enhancement Package 6), plus ten additional DPPX licensed programs, into a single transaction-oriented product which has been system tested for use together. Menu-driven dialogs provide the primary means by which system functions are managed. Online user guidance eases the customer effort to install, customize and maintain the DPPX/SP system.

DPPX/SP comprises the following components:

DPPX/BASE  
CFE feature  
Interactive Productivity Facility  
Data Stream Compatibility  
Data Base and Transaction Management System  
Sort  
Router  
COBOL Library  
Programmed Operator Facility  
Problem Determination Application  
Remote Job Entry  
Format Management

DPPX/SP provides support for a range of 8130 and 8140 configurations including new input/output devices (i.e., the 3290 and the 3178), new performance options (i.e., DASD Cache, self-tuning buffers, Save/Restore IPL, etc.), new network/system management facilities (i.e., Link Problem Determination Application, new tract options, etc.) and improved application development and execution flexibility (i.e., Format Management, Router, etc.).

DPPX/SP is provided for both new and existing 8100 distributed data processing customers. New customers will find DPPX/SP particularly easy to install and use, allowing them to get their 8100 systems into production easier. DPPX/SP allows this activity to be accomplished

with less effort than the current DPPX licensed product. Migration aid support for installed DPPX users is provided. New and enhanced functions, enhanced usability characteristics, application-to-application communication flexibility as well as performance benefits make DPPX/SP an attractive solution to those customers desiring to upgrade their 8100 DDP capabilities.

**MIGRATION AID FEATURE:** The Migration Aid feature is provided to assist users in migrating from DPPX/BASE to DPPX/SP. This feature installs on DPPX/BASE in the same manner as any other DPPX licensed program, and includes the following functions:

- A new command, REDEFINE.CATALOG, that can be used for clearing space and expanding system catalogs. It operates similar to COMPRESS.CATALOG function in DPPX.
- A new command, ANALYZE.SPACE, that analyzes the space available in your system catalogs and tells you how much additional space is required.
- A new command, IPL.DISKETTE, which allows a central site operator to perform an IPL of the diskette created by REDEFINE.CATALOG at a distributed site.
- CLISTS are provided which delete obsolete material on the System Residence file.

**DESCRIPTION OF DPPX/SP COMPONENTS**

**BASE -- Based on DPPX/BASE (5760-010):** The base component of DPPX/SP provides a variety of functions to communicate with S/370, 303X, 4300, other 8100 systems and terminals. The base component provides multi-programming, multi-user and multi-level system support for concurrent application environments. Interactive, batch, and plant floor applications are supported.

Refer to 5760-010 for a detailed description of the functions provided. In addition to the functions described for 5760-010, the base component of DPPX/SP provides the following.

**Highlights of the Base Component of DPPX/SP**

- New and Enhanced function
  - Support for the new 8130 mdls B23 and B24
  - Connectivity with special subsystems
  - Printer sharing enhancements
  - New device support
- Improved performance
  - DASD Cache
  - Self-tuning buffers
  - Save/Restore IPL
  - RJE larger maximum RU (request unit) size
  - I/O reductions for loading application programs and maps
  - User library improvements
  - Programmed Communications feature (high performance bisynchronous communications)
  - HDT (Host Data Transfer) larger maximum RU size
- Enhanced Network/System Management Support
  - Link Problem Determination Application (LPDA)
  - System trace enhancements
  - Formatted Dump
  - Error Recovery Management enhancements
  - Clear Error Log capability
  - Enhanced Problem Determination Application naming capability
  - Error Log Summary and Archive (ELSA) enhancements

**Description**

- Support for new 8130 mdls B23 and B24  
DPPX/SP supports the new 8130 mdls B23 and B24. These new models employ state-of-the-art technology and provide a new 32-bit processing element. The 8130 mdls B23 and B24 will achieve up to 50% more interactive throughput over 8130 for equivalent response times. The new models will provide up to two megabytes of real memory with eight megabytes of logical address space.  
The 8130 mdls B23 and B24 are also supported on DPPX/BASE FEP6.
- Connectivity with special subsystems  
DPCX-DPPX/SP Interconnect Extensions  
- DPCX device access to DPPX/SP  
The DPCX-DPPX/SP interconnect facilities are extended with support of DPCX device access to DPPX/SP. Most 3270-compatible devices that are supported by both DPPX/SP and DPCX can be attached to DPCX and have access to all DPPX/SP

**DPPX/SP R1 (cont'd)**

functional capabilities. This includes support for other intelligent workstations attached to DPCX, including the Displaywriter and Personal Computer via their emulation functions. The DPCX system appears as a 3274 Control Unit to the DPPX/SP system; the DPPX system appears as a host to the DPCX system.

With this capability, devices attached to DPCX can, via the DPCX data stream compatibility function, access any application in a DPPX/SP system. This includes DTMS, ICF and DSC (to function as a 3270 device on a S/370, 30XX, or 4300 host system).

DPCX attached printers can be used as local copy devices for DPCX attached displays that are logged on to either DPPX/SP or DPCX applications. Printers attached to DPPX/SP cannot be used for local copy by DPCX attached displays.

The following DPCX attached devices are supported:

Attachment	Device
SDLC Loop	3104 Display
	8775 Display
	3262 Printer
	3268 Printer
	3287 Printer
SDLC Loop or DLA (3274/3276)	3178 Display
	3278 Display
	3279 Display
	3290 Display
	3262 Printer
	3268 Printer
	3287 Printer
	3289 Printer
SDLC DLA	6580 Displaywriter
	5150 Personal Computer
	8775 Display
SDLC Loop or DLA (7426 TIU)	5150 Personal Computer 3101 Display

DPCX attaches directly or through a nonswitched line to an SDLC adapter on the DPPX/SP system. Communications speeds up to 56K bps between DPCX and DPPX/SP are supported. The number of DPCX attached devices that can be supported in this environment is limited only by performance considerations and DPCX active task and configuration restrictions.

It is now possible for both a DPCX system and DPPX/SP system to have access to all the functional capabilities in the other system. This is done by having two communication links between the two systems, with each system defined as a host to the other.

A prompt facility is provided in DPPX/SP for DPCX users who log on to the DTMS or Command Facility functions of DPPX/SP.

**DPPX/SP-DPCX Application-to-Application Support**

When DPPX/SP is defined as a host to an attached DPCX system, transfer of records, programs, messages and documents can take place in both directions on the same communication link between the two systems. Using the SNA LU Type 0 protocol, applications can perform this function in either of the following ways:

- 1.A DPPX/SP application with Resource Independent Interface (RII) and a Type 2 host communication application in DPCX.
- 2.A DPPX/SP application with an RII interface that conforms to the Document Transmission Facility (DTF) interface in DPCX, and a Type 2 host communication application in DPCX.

**DPPX/SP-8775-IDTF Local Copy Support**

A DPPX/SP attached 8775 with the Interactive Display Text Facility (IDTF) license program loaded, can now perform local copy operations when accessing DPPX/SP applications, or when accessing the non-text functions of DPCX. The original announcement of DPPX/8775-IDTF to DPCX/DOSF listed the local copy function as a restriction.

**Displaywriter Attached Printer Support:** Support is provided for 3287 Printer emulation for printwheel printers attached to Displaywriters with 3270 Data Stream Compatibility licensed program (5608-SR6). This support augments the previously announced DPPX support of the 3278 Display emulation of Displaywriter through this same program. Through the Displaywriter, the Displaywriter printwheel printer emulates the operation of, and appears to DPPX/SP, as a communication port attached 3274 Control Unit supporting a 3287 mdl 1 or 2 printer.

This support is also available with DPPX/BASE FEP6.

Support for this capability requires the Displaywriter 3270 Data Stream Compatibility licensed program (5608-SR6) and a 5218-A01, A02 or 5228-A12 Printer.

- Printer Sharing Enhancements

- Previously, all printers used by Printer Sharing were controlled by the System Operator. With DPPX/SP, each printer used by Printer Sharing can be controlled independently by a separate operator, or each operator can control more than one printer, as specified by system setup. Printer Sharing messages necessary for control of the printers are sent to the operator defined as controlling that printer.

- Jobs can be submitted to a particular print queue, and a printer can be started using a particular print queue. Two or more printers may share the same print queue, with each printer servicing different print classes or the same print classes of that queue. Up to 255 classes per print queue are supported. Additionally, the Display Printer Status command (DISPLAY.PSTATUS) has been enhanced to display more status information.

- Authorization capability is provided to protect printers and print queues from unauthorized operators.

- Printer Sharing will support up to 36 printers. Depending upon configuration and system workload, all printers may not print at rated speed.

- New Device Support

- 5210 Printer mdls E01, E02, G01, G02

The 5210 Printer is a bidirectional printwheel printer combining letter quality printing and paper handling flexibility in a single desktop unit. The mdls E01, E02 attach directly to the loop, the mdls G01, G02 attach to the 3274 Control Unit and 3276 Control Unit. On data link attached loops, the 5210 mdls E01 and E02 will operate only at 9600 bps.

The DPPX/SP support for this printer is the same as that currently provided for the 3287 and 3268 printers operating under SNA LU Type 3 (3270 data stream) and LU Type 1 (SCS data stream) protocols.

5210 mdls E01 and E02 feature #9001 for attachment to the 8100 will be available in January, 1984.

The 5210 mdls E01 and E02 must be at EC Level 996869 or higher in order to assure correct operation with DPPX/SP.

- 3290 Information Panel \*

Support is provided for the Information Panel Display Station, a new member of the 3270 Information Display System. The 3290 utilizes a flat plasma panel as its display medium to provide a large capacity display of alphanumeric data and graphic images. It attaches to the 8100 via the 3274 mdl 61C Control Unit.

The 3290 is data stream compatible with all models of the 3270 Displays in alphanumeric application environments, and also provides new functions. Highlights of the new functions supported by DPPX/SP include:

- Concurrent multiple screen-capability: The viewing area can be configured to display up to four 3278 mdl 2 screens, two 3278 mdls 3, 4, or 5 screens, a full page of computer output in printer format (62 rows x 132 columns), two horizontal screens of up to 31 rows x 160 columns or two vertical screens of up to 62 rows x 80 columns.

- Multiple screen-copy capability: One or more screens are interactive and the remaining configured screens can be used for copying of the interactive screen(s).

- Multiple interactive screens: The user may logon to one application, multiple applications, or multiple systems. Each configured screen acts like a separate display station (referred to as a logical terminal). Up to four logical terminals may be operable simultaneously in one physical 3290 terminal.

- Multiple partitions: A screen can be divided into up to 16 separately managed partitions via application program control with vertical scrolling capability in the 3290 Display Station.

The 3290 also provides the DPPX/SP user with new screen management capabilities. These include:

- Control of 3290 Information Panel's screen configuration from the keyboard.

- Coexistence of multiple copy screens with multiple interactive screens.

- A horizontal rule line provided to assist in eye positioning and location of the displayed data.

- A Zoom capability provided to enlarge the character size of either a partition or a displayed screen to proportionally occupy the full viewing area.

**3178 Display Station:** Support is provided for the 3178 Display Station, a new, lower priced member of the 3270 Information Display System. It is a compact, lightweight display station with a

**PROGRAM PRODUCTS**
**DPPX/SP R1 (cont'd)**

1,920-character 12-inch CRT, a low profile keyboard, and significant human factors enhancements.

The 3178 attaches to the 8100 via the 3274 Control Unit, or via the 3276 Control Unit Display and provides functions equivalent to the base functions of the 3278 mdl 2.

– 3274-41C Control Unit \*

Support is provided for the new 3274-41C Control Unit. This new control unit provides increased functional capability by including 192K control storage, double-sided diskette capability and a full complement of terminal ports at a lower price than the currently supported 3274-31C configured with similar capabilities. The 3274-41C supports up to 32 attached devices and can be connected to the 8100 system via a data link.

– 3274-61C Control Unit \*

Support is provided for the new 3274-61C Control Unit. This new control unit provides increased functional capability by including 192K control storage, double-sided diskette capability, and a full complement of terminal ports at a lower price than the currently supported 3274-51C configured with similar capabilities. The 3274-61C supports up to 16 attached devices and can be connected to the 8100 system through a directly-attached loop, a data link-attached loop or a data link.

– Entry Assist Capability on 3274 Control Units \*

Support is provided for the entry assist capability on the 3274 for 3178, 3278, and 3279 Displays attached via the 3274 Control Unit. The entry assist for 3274, operating in concert with the DPPX/SP editor program, provides capabilities that facilitate operator entry and editing of textual material such as letters, memos, reports, source programs, and other text documents. These capabilities can provide improved operator convenience and productivity for text-related tasks.

– 3270 Personal Computer Attachment \*

Support is provided for the 3270 Personal Computer attachment for the 3278 Display Station. This capability enables the IBM Personal Computer, 5150, to be attached to the 3278 Display Station. The display stations and the associated keyboard become common to both the Host processor and to the IBM Personal Computer, thus expanding the use of the display station and the applications available at the display station.

\* Note: These devices are also supported on DPPX/BASE FEP6 with the following limitation:

- The 3290 Information Panel support is through DPS Version 2 and is equivalent to that provided for the 3278 and the 8775. The new capabilities of the 3290 are not supported on FEP6.

• Host Transaction Facility (HTF) enhancements

– An option is provided that allows a user to bypass the scheduling of a Host Request Complete transaction when there are no errors or reply messages. This capability provides for savings in system resource utilization by allowing for suppression of unnecessary transactions.

– An option is provided that allows Host Request Complete transactions to be run on a session different from the one that initiated the transmission to the host.

**IMPROVED PERFORMANCE**

• DASD Cache

The DASD Cache function can add to the performance improvement of DPPX/SP over DPPX/BASE FEP6. DASD Cache is designed to reduce physical disk I/O activity by keeping frequently used disk blocks in the main memory buffer. The performance improvement depends upon three key factors:

– Application Dependent Factors

The actual reduction in physical disk I/Os depends upon the application type, data set type, and the data set's access pattern. Depending on these factors, a 20% - 80% reduction in disk I/Os can be achieved with DASD Cache.

– Available Real Storage

Additional real storage is required in order to use the DASD Cache function. The amount of real storage required depends upon the application. Simulation and measurement have shown that 64K to 512K bytes of storage is generally required to achieve significant reduction (20% - 80%) in physical disk I/Os.

– Available Processing Power

Although DASD Cache can significantly reduce disk I/Os, an application may not experience significant response time or throughput improvement if it is relatively CPU or communication bound.

DASD Cache is expected to provide performance improvement for 8140C users.

DASD Cache may provide users of the 8130 mdls B23 and B24 with a performance improvement if the application is not CPU bound.

DASD Cache may not provide 8130A and 8140B users with significant performance improvement due to real storage and processing power limitations.

• Self-Tuning Buffers

DPPX/SP is able to dynamically adjust the levels of its buffer pools in response to changing demands on the system. DPPX/SP will expand and contract the number of buffer pools to achieve optimum performance while avoiding retention of excessive amounts of storage. Users will not need to monitor and adjust the number of buffer pools based upon system activity. This will be performed automatically.

• Save/Restore IPL

This capability provides improvement in the time it takes to restart DPPX/SP (i.e., IPL, activate auto logged terminals, environments, TSEs, etc.). DPPX/SP uses a saved image of the system to re-IPL DPPX/SP, consequently requiring less initialization time.

For example, 8140B DPPX/SP SAVE/RESTORE IPL time for a specific test configuration of 30 DTMS terminals (all autologged), 5 data bases, and 4 TSEs, is 3 minutes. This is less than half the time of a DPPX/BASE FEP6 system which required 8 minutes of IPL time.

Since the IPL time depends upon configuration, number of data bases and other variations, etc., the actual IPL time will not be the same for every system.

• RJE Larger Maximum RU Size

The maximum request unit (RU) size for the RJE component is increased from 512 bytes to a maximum of 3,840 bytes in order to provide improved throughput.

• I/O Reductions Loading Application Programs and Maps

DPPX/SP reduces the number of disk accesses required to load application programs and maps. DPPX/SP will typically reduce program load requirements from three to two I/Os compared with DPPX/BASE. Heavy program fetch environments will experience improved response times.

• User Library Improvements

Users may now have duplicate names in the user library and system library. Performance of user libraries is improved by maintaining information in main storage for each userlib module location on disk. This performance improvement will enhance the use of user libraries in an application development and production environment.

• Programmed Communications Feature (bisynchronous communications)

DPPX/SP supports the Programmed Communications feature. Use of the PCF instead of the current BSC Communications Adapter will reduce processor utilization for bisynchronous operation. This reduction depends upon the data rate to the processor. The reduction is more significant if the data rate is higher.

Using the Programmed Communications feature, bisynchronous communication is now supported in the 8140 mdl C processor in dual mode as well as single mode.

• HDT Larger Maximum RU size

The maximum request unit (RU) size for the DPPX/SP Host Data Transfer (HDT) component is increased from 4,096 bytes to 32,768 bytes. This capability, with DSX Version 2 Release 2, will provide improved throughput performance. This improvement is particularly significant for transmissions utilizing satellite communications links.

**IMPROVED NETWORK/SYSTEM MANAGEMENT SUPPORT**

• Link Problem Determination Application (LPDA)

LPDA, as part of DPPX/SP, will offer those customers who have installed 3863, 3864, and 3865 Modems, the ability to obtain problem determination information from their downstream data link networks. This information will be collected from the modems by an SDLC LPDA request and an SDLC LPDA response containing problem determination data regarding local-remote modem status, modem conditions, and data link status.

Data is collected both on reaching a traffic threshold and by DPPX/SP error recovery routines. The data is placed in the DPPX/SP error log. The user can access this data using the LPDA option of the Display.Error Log command and can initiate additional LPDA tests as desired.

**DPPX/SP R1 (cont'd)**

These facilities are available both at the 8100 System and at the central site host through use of the Host Command Facility.

**Note:** 8100 units installed prior to September 1983 require the customer to contact the local Field Engineering Branch Office to set up the adapter external test line which is required before invoking the LPDA function.

- **System Trace Enhancements**
  - Trace performance is improved by tracing certain events (Dispatch and Service Request) logically inline in the system dispatcher.
  - System trace now provides the ability to specify which call types will be traced for events 1 and 2 (Dispatch and Service Request). Fewer trace entries will be built, recorded, and spooled. The user of system trace will be able to build a trace table with fewer unwanted entries, making the desired data easier to find.
  - System trace has been expanded to include the DTMS and Router components of DPPX/SP, as well as additional communications line trace capabilities.
- **Formatted Dump**
  - A new DISPLAY.DUMP subcommand (FORMAT) has been provided in DPPX/SP to enable a customer, working with the support center, in problem source identification mode, to dump selected control block information as formatted output. This capability will enhance DPPX/SP serviceability by eliminating a significant amount of hexadecimal dump reading.
- **Error Recovery Management (ERM) Enhancements**

ERM dump output will be improved by formatting existing information in a more usable fashion, and by dumping additional information. Formatting of PSV, register and control block information will be done similar to that provided by DISPLAY.ERRORLOG.
- **Clear Error Log Capability**

A Clear Error Log function will improve the problem determination characteristics of DPPX/SP by enabling users to reset the DPPX/SP Error Log.
- **Enhanced Problem Determination Application Naming Capability**

The Problem Determination Application component is enhanced to allow the specification of an eight-byte node identifier (currently limited to four bytes). This will enable a DPPX/SP user to name the 8100 resource more meaningfully for identification in an ALERT. Users who want to utilize an existing identifier (typically, link name) that is already understood at the host to represent a particular 8100 node in the network can now do so. This function will improve the NPDA operator's capability to recognize a particular failing 8100 node and thus enable the operator to enter problem determination mode more rapidly.
- **Error Log Summary and Archive (ELSA) Enhancements**

The SUMMARIZE.ERRORLOG command has been improved to assist DPPX/SP 8100 users in more effectively diagnosing error conditions. The command has been rewritten to take less storage, run faster and provide error reports which are easier to read.

**Command Facility Extensions: Based on Command Facility Extensions (CFE) Feature - Level 2 of DPPX/BASE (5760-010)**

This component provides services for logic control, accessing and displaying pre-defined menu, data entry, and tutorial panels of the Interactive Productivity Facility component. It invokes DPPX/SP commands and programs based on the logic of IPF scripts. It manages the retrieval, modification and display of internal IPF tables.

Refer to PP 5760-010 for a more detailed description.

**Interactive Productivity Facility: Based on DPPX Interactive Productivity Facility (5660-271)**

This component provides a simplified full screen interface to the facilities of DPPX/SP. It consists of a series of panels, dialog scripts and programs whose execution sequence is controlled by the Command Facilities Extension component. Functions requiring specific command sequences and coordination of parameters are supplied by the dialog scripts. The user, interfacing with a full screen panel, selects the functions to be performed. The dialog script issues the necessary DPPX/SP commands to complete the requested function.

Refer to PP 5660-271 for a more detailed description of the functions provided. In addition to the functions described in PP 5660-271, the Interactive Productivity Facility component of DPPX/SP provides the following.

- **Menu-Driven System Functions**

The IPF component of DPPX/SP is used for most everyday tasks for the DPPX/SP user. Step-by-step interactive guidance through a menu hierarchy is provided for common system function. This interface is organized so that the steps necessary to accomplish a task are logically grouped together.

  - The IPF panel interface to catalog and data set services has been expanded and restructured.
  - New IPF services (for example, Router Definition and Printer Sharing) are also available.
- **Menu-Driven Hardware Definition, Activation and Testing**

DPPX/SP provides simplified hardware (terminals, disks, tapes, etc.) definition for most device types attachable to the 8100. This support is through an IPF menu-driven interface. This support can be used only after an initial IPL to customize the system. At a later time this support can be used to reconfigure the system. The tasks supported are:

  - **Definition**

Definition is simplified in these ways:

    - A full screen interface is implemented to do definition.
    - The number of SNA terms necessary to define devices has been reduced.
    - Many SNA logical devices are defined automatically.
  - **Activation**

The definition process automatically updates appropriate activation CLISTS so that the device will be activated automatically at IPL.
  - **Testing**

A verify process may be invoked optionally for each terminal device defined. This will provide assurance immediately after definition that the terminal was defined properly. If the verify process fails, there are additional IPF panels provided to assist problem determination.

**Data Stream Compatibility: Based on DPPX Data Stream Compatibility (DPPX/DSC, 5760-RC1)**

This component allows certain keyboard displays, printers and selected controllers and communications systems attached to the 8100 system with DPPX/SP to communicate with S/370, 303X, 4300 hosts as though they were directly attached by data link to the host processor.

Refer to PP 5760-RC1 for a more detailed description of function provided and devices supported. In addition to the function described in PP 5760-RC1, the Data Stream Compatibility component of DPPX/SP includes support for devices attached via the new programmed communications adapter.

**Data Base and Transaction Management: Based on DPPX Data Base and Transaction Management System (DPPX/DTMS, 5760-TD1)**

This component is the data management and transaction management system that provides ease-of-use facilities for DPPX/SP application programmers and system programmers in the online transaction-oriented environment. The facilities provided by this component are designed to enable the programmers to concentrate on application program development rather than on data and transaction management.

Refer to PP 5760-TD1 for a more detailed description of functions provided. In addition to those functions described in PP 5760-TD1, the DTMS component of DPPX/SP provides the following:

- **The DTMS component of DPPX/SP provides 8100 users with the following additional functional improvements over the current DPPX DTMS licensed product:**
  - **Session Control** - Users are provided with the capability to control certain session parameters which are determined at logon time and previously could not be altered. This includes the capability to execute a final transaction before session termination.
  - **Trace** - Users are provided with the capability to trace logic flows of the DTMS component, thus enhancing the problem determination facility of the system.
  - **Non-indexed data base support** - The DTMS component provides full data base support for relative sequential data sets (non-indexed) processed in direct mode.
  - **Final Program Name (FPN) Support** - A routine may be provided by the user to take control when a DTMS user exits the system. The FPN routine is similar to the DTMS Initial Program Name (IPN) routine (which may be invoked between transactions), except that the FPN is invoked at logoff and cannot access a terminal. FPN may be used to release storage, resources and disconnect data sets prior to the completion of the logoff.

**DPPX/SP R1 (cont'd)**

- Logon With Prompts - When a DPCX terminal user attempts to logon, the system will prompt for the ID (and a password, if used).

**Sort/Merge: Based on DPPX Sort/Merge (5760-SM1)**

This component provides a sort capability for DPPX/SP which provides users with facilities for extracting data from their data sets and sequencing it. It is designed to address the user's needs not only for straightforward sorting and merging of records of a single type, but also for related tasks such as selecting certain records from one or more files and handling multiple record types as well as ordering according to user-specified collating sequences.

Refer to PP 5760-SM1 for a more detailed description of the function provided.

**COBOL Runtime Library: Based on DPPX COBOL Runtime Library (5760-LB1)**

COBOL is a high-level programming language suited to developing application programs. It is especially efficient for coding programs that manipulate files of formatted data.

The runtime library component provides certain subroutines that provide services at execution time to run a COBOL application.

Refer to PP 5760-LB1 for a more detailed description of functions provided.

**Programmed Operator Facility: Based on DPPX Programmed Operator Facility (5660-273)**

This component provides the ability to service messages directed to the system operator with programmed responses. It is designed to reduce the skills and effort required to operate an 8100 system with DPPX/SP, especially at a remote site.

Refer to PP 5660-273 for a more detailed description of function provided.

**Problem Determination Application: Based on DPPX Problem Determination Application (DPPX/PDA, 5660-272)**

This component supports central network management of 8100 systems. It interfaces with the DPPX/SP error log, analyzing errors that have occurred, and notifies the host NPDA V2, which in turn will notify the central network operator who can take the appropriate action.

Refer to PP 5660-272 for a more detailed description of functions provided. In addition to the function described in PP 5660-272, the PDA component of DPPX/SP provides the following:

- The specification of an 8-byte node identifier. This will enable a DPPX/SP user to more meaningfully name the 8100 resource for identification in an ALERT. Users who want to utilize an existing identifier that is already understood at the host to represent a particular 8100 node in the network can now do so. This function will improve an NPDA operator's capability to recognize a particular failing 8100 node and thus enable the operator to more rapidly enter problem determination mode.

**Remote Job Entry: Based on DPPX Remote Job Entry (DPPX/RJE, 5760-XC1)**

This component permits the 8100 Information System executing with DPPX/SP to function as an SNA or BSC remote job entry workstation for submitting jobs to a host S/370, 303X or 4300 processor with an OS/VS, DOS/VSE, or VM/370 operating system and a job entry subsystem installed.

Refer to PP 5760-XC1 for a detailed description of the functions provided. In addition to the functions described in PP 5760-XC1, the RJE component of DPPX/SP provides the following:

- A workstation can function independently of a logged-on RJE operator, thereby fully supporting unattended workstation operation. New commands are provided to acquire or relinquish the role of operator of a workstation.
- The maximum request unit (RU) size for the RJE component is increased from 512 bytes to a maximum of 3,840 bytes.
- Support is provided for the new programmed communications adapter.

**Format Management: Based on DPPX Distributed Presentation Services Format Management Version 2 (DPPX/DPS V2 FM, 5660-264)**

This component provides the application runtime support for interaction with input/output devices. The basic mapping function of Format Management, using maps created by the DPPX/SP Interactive Map Definition licensed program (DPPX/SP IMD) allows the application to send and receive data in a device-independent manner.

Refer to PP 5660-264 for a more detailed description of the functions provided. In addition to the functions provided in PP 5660-264, the Format Management component of DPPX/SP provides the following:

- Execution Debug Monitor Improvements

A specified printer or display connection may be debugged on a display, including monitoring of exits, while output to the device is unaffected by the monitor.

- Device Size Independence

The rules for matching the map definition and runtime device sizes have been relaxed. Format Management will adjust the presentation area size of a mapgroup to that of the runtime display device.

- Stored Logical Messages

Format Management will optionally retain in storage the data structure from each output request. This information may be used to provide, on user option, the facility to:

- Merge inbound data, returning a complete data structure to the application, not just the modified field.

- Give full page out-of-paper recovery for non-batch printers.

- Enable automatic recovery from use of the clear key.

- Improved Magnetic Stripe Reader (MSR) Support

Special processing of MSR input to locate and map the MSR data as if it were normal input data.

- Auto-Logon for Keylocked Devices

Format Management will allow the DTMS component to proceed with auto-logon connections without hanging or excluding a terminal which has the security keylock turned off. When subsequently turned on, Format Management will complete the connection.

**Router:** The router is new to DPPX/SP. It provides the following functions.

- Display operators may communicate with multiple applications in different nodes in the network without extra logons and logoffs. Applications may reside in a local or remote DPPX/SP environment or in a host system. The Binary Synchronous Communications to Systems Network Architecture (BIAS) portion of Data Stream Compatibility (DSC) is not supported by the Router. When operating in full routing mode, the user's terminal must be a display with a screen size of at least 80 characters wide with a total screen size not greater than 4,096 characters (rows x columns).

The Router can also operate in a passthrough mode which is functionally equivalent to Data Stream Compatibility Co-Domain Pass-Through (DSC/CDP). When operating in this mode, the Router supports all of the devices supported by DSC/CDP. This support simplifies the user's installation and configuration requirements by eliminating the need for DSC/CDP when the Router function is used.

The Distributed Processing Connection Facility (DPCF) program offering (5798-DKX) provides a similar capability to the DPPX/SP Router function. DPCF is supported on DPPX/SP and operates in the same manner as on DPPX/BASE. Although DPCF and the Router can exist on the same DPPX/SP system, users will want to take advantage of the Router's enhancements which have been designed to increase operator ease and flexibility to access applications anywhere in the network.

- This support provides easy-to-use menu driven operator interface for switching between applications.
- Extended recovery from application session outage is provided.
- The Router supports autolog on/off for both display and non-display devices.

**CUSTOMER RESPONSIBILITIES**

To successfully install and use DPPX/SP, the customer must:

Attend education courses as necessary ... Acquire a knowledge of the functions documented in DPPX/SP customer publications ... Understand the management and control of the design, installation and control of DPPX/SP as described in *DPPX/SP Administration* ... Install DPPX/SP on an 8100 System ... Become familiar with the operating procedures as described in *DPPX/SP Operation* ... Design and implement user applications ... Carry out approved problem determination procedures before contacting IBM for program service ... Install service-level updates and fixes as appropriate.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on an IBM 8130 or 8140 Processor with a minimum of 512K bytes of processor storage, a diskette drive, and at least 58MB of disk storage capacity.

- Terminal requirements are one IBM 3104, one IBM 3276 or one IBM 8775 Display Terminal, or an IBM 3274 Control Unit with an attached Display Station connected via a directly-attached loop or

PROGRAM PRODUCTS

DPPX/SP R1 (cont'd)

a directly-attached IBM 3277.

- Users who implement DPPX/SP utilizing the same functional capabilities as DPPX/BASE FEP6 require a minimum processor storage of 512K for production configurations.
- Users who implement some of the new functional improvements of DPPX/SP such as the Router, DASD Cache, HDT larger RU size, etc., will require a minimum processor storage of 768K for production configurations.

SOFTWARE REQUIREMENTS

DPPX/SP is a self-contained executable system. For application development, users are required to separately order the desired programming language capability. The following licensed programs are supported by DPPX/SP:

Application Programming Languages and Tools

DMS/DPPX (only with DPS V1 IMD or DPS V2 IMD)	5760-XC2
DMS/DPPX Execution Facility	5660-265
DPPX COBOL Compiler	5760-CB1
DPPX FORTRAN Compiler	5760-FO1
DPPX FORTRAN Library	5760-LM1
DPPX PL/I Compiler	5760-PL1
DPPX PL/I Library	5760-LM2
DPPX Assembler	5760-AS1
DPPX APL	5760-XR2

Application Support

DCMS/DPPX	5760-XR6
DPPX/SP IMD	5660-282
DPPX GEN 3644	5760-ED1
DPPX PT	5760-XR5
DPPX/PS3640	5660-267
DPS Version 1 IMD Feature (for migration purposes only)	5760-XR1
DPS Version 2 IMD Feature (for migration purposes only)	5660-264

Network Management

(The following program products run in a S/370, 30XX, or 4300 host):

Distributed Systems Executive (DSX) Version 1.2.2	5748-XXG
Distributed Systems Executive (DSX) Version 2	5668-986
Host Command Facility (HCF) Version 1	5735-XR1
Host Command Facility (HCF) Version 2	5668-985

The following PRPQs, FDPs, IUPs and IFPs are supported on DPPX/SP:

PRPQs

SDLC Auto-Answer	5799-BDE
3277 Graphics Attachment	5799-BAQ

FDPs, IUPs, IFPs

COBOL Appl X-Reference (FDP)	5798-DDJ
COBOL Appl Integrity Monitor (FDP)	5798-DGZ
Communication Design Aid (IUP)	5796-PNL
COPICS Host Interface (FDP)	5798-DFR
COPICS Plant Monitor (FDP)	5798-DFT
Data Compression - Host (FDP)	5798-DJL
Data Compression - Controller (FDP)	5798-DJN
Distributed Document Formatting Facility (IFP)	5785-RAA
Distributed Plant Maintenance (FDP)	5787-GAA
Distributed Processing Connection Facility (FDP)	5798-DKX
DMS Management Aid (FDP)	5798-DHH
DTMS Segmented Access Method (IUP)	5796-DCG
DTMS Transaction Simulation (FDP)	5798-DDP
Extended Debug Facility (FDP)	5785-ECA
File Print Utility (FDP)	5798-DGG
Interactive Data Base Transaction Program (IUP)	5796-PNR
Interactive Processing of Data and Text (IFP)	5785-DDK
Mortgage Banking System (FDP)	5798-DDN
Order Entry Using DMS (FDP)	5798-DEZ
Pattern Letter Generator (FDP)	5798-DHP
Payroll Management System (FDP)	5798-DDD
Peer Data Transfer (FDP)	5798-DWJ
Power Plant Maintenance (FDP)	5798-DED
Retail Merchandise Ticketing (IUP)	5796-BCA
Spoiled Output Transcription Program (FDP)	5798-DHW
Virtual Terminal Access Facility (FDP)	5798-DFF
3640 Device Support Programs (FDP)	5798-DEJ
3640 Data Collection/Lot Tracking (FDP)	5798-DFG
3640 Shop Floor Control (IUP)	5796-BBR

COMPATIBILITY

Upward compatibility for the earlier licensed programs now contained in DPPX/SP is maintained. Printer Sharing and RJE operator responses have been changed. Users of the Programmed Operator Facility may be

required to make changes to their message action files. This will be documented in the Informal Documentation which accompanies the DPPX/SP shipment and also in other publications.

Users of the DPPX/Performance Tool must install the latest level which will be available at the time of the first shipment of DPPX/SP. Usability changes have been made in this new service level in the print and monitor files. Customers with programs that access these files may have to make modifications to their programs.

MIGRATION AND PLANNING

To assist customers in migrating to DPPX/SP, these functions or performance improvement items are provided.

- Improved Service Level Update (SLU) Processing Time

DPPX/SP can be installed as a Service Level Update (SLU). SLU performance has been improved significantly. The amount of time to install one diskette will change from 25 minutes to approximately 3 minutes.

- Migration Aid Feature

The Migration Aid feature is a set of routines and programs which assist in migrating to DPPX/SP. The Migration Aid contains the following new commands:

- ANALYZE.SPACE Command

When the ANALYZE.SPACE command is invoked, it will analyze the current amount of space available in the system catalogs and the amount of space required by DPPX/SP. It will present, via a full screen interface, the results of that analysis, identifying the catalogs that need expansion.

- REDEFINE.CATALOG Command

This new command allows DPPX/SP to change the characteristics of an existing catalog. The catalog may be increased or decreased in size, or the number of data sets it can potentially contain can be changed. The input for changing a catalog is specified interactively while DPPX is running. When the actual redefinition of the catalog takes place, it is necessary to IPL a stand-alone utility that has been created on a diskette. If the IPL.DISKETTE command was used to invoke the standalone utility, DPPX will automatically be IPLed and restored to an operational state when the stand-alone utility is complete.

- IPL.DISKETTE Command

This new command requests DPPX to IPL the diskette prepared by the Redefine Catalog process. The terminal operation requesting the IPL could be connected via the Host Command Facility (HCF) from a central site.

- DPPX/SP Distribution via DSX

For DPPX/SP customers who have an existing DPPX network and wish to install DPPX/SP at their remote sites, an alternative to a Service Level Update installation is available. DPPX/SP supports a network installation option which is similar in nature to the Remote Service Distribution Option (RSDO), a DPPX network maintenance procedure.

The network installation option approach uses the Distributed Systems Executive (DSX) to perform network installation of DPPX/SP. It includes the retrieving from the DPPX/SP base license site and sending to the remote sites, the necessary DPPX/SP data sets to upgrade a DPPX remote site (at a prerequisite service level, FEP6) to DPPX/SP.

Planning information for existing DPPX users will be available in the publication, *DPPX/SP Migration Guide*, (GC23-0601).

SYSTEM INTEGRITY

The system integrity features of the earlier licensed programs now contained in DPPX/SP are unchanged.

DATA SECURITY, AUDITABILITY AND CONTROL

The data security, auditability, and control features of earlier licensed programs that run under DPPX/SP are unchanged. User management is responsible for the selection, implementation, and adequacy of these security features.

PERFORMANCE

Generally, DPPX/SP with storage available to accommodate additional functions, will run with performance equivalent to DPPX/BASE FEP6. However, some systems will experience improved performance with DPPX/SP due to DASD Cache, Save/Restore IPL, self-tuning buffers, dynamic resident program fetches disk I/O reduction, user library improvements, and increased RJE and DSX/HDT maximum RU size.

The performance impact of using the Router depends upon the message rate from the terminals configured to use the router and the size of the message. If the message rate is 1,800 messages-per-hour and the inbound/outbound message size is less than one RU (Request Unit), each, then the 8140B Processor utilization is increased by 4%

PROGRAM PRODUCTS

**DPPX/SP R1 (cont'd)**

absolute. The impact on user's response time due to the increase in processor utilization depends upon the user's application and the total processor utilization.

When the router is used instead of Co Domain Passthrough (CDP) for host sessions, performance is equivalent to CDP.

In general, the 8130 mdls B23 and B24 will achieve up to 50% more interactive throughput over 8130 A models for equivalent response times. For an 8130 application which is CPU and storage constrained, the 8130 mdls B23 and B24 may provide more than a 50% throughput improvement if the application can take advantage of additional storage (e.g., DASD Cache.)

**Real Storage Requirements**

- Migration to DPPX/SP from DPPX/BASE FEP6 with DTMS FEP1, and DPS 2.1 results in an additional 20K bytes.
- In cases where more storage than necessary was allocated in DPPX/ BASE FEP6 and earlier releases buffer pools, the self-tuning buffer pool feature of DPPX/SP may result in a reduction in processor storage utilization.
- Optionally, up to one-fourth of real storage on any 8100 Processor can be allocated for the DASD Cache function. With allocation of additional storage, DASD Cache may provide additional throughput.
- The following product storage requirements are in addition to 20K-byte base storage increases.
  - Installation of a Programmed Communications feature replacing all existing BSC Communications Adapters will not require more real storage. Addition of a Programmed Communications feature to a system that did not contain any BSC Communications Adapters will require 14.5K bytes more real storage plus the real storage to support the user's applications.
  - User library performance improvement requires 20 bytes of real storage for each module in an active user library. This additional storage is required only if the facility is utilized.
  - 40K bytes of additional storage may be required for systems which previously had DPPX/DPS FM modules non-resident.
  - The host communication performance improvements for RJE and HDT require the following increase in storage: For host to 8100, the increase is [(2 X Pacing) - 1] X RU size increase; For 8100 to host the increase is 2 X Pacing X RU size increase.
- The basic storage requirements for the Router, if utilized, are as follows:
  - 8K bytes of fixed storage
  - 3.5K bytes of storage for every user of the router with two sessions, e.g., DTMS and Host.
  - 1.0K bytes of storage per user for every additional session above two sessions.
  - If the user saves the screen for a suspended session, then enough storage for the terminal screen size (i.e., 1,920, 2,560, etc.) for each suspended session is required. This is in addition to the basic router storage requirements.

**Disk Storage Requirements:** DPPX/SP system catalogs require 30 megabytes on a system residence volume. An additional 12 megabytes of catalog space has been preallocated for customer usage.

**INSTALLATION**

DPPX/SP will be shipped in two forms: Dump/restore tapes and SYSRES initialization diskettes. The dump/restore tapes are intended for new users with tape drives. The contents of the tape will completely overlay whatever is on the disk.

The SYSRES initialization diskettes provide two installation modes:

1. A complete disk initialization process for new DPPX/SP users. If this mode is selected, any data existing on the disk will be overlaid.
2. An update option for existing DPPX/BASE users. The selection of this mode will result in the replacement of IBM data on the disk as well as adding new IBM data. Customer programs and data sets will not be affected.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/SP General Information (GC23-0600) ... DPPX/SP Migration Guide (GC23-0601) ... DPPX/SP Installation Card for Tape (SC23-0611) ... DPPX/SP Installation Card for Diskette (SC23-0612) ... DPPX/SP Interactive Productivity Facility Reference Card (SC23-0613) ... DPPX/SP Macro Guide and Reference (SC23-0614) ... DPPX/SP Dialog Development Facility Panel Design Forms (SX23-0242) ... (Miscellaneous-use 3-ring binder) (SX23-0240) ... (Spine and cover inserts for miscellaneous-use binder) (SX23-0241).*

The documentation for DPPX/SP is contained in the manuals shown above. These manuals are task-oriented to minimize the need to refer to multiple manuals and may be placed in separately orderable binders. The DPPX/SP manuals include information on all components. The DPPX/SP manuals are:

3-Ring Binder Volume & Title	Binder Order #	Manual Title	Manual Order #
1 Installation and Operation	SX23-0233	DPPX/SP Installation DPPX/SP Operation	SC23-0603 SC23-0604
2 Administration	SX23-0234	DPPX/SP Administration	SC23-0605
3 Application Programming	SX23-0235	DPPX/SP Application Programming	SC23-0606
4 Commands	SX23-0236	DPPX/SP Commands	SC23-0607
5 Messages & Codes	SX23-0237	DPPX/SP Messages and Codes	SC23-0608
6 Problem Mgmt	SX23-0238	DPPX/SP Problem Management	SC23-0609
7 Diagnosis Guide	SX23-0239	DPPX/SP Diagnosis Guide	SC23-0610

**5660-281 - DPPX/SP R2**  
**8100 INFORMATION SYSTEM**  
**DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE**  
**SYSTEM PRODUCT RELEASE 2**

**PURPOSE**

DPPX/System Product (DPPX/SP) Release 2 provides significant functional enhancements which extend the previously announced DPPX/SP (now referred to as DPPX/SP Release 1) capabilities to ease the implementation and management of 8100 Information Systems in a distributed data processing (DDP) environment.

DPPX/SP Release 2 provides full support for the 8150 Processor as well as the current 8130 and 8140 Processors. DPPX/SP Release 2 also contains enhancements which provide better storage management facilities, higher availability capabilities and improved DXAM file management support.

Also provided is the capability to run DPPX/SP Release 1 on the new 8150 Processors, but without the full function of the 8150.

**HIGHLIGHTS**

**Additional Hardware Support:**

- Support of 8150 Systems:
    - Main storage support of up to 6MB real storage and 16MB logical storage, plus reduced mode operation of the 8150 mdl B. The 8150 mdl B is capable of being operated in several reduced modes, occurring either automatically as a result of a component failure during IPL, or as specified by the operator during an IPL. Reduced modes may occur with either Processing Control Element (PCE) running in single mode, with full memory or with half memory.
    - An optional Keys and Locks approach to storage management allows for a wider variety of user area sizes with access to storage areas via keys and locks. The Common Address Storage Section (CASS) is no longer duplicated throughout logical storage; only one copy exists when using the Keys and Locks option. Also, CASS can be from 148K bytes to 14M bytes in size in multiples of 32K bytes. In addition to less logical storage space used by CASS, this addressing structure provides the capability for more user areas and the potential for more separation of users.
    - Dual PCE (Processing Control Element) I/O Connection. I/O Devices, such as display terminals, printers, communications devices, may be attached to either PCE in the 8150 mdl B Processor. This support allows the customer to continue operations in the event of a single PCE failure. Following a failure, a re-IPL is required to run with one PCE.
- Devices attached through 8150 mdl B communications ports have paths to each PCE and are therefore available to either PCE. 8101 units can each be connected to both PCEs through the 8101 File/Tape Switch RPQ (mdls A20, A23, A25 only). Attached in this way, if a PCE fails, the switch will allow the 8101 to be automatically activated by the working PCE.
- This means that the customer, through proper configuration and use of the above mentioned switches, can potentially recover and use all I/O in the event of a single PCE failure. Customers who desire to restrict their use of I/O or memory in the event of a PCE or memory failure can use the new Alternate System Parameters capability. The Alternate System Parameters will be automatically used during IPLs that occur when the PCEs or memory have been reconfigured into a reduced mode of operation.
- Enhanced 5210 Printer Support:
    - Additional support for the 5210 Printer via Printer Sharing. Alternate sheet feed and data processing printwheel changes for varying typesets will now be supported on the 5210 mdls E1 and E2 (installed with EC 996869) quality printers via Printer Sharing.

**Enhanced Functions:**

- Multiple environments in batch mode. DPPX/SP Release 2 provides users with the option to run up to 16 environments in batch mode. Batch jobs are processed concurrently, thereby providing higher utilization of 8100 Processors and improved batch throughput. This support, combined with the faster 8150 Processor, provides the application developer with a powerful environment which can speed up application development efforts and get applications installed more quickly.
- Additionally, dialog support is provided to ease the setup and management of the multiple batch environments.
- Shadow File Facility. Provides a simple-to-use alternative to data base recreation for the protection of critical data from physical damage of loss due to hardware related causes. This facility gives the customer the ability to maintain an exact copy of a non-SYSRES disk volume on a separate disk enclosure. Each update to a volume (source) is automatically applied to the other volume

(shadow) as well. The optional use of the Shadow File facility is transparent to applications and licensed programs.

Should one disk fail, processing can automatically continue with the other disk. After repair of the failing device, a command is issued to resynchronize and process with both the source and the shadow volumes.

The Shadow File facility reduces the need for customers to maintain and dump backup and audit files or to recreate a data base when a problem occurs. Customers may also combine this facility with the 8101 Manual File/Tape Switch feature (RPQ 8K0958) to provide the capability to resume control of a disk device from another 8100 processor in the event of an unrecoverable processor failure. This will achieve higher availability and shorter recovery time from hardware failures.

The DXAM automatic index reorganization enhancement and the Shadow File facility will provide the ability for customers to approach continuous operation of 8100 Systems.

- Enhanced DXAM File Management. DPPX/SP Release 2 provides the 8100 user with improved system availability through DXAM index reorganization support. Release 2 will automatically perform a partial reorganization of DXAM indexes on 'out of space' conditions. Also, a command is provided to fully reorganize DXAM indexes. This enhancement represents a significant time saving over previous methods which required deactivation of files for reorganization.
- Also, the ability to access and update data is maintained during either reorganization process.
- Router Enhancements:
    - The Router of DPPX/SP Release 2 will now support the 6580 Displaywriter and 8815 Scanmaster in passthrough mode. These devices may now be connected to an 8100 System for pass-through only to a host system. The Displaywriter, connected in this way, may now utilize its full function, for example, Document Transfer. Since the Scanmaster transmits up to 256K bytes per image, consideration should be given to the resulting communications load before attaching the device.
    - Resolution of different Request Unit (RU) sizes. Previously, if an RU size specified from an application to the Router did not match the RU size specified from the Router to a terminal, the system administrator had to redefine the RU size parameters to match before processing could continue. DPPX/SP Release 2 will automatically resolve such differences in RU size so that intervention is not required.

Also, the binary synchronous communication to systems network architecture (BIAS) portion of data stream compatibility (DSC) is now supported by the Router component in DPPX/SP Release 2.

- Host Transaction Facility (HTF) Improvements:
    - Host Transaction Facility (HTF) Direct. This facility decreases the path length required to process a message to a host subsystem such as IMS or CICS. The facility uses fewer services of the data base and transaction management capability (including message error recovery services) of DPPX/SP. Therefore, for a single transmission request, it is faster than normal HTF processing.
- When using HTF Direct, application programs need not be designed with a separate Host Request Complete Transaction to process the host reply message. Also, a COMMIT is not required before transmitting information to a host transaction program. 8100 data base updates can be committed after the reply from the host is received.
- HTF Direct is used for synchronous, non-batch, non-recoverable messages to a host.
- HTF Display/Delete Messages. HTF messages, or input for host transactions, are submitted to the HTF Batch Message Data Set (BMDS) for periodic transmission to a host subsystem such as CICS or IMS. DPPX/SP Release 2 provides the user with the ability to display the messages in the BMDS and to selectively delete messages within the data set. This will allow customers to review and delete messages before they are sent to the host.
- Enhanced DPPX/SP LPDA (Link Problem Determination Aid) Function:
    - An alert to a host system will be generated from the 8100 when LPDA data is logged in the 8100 system error log. The alert can result from error solicitation by the 8100, error threshold exceeded, or error-to-traffic ratio exceeded.

**Education Support:** 8100 technical education for NAD and NMD is provided by the NAD Washington System Advanced Education Center. Customers should consult the latest customer education catalogs.

PROGRAM PRODUCTS

DPPX/SP R2 (cont'd)

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

This licensed program is designed to operate on an IBM 8130, 8140, or 8150 Processor with a minimum of 768K bytes of processor storage, a diskette drive, and at least 58MB of disk storage capacity.

- Terminal requirements are one directly-attached IBM 3277 or one IBM 3104, 3276 or 8775 Display Terminal, or an IBM 3274 Control Unit with an attached Display Station connected via a directly-attached loop.

SOFTWARE REQUIREMENTS

DPPX/SP Release 2 is a self-contained executable system. For application development, users are required to separately order the desired programming language capability. The following licensed programs are supported by DPPX/SP Release 2:

Application Programming Languages and Tools

Cross SystemProduct/AD (only with DPPX/SP IMD, 5660-282)	5660-284
Cross System Product/AE	5660-285
DMS/DPPX Execution Facility (for migration purposes only)	5660-265
DMS/DPPX Development Facility (only with DPS/IMD Versions 1 and 2, for migration purposes only)	5760-XC2
DPPX COBOL Compiler	5760-CB1
DPPX FORTRAN Compiler	5760-FO1
DPPX FORTRAN Library	5760-LM1
DPPX PL/I Compiler	5760-PL1
DPPX PL/I Library	5760-LM2
DPPX Assembler	5760-AS1
DPPX APL	5760-XR2

Application Support

DCMS/DPPX	5760-XR6
DPPX/SP IMD	5660-282
DPPX GEN3644	5760-ED1
DPPX PT Version2	5660-286
DPPX/PS3640	5660-267
DPS Version 1 IMD Feature (for migration purposes only)	5760-XR1
DPS Version 2 IMD Feature (for migration purposes only)	5660-264

Network Management

(The following program products run in an S/370, 30XX, or 4300 host):

Distributed Systems Executive (DSX) Version 1	5748-XXG
Distributed Systems Executive (DSX) Version 2 Releases 1 and 2	5668-986
Host Command Facility (HCF) Version 1	5735-XR1
Host Command Facility (HCF) Version 2	5668-985

The following PRPQs and Program Offerings are supported on DPPX/SP:

PRPQs

Line Switching Attachment	5799-BBT
SDLC Auto-Answer	5799-BDE
X.21 Host Switched Short Hold Mode	5799-BBG

Program Offerings

COBOL Appl X-Reference	5798-DDJ
COBOL Appl Integrity Monitor	5798-DGZ
Communication Design Aid	5796-PNL
COPICS Host Interface	5798-DFR
COPICS Plant Monitor	5798-DFT
Data Compression - Host	5798-DJL
Data Compression - Controller	5798-DJN
Distributed Document Formatting Facility	5785-RAA
Distributed Plant Maintenance	5787-GAA
Distributed Processing Connection Facility	5798-DKX
DMS Management Aid	5798-DHH
DTMS Segmented Access Method	5796-DCG
DTMS Transaction Simulation	5798-DDP
Extended Debug Facility	5785-ECA
File Print Utility	5798-DGG
Interactive Data Base Transaction Program	5796-PNR
Interactive Processing of Data and Text	5785-DDK
Mortgage Banking System	5798-DDN
Order Entry Using DMS	5798-DEZ
Pattern Letter Generator	5798-DHP
Payroll Management System	5798-DDD
Peer Data Transfer	5798-DWJ
Power Plant Maintenance	5798-DED
Retail Merchandise Ticketing	5796-BCA
Spooled Output Transcription Program	5798-DHW

Virtual Terminal Access Facility	5798-DFF
3640 Device Support Programs	5798-DEJ
3640 Data Collection/Lot Tracking	5798-DFG
3640 Shop Floor Control	5796-BBR

**DPPX/SP Release 2 Real Storage Requirements:** DPPX/SP Release 2 will require up to 30K bytes of additional main storage over DPPX/SP Release 1.

The following product storage requirements are in addition to the 30K bytes base storage increase:

- Use of the Shadow File facility will require additional processor storage as shown below:
  - Normal Operation: 16K bytes for a source and target pair (a disk volume and its shadow volume) and 2K bytes for each additional pair.
  - During Activation and Resynchronization (COPY): 46K bytes for a source and target pair and 26K bytes for each additional pair activated concurrently.
- Use of the Multiple Environments in batch mode support will require additional real storage for each batch environment started. The total storage required is dependent upon the size and number of environments.

INSTALLATION

DPPX/SP Release 2 will be shipped in three forms: Dump/restore tapes, SYSRES initialization diskettes, and a DPPS/SP Release 1 to DPPX/SP Release 2 Revision Package.

The dump/restore tapes are intended for new users with tape drives. The contents of the tape will completely overlay whatever is on the disk.

The SYSRES initialization diskettes provide two installation modes:

- A complete disk initialization process for new DPPX/SP users. This is intended for an initial install. If this mode is selected, any data existing on the disk will be overlaid.
- DPPX/BASE FEP6 users may install an SLU (Service Level Update) to migrate their system to DPPX/SP Release 2. An SLU results in replacement of IBM data on the disk as well as adding new IBM data. Customer programs and data sets are not affected.

The Revision Package is provided for DPPX/SP Release 1 users to migrate to Release 2. The Revision Package will upgrade the existing DPPX/SP Release 1 system to Release 2 by applying the coding differences interactively.

COMPATIBILITY

DPPX/SP Release 2 maintains compatibility with Release 1 components and those licensed programs now combined in DPPX/SP. User application programs which run under DPPX/BASE or DPPX/SP Release 1 will run under DPPX/SP Release 2. DPPX/BASE users should be aware that Printer Sharing and RJE responses were changed in DPPX/SP Release 1, and that changes may have to be made to the Programmed Operator Facility message action files. This will be documented in the informal documentation that accompanies the DPPX/SP shipment and also in other publications.

DPPX/PT Version 2 supports DPPX/System Product Releases 1 and 2. DPPX/PT Version 1 supports DPPX/BASE FEP6 and DPPX/System Product Release 1 only, with no enhancements.

The DPPX/Performance Tool Version 2 program product consists of the Monitor, the Reporter and a new Accounting Collector that provides job resource usage information for capacity planning and billing purposes. For more information, please see the DPPX/PT Version 2 Announcement Letter, dated October 18, 1983.

MIGRATION and PLANNING

To assist customers in migrating to DPPX/SP Release 2, these functions are provided:

- DPPX/SP Revision Package for DPPX/SP Release 1 Users: For customers currently using Release 1 of DPPX/SP, the DPPX/SP Revision Package will enable them to migrate to Release 2. The Remote Service Distribution Option (RSDO) may be used to distribute the Revision Package to other Release 1 systems in a network.
- Service Level Update (SLU): If migrating from DPPX/BASE FEP6, DPPX/SP Release 2 can be installed as a Service Level Update (SLU). SLU performance has been improved significantly. The amount of time to install one DPPX/SP SLU diskette is approximately three minutes.
- Migration Aid Feature: The Migration Aid Feature is a set of routines and programs which will assist the DPPX/BASE FEP6 user migrating to DPPX/SP Release 2. The Migration Aid Feature can be installed and run on a DPPX/BASE system. The Migration Aid Feature function and commands have been incorporated into DPPX/SP Release 1 and may be used when migrating from Release 1 to Release 2.

PROGRAM PRODUCTS

DPPX/SP R2 (cont'd)

The Migration Aid contains the following commands:

- ANALYZE.SPACE Command
- REDEFINE.CATALOG Command
- IPL.DISKETTE Command

RPOs ACCEPTED: Yes

Planning information for existing DPPX/BASE users is available in the publication *DPPX/SP Migration Guide* (GC23-0601).

PERFORMANCE

DPPX/SP Release 2, with processor storage available to accommodate the 30K byte increase, will run with throughput performance equivalent to DPPX/SP Release 1.

**Keys/Locks on 8150 Processor:** The potential for increased CASS size and more address spaces can improve DPPX/SP Release 2 performance over Release 1.

Users with large (i.e., more than 404K bytes total) and frequently used application programs can reduce physical disk I/O activity and processor utilization by making these programs resident in CASS storage.

**HTF Direct:** HTF Direct will reduce the path length and disk utilization required by HTF. This improvement is achieved by:

- a. Eliminating CREATX processing that is required to send or receive host messages, and
- b. Eliminating the need to issue a COMMIT before sending a message to the host system from the 8100.

**Multiple Environments in Batch Mode:** Batch throughput (often, COBOL compiles) can be improved on the 8140 mdl C and the 8150 mdl B with the use of the Multiple Environments in batch mode support of DPPX/SP Release 2.

**Disk Storage Requirements:** DPPX/SP Release 2 requires 32 megabytes of system catalog space on a system residence volume. An additional 12 megabytes of catalog space has been preallocated for customer usage.

DATA SECURITY, AUDITABILITY and CONTROL

The data security, auditability and control features of earlier licensed programs that run under DPPX/SP are unchanged. User management is responsible for the selection, implementation and adequacy of these security features. If sensitive data is sent over external communications facilities, user management may wish to pursue the application of cryptography.

DOCUMENTATION

(available from Mechanicsburg)

The documentation for DPPX/SP is contained in the manuals shown below. These manuals should minimize the need to refer to multiple manuals and may be placed in separately orderable binders. The DPPX/SP manuals include information on all components. The DPPX/SP manuals are:

3-Ring Binder Volume & Title	Binder Order #	Manual Title	Manual Order #
1 Installation and Operation	SX23-0233	DPPX/SP Installation DPPX/SP Operation	SC23-0603 SC23-0604
2 Administration	SX23-0234	DPPX/SP Administration	SC23-0605
3 Application Programming	SX23-0235	DPPX/SP Application Programming	SC23-0606
4 Commands	SX23-0236	DPPX/SP Commands	SC23-0607
5 Messages & Codes	SX23-0237	DPPX/SP Messages and Codes	SC23-0608
6 Problem Mgmt	SX23-0238	DPPX/SP Problem Management	SC23-0609
7 Diagnosis Guide	SX23-0239	DPPX/SP Diagnosis Guide	SC23-0610.

The entire set of publications and binders may be obtained by ordering SBOF-1044.

*DPPX/SP General Information* (GC23-0600) ... *DPPX/SP Migration Guide* (GC23-0601) ... *DPPX/SP (8150) Migration Guide* ... *DPPX/SP Installation Card for Tape* (SC23-0611) ... *DPPX/SP Installation Card for Diskette* (SC23-0612) ... *DPPX/SP Interactive Productivity Facility Reference Card* (SC23-0613) ... *DPPX/SP System Services and Reference* (SC23-0614) ... *DPPX/SP Dialog Development Facility Panel Design Forms* (SX23-0242) ... *DPPX/SP Supplemental Binder* (SX23-0240) ... *DPPX/SP Supplemental Spine and Cover Inserts* (SX23-0241).

SYSTEM INTEGRITY

The system integrity features of the earlier licensed programs now contained in DPPX/SP Releases 1 and 2 are unchanged. See statement of DPPX System Integrity dated April 3, 1980.

LICENSED PROGRAM MATERIALS AVAILABILITY

**Restricted Materials:** No. This licensed program will be available without source licensed program materials. It will be available with object code.

## PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
 DISTRIBUTED PROCESSING PROGRAMMING  
 EXECUTIVE/SYSTEMS PRODUCT  
 INTERACTIVE MAP DEFINITION (DPPX/SP IMD)  
 5660-282**

**PURPOSE**

The Interactive Map Definition program is a new licensed program, designed to run with DPPX/SP. It generates maps which exploit the enhanced functions provided by the DPPX/SP Format Management component. These maps form the basis of easy-to-use, device and format independent, full-screen device support for DPPX/SP.

DPPX/SP IMD is upwards compatible with the DPS Version 2 Interactive Map Definition feature and creates source maps to extended DPS V2 map specifications.

**HIGHLIGHTS**

The new functions provided in the DPPX/SP IMD licensed program beyond that available in existing releases of the DPPX/DPS Interactive Map Definition feature are:

- Greater Device Size Independence
- Improved Mapgroup Test
- MSL Concatenation and Sharing
- Mapgroup Generator Improvements
- Support for Improved Mapgroup Load Module
- Support for 3290 Information Panel

**DESCRIPTION**

DPPX/SP IMD enables the DPPX/SP application programmer to create and update screen and printer panel layouts online at program development time.

The application programmer uses a display to describe how data will appear in a panel to an end-user of a display device or a printer. Interactive Map Definition captures this description in a map and imparts it both to the application program at compile-time and to a run-time library via generation. At application run-time, the Format Management component of DPPX/SP loads the generated run-time map from the library and uses it to format the panel, to control the transfer of data between the application and the device, and for device-dependent information.

The DPPX/SP IMD licensed program provides online facilities for the DPPX/SP application programmer to create and update a map specification library (MSL) containing source maps. The user can also share MSLs (read-only) with other concurrent developers and generate compile-time (application data structure) and run-time maps.

Program development is normally completed by compilation/assembly of the source program. At this time, a copy of the IBM-supplied control structure and DPPX/SP IMD generated application data structure from the source copy library are included.

- Greater Device Size Independence
 

The Format Management (FM) component of DPPX/SP has enhanced the procedure for matching the device (both size and function level) at run-time with that for which the mapgroup was defined. DPPX/SP IMD supports this facility at generation. DPPX/SP IMD also uses this new facility to reduce the number of versions of each IMD menu map from four (DPS/IMD Version 2) to just one, with a consequent reduction in disk storage requirements.
- Improved Mapgroup Test
 

This enhancement permits the user, without leaving IMD, to send maps to the screen by invoking the FM component of DPPX/SP just as an application would. This permits additional map facilities to be tested. This testing includes any combination of maps from a map group. The testing can demonstrate any of the following facilities: Programmed symbol sets, partitioning, and user exits.
- MSL Concatenation and Sharing
 

DPPX/SP IMD allows a user to access up to six MSLs. The first MSL is read/write and is exclusive for the user. Subsequent MSLs are read-only and may be referenced as read-only by other concurrent users.
- Mapgroup Generator Improvements
  - Mapgroup Generator Invocation.

All the information to initiate map generation is now contained within a single frame.

  - Mapgroup Generator Errors

Additional checking and diagnosis occurs during Mapgroup and Application Data Structure generation.
- Support for Improved Mapgroup Load Module

DPPX/SP IMD generates the improved mapgroup load module accepted by the FM component of DPPX/SP. Improvements include:

- Reduced path length at run-time for maps of average complexity.
- An interface at the built-in procedure level for an application to obtain a descriptor of the data structure corresponding to a map.
- Support for 3290 Information Panel

The 3290 Information Panel allows large screen capacity, variable character size, extended highlighting, Programmable Symbol sets, and multiple partitions. DPPX/SP IMD allows a user to take advantage of all of these facilities.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on all models of the IBM 8100 Information System.

Use of DPPX/SP IMD requires a display supported by the FM component of DPPX/SP with a screen width of at least 80 characters, depth of at least 24 lines and with a keyboard which has 12 or more program function keys.

**SOFTWARE REQUIREMENTS**

This licensed program is designed to work under DPPX/SP licensed program, 5660-281.

One of the following licensed programs will be required to create applications to utilize DPPX/SP IMD maps via the FM component of DPPX/SP, depending on the application programming language used:

DPPX/COBOL Compiler	5760-CB1
DPPX/PL/I Compiler*	5760-PL1
DPPX/PL/I Library*	5760-LM2
DPPX/ASM	5760-AS1
DPPX/APL	5760-XR2

\* PL/I Library is a prerequisite for PL/I Compiler

**COMPATIBILITY**

The DPPX/SP IMD licensed program is upwards compatible with the Interactive Map Definition feature of DPS Version 2. All of the DPS IMD V1 and V2 function is provided, together with significant usability, performance, and functional enhancements. Source maps and MSLs created by either DPS V1 IMD feature or DPS V2 IMD feature can be processed by DPPX/SP IMD.

Conversion of source map formats from those used by DPS IMD V1 and V2 may be made either explicitly, by user request, or implicitly (automatically) on reference. Saving an edited map results in the DPPX/SP IMD level being saved. Read-only access to the source map, for example, for generation or editing of related objects, causes temporary conversion, but the new level is not saved. Therefore, explicit conversion offers better performance during map editing.

Map conversion back to DPS V2 IMD format is provided by explicit user request. Map conversion back to DPS V1 IMD format is not provided.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/SP General Information Manual (GC23-0600).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No

PROGRAM PRODUCTS

**CROSS SYSTEM PRODUCT/APPLICATION  
DEVELOPMENT (AD) for DPPX/SYSTEM PRODUCT  
5660-284**

**CROSS SYSTEM PRODUCT/APPLICATION  
EXECUTION (AE) for DPPX/SYSTEM PRODUCT  
5660-285**

**PURPOSE**

Cross System Product/Application Development provides an interactive interface for developing, testing and generating application programs for execution in a DPPX/System Product (DPPX/SP) environment. It is highly compatible with Cross System Product/AD for CICS/VS, SSX/VSE, MVS/TSO and VM/SP CMS. Cross System Product/Application Development includes the facilities for developing, testing and generating applications. Cross System Product/Application Execution provides for production execution of Cross System Product/AD applications.

**SPECIAL SALES INFORMATION**

Cross System Product/AD and Cross System Product/AE are members of the Cross System Product set of programs which also contains DMS/DPPX, DMS/DPCX, and Cross System Product/AD and AE for CICS/VS, SSX/VSE, MVS/TSO and VM/SP CMS. Each of these programs shares a common, proven architecture and all are highly compatible in their implementation. The Cross System Product set provides the IBM customer with a highly productive capability for producing applications which, with little or no change, may be used in the DPPX/SP, SSX/VSE, CICS/VS, MVS/TSO and VM/SP CMS environments. Applications developed in the DMS/DPPX or DMS/DPCX environments may be moved to the Cross System Product/AD environment, regenerated and executed in the Cross System Product/AE environment, subject to published restrictions.

Generation of applications for DPPX/SP execution is now a capability of Cross System Product/AD on the 4300 and 3000-series. This capability will provide 8100 customers with large DPPX/SP application development projects an additional avenue of application development with their 4300 or 3000-series processor.

Cross System Product/AD and AE provide a powerful tool for the customer who is planning distributed applications for the 8100.

**HIGHLIGHTS**

- Interactive definition, test and execution of application programs.
- Trace/debug facility at development time.
- Direct execution of generated applications.
- Call and transfer linkage to other applications.
- Definition and execution in a DPPX/SP environment.
- Portability of application definitions (within published restrictions) between members of the Cross System Product set.

**DESCRIPTION**

**Data Definition** - Allows the definition of data structures and the characteristics associated with that data. Single elements of data are defined as data items. Each data item name is unique within a development library called the Member Specification Library (MSL). Data items are components of a record, table, map or working storage. After a data item has been defined once, it may be used in other records, tables, maps or working storage by entering the data item name. The associated characteristics of the data item, collected from the MSL, need not be reentered.

**Map Definition** - Allows the definition of a map for a terminal display or printer. Each map is given a unique name within a map-group (a group of maps for use in an application) and device. The variable fields defined on a map are named and characteristics are defined for each. Characteristics may be collected from data definitions on the MSL if an already-defined data item name is used.

**Application Definition** - Provides for the definition of an application as a group of related processes. Processing statements can be used to define arithmetic operations, movement of data, use of tables, access to map fields and record data items, and logical testing and and branching.

**Application Test** - Allows the user to verify the syntax and logic design of any Cross System Product/AD-defined application, as well as to view the logical sequence of map displays as the user will see them in the production environment.

**List Processor** - Provides the capability to list all members of an MSL, or select subsets to be listed, and then invoke other Cross System Product/AD functions against them. These functions are: Copy, rename, delete, print, change, where used, edit view, export. Most utilities and editors can be invoked directly from the list processor.

**Tutorial** - Can be used to learn about Cross System Product/AD by reading it as a manual or by direct selection of certain sections. It can be accessed at any point in Cross System Product/AD by pressing the HELP program function key.

**Utilities:**

**EXPORT** - Allows an MSL member to be moved out of an MSL.

**IMPORT** - Allows a previously-exported member to be moved into an MSL.

**Member Maintenance** - Allows members in an MSL to be copied, deleted, renamed or printed.

**File Maintenance** - Allows the user to view or change data that is stored in a file that has been previously created and defined. If the change option is selected, the user may display, replace, delete, add or copy records to the file.

**Application Generation:** This process translates the defined application into a set of tables which may be executed in the DPPX/SP environment. These execution tables may be distributed to a production system by tape, diskette, or communication facilities. Normal DPPX/SP library services are used to enter the module (execution tables) into the program library of the production system.

**Application Execution:** Once an application has been generated, it may be executed under the control of Cross System Product/AE. Cross System Product/AE retrieves the application definition from the DPPX/SP library, initializes it to the run-time environment, and manages the execution of the application.

**CUSTOMER RESPONSIBILITIES**

**Installation:** Cross System Product/AD and AE are installed using the DPPS/SP Program Product Installation procedure as described in the *DPPX/SP Installation Manual*. The Cross System Product/AD installation procedure consists of loading programs and data files from the distribution diskettes to disk. All Cross System Product/AD programs are distributed in object module form, and program assembly is not required.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Cross System Product/AE has been designed to operate on an IBM 8130 or 8140 Processor with a minimum of 512K bytes of memory. Cross System Product/AD has been designed to operate on an IBM 8130 or 8140 Processor with a minimum of 768K bytes of memory.

Terminal requirements are:

- One display terminal with 1,920-character screen and 12 program function keys.
- One operator terminal (execution).

For system libraries, any appropriate storage devices supported by DPPX/SP are allowed.

For user data storage and system data sets, at least one disk storage unit is required, which may be the same as required for DPPX/SP system operation.

**SOFTWARE REQUIREMENTS**

Cross System Product/AD and Cross System Product/AE require the following product:

- DPPX/SP (5660-281).

Cross System Product/AD also requires:

- DPPX/SP Interactive Map Definition (5660-282).

Cross System Product/AD and DMS/DPPX may not be installed concurrently on the same DPPX/SP system. In like manner, Cross System Product/AE and DMS/DPPX Execution Facility may not be concurrently installed on the same system.

**Storage Estimates:** Cross System Product/AD requires a minimum of 256K bytes of real storage. Additional storage is required for multiple concurrent users.

Cross System Product/AE requires a minimum of 64K bytes of real storage, plus the size of the run-time application. Applications vary in size from 8K bytes for a small application to 64K bytes or more for large applications.

These storage requirements do not include data storage, or storage for other licensed programs or the concurrently-resident application programs.

**COMPATIBILITY and PORTABILITY**

**Compatibility with Cross System Product/AD (5668-944):** Cross System Product/AD provides a means for defining applications which, with little or no change, can be migrated between S/370, 4300, 3000-series, and 8100 systems. This is achieved as follows:

**Cross System Product/AD and AE for DPPX/SP (cont'd)**

The definition facilities, by which a user defines his application, maps, and data, are identical in Cross System Product/AD for DPPX/SP (5660-284) and Cross System Product/AD for CICS/VS, SSX/VSE, MVS/TSO and VM/SP CMS (5668-944). These definitions are stored in a Member Specification Library which can be moved from one system to another. Each product includes utilities to assist in moving definitions between them.

Cross System Product/AD and Cross System Product/AE recognize differences between environments and allow use of certain facilities unique to the environment. While use of these facilities does not preclude portability, the user should be cautious in taking advantage of them during definition as they may introduce some extra effort into migrating between supported environments.

Additional information on application portability is included in the *Operation-Development Manual*.

**Compatibility with DMS/DPPX and DMS/DPCX:** DMS/DPPX, DMS/DPCX and Cross System Product/AD are conceptually the same in the definition phase, however, Cross System Product/AD offers functions that are not available with DMS/DPPX and DMX/DPCX. Applications developed on Cross System Product/AD will execute only on Cross System Product/AE.

Applications defined using DMS/DPPX or DMS/DPCX are portable to Cross System Product/AD within published restrictions. For more information, see the *Operation-Development Manual*.

**CONVERSION**

The DMS/DPPX Execution Facility will execute in the DPPX/SP environment. Therefore, DMS/DPPX applications can migrate from DPPX to DPPX/SP without a regeneration if DMS/DPPX Execution Facility is used.

Applications that were generated by the DMS/DPPX Definition product will execute in the DPPX/SP environment under Cross System Product/AE without regeneration.

Applications that are generated using Cross System Product/AD will not execute under the DMS/DPPX Execution Facility.

DMS/DPPX FEP1 definition will run on DPPX/SP only with DPS V1 IMD or DPS V2 IMD. This capability is provided for migration purposes only, and DMS/DPPX will not co-reside on DPPX/SP with Cross System Product/AD.

**DOCUMENTATION**

(available from Mechanicsburg)

The publications for Cross System Product/AD and Cross System Product/AE have been restructured into a common, task-oriented library utilizing loose-leaf binders, tabs and inserts. They may be ordered at product availability.

All of the publications, binders and binder inserts may be obtained by ordering *Cross System Product/AD* (SBOF-1023) and *Cross System Product/AE* (SBOF-1024).

Individual form numbers for publications are: *General Information* (GH20-0940) ... *Application Development Guide* (SH20-0942) ... *How-to-Use Cross System Product/Application Development* (SH20-0941) ... *Operation - Development* (SH20-0943) ... *Operation - System Considerations* (SH20-0944) ... *Operation - Execution* (SH20-0945) ... *Problem Determination Guide* (SH20-0947) ... *Messages and Codes* (SH20-0946) ... *Program Specifications - Development* (GH20-0951) ... *Program Specifications - Execution* (GH20-0952) ... *Reference Summary* (GX20-0950).

PROGRAM PRODUCTS

**DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
PERFORMANCE TOOL VERSION 2  
DPPX/PT (5660-286)**

**PURPOSE**

The DPPX/PT Version 2 program consists of a Monitor, a Reporter and an Accounting Collector that monitors and reports on the activity of the DPPX/System Product, as well as provides system resource usage information for each user.

Regular use of DPPX/PT Version 2 can assist the customers to measure and evaluate the performance of their current 8100/DPPX systems. In addition, it enables them to plan for additional 8100/DPPX capacity to meet their distributed processing needs.

Both general and detailed information are available, such as:

- The 8100 Processor utilization.
- Real storage utilization.
- DASD device utilization.
- Environment statistics.
- Transient module utilization.
- DASD data set utilization.
- DTMS transaction statistics.
- Dynamic resident module utilization
- CPU and I/O resource utilization for each user.

**HIGHLIGHTS**

- Supports DPPX/SP Release 1 and Release 2.
- Combines the Monitor, the Reporter and the new Accounting Collector into a single program product.
- Provides an enhanced Environment Report with comprehensive resource utilization information.
- Adds a new Accounting Collector for capacity planning and billing applications.
- Makes available a sample COBOL source program to print accounting data.
- Improves the Monitor's I/O performance.
- Provides a one-time charge with Volume License Amendment discounts.

**DESCRIPTION**

DPPX/PT Version 2 supports the 8100 DPPX/System Product Releases 1 and 2. A fix package (FP) will be shipped to all DPPX/PT Version 2 users of record at general availability of DPPX/SP Release 2.

DPPX/PT Version 2 combines into a single program product the previously separate Monitor program and Reporter feature of Version 1, and a new Accounting Collector.

The Monitor uses a sampling technique to scan and record the current DPPX system status. It also captures and records information from event trace points in the DPPX system. DTMS transaction statistics are obtained by capturing transaction events at appropriate points in the DTMS modules. At requested intervals, the DPPX/PT Monitor will write its collected data to a disk data set. The Monitor output data may then be entered into the Reporter Program which produces formatted reports from the captured performance data.

The Reporter contains information on processor, real storage and device utilizations, environment and DTMS statistics, transient module and dynamic resident module utilizations. Bar graphs are produced for both processor and DASD device utilization.

The new Environment Report provides comprehensive information about DPPX system performance, such as: CPU utilizations by level within environment or transaction, and read/write statistics by data set and adapter type within environment or transaction.

The new Accounting Collector provides CPU and I/O resource usage data for each 8100/DPPX user. In addition, the CPU utilization may be monitored at the end of each user-defined interval through messages sent to the system operator by this program.

Three types of records are written:

- Interval Record: One summary record for each interval.
- User Record: One record for each user active during the interval.
- Device Record: One record for each device accessed by each user.

This data provides basic information necessary to implement capacity planning or user billing applications.

A sample COBOL source program is provided to print each accounting record. This COBOL source program may be used as the basis for a more comprehensive accounting report developed by the user.

Improvements in I/O performance for the Monitor have been implemented in DPPX/PT Version 2. These performance improvements are achieved by writing multiple blocks of records with a single SEND macro.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This program product is designed to operate on any IBM 8100 system on which DPPX/SP will operate. The minimum real storage and disk requirements for each of the functions are show below:

Function Name	Real Storage	Disk Space
Monitor	16K	7 logical blocks
Reporter	14K	34 logical blocks
Accounting Collector	11K	10 logical blocks

For details, refer to the *DPPX/PT Version 2 User's Guide* (SC34-2147).

**SOFTWARE REQUIREMENTS**

DPPX/PT Version 2 requires the functions provided in the following program products that are components of the DPPX/System Product (DPPX/SP, 5660-281):

- DPPX/BASE (5760-010)
- DPPX/DTMS (5760-TD1) for the DTMS transaction statistics.
- The COBOL Compiler (5760-CB1) for the sample COBOL source program.

**PLANNING INFORMATION**

Planning information is provided in the *DPPX/PT Version 2 General Information Manual* (GC34-2145).

**INSTALLATION**

Installation procedures are described in the *DPPX/PT Version 2 User's Guide* (SC34-2147).

**EDUCATION**

IBM 8100 technical education is provided by the Washington Advanced Education Center. Courses in the 8100 curriculum will be updated to include discussion of the DPPX/PT Version 2 functions and features.

**DATA SECURITY, AUDITABILITY and CONTROL**

DPPX/PT Version 2 provides no security or data integrity functions beyond those provided by the environments in which it operates. User management is responsible for the selection, implementation and adequacy of these security features. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/PT Version 2 User's Guide* (SC34-2147) ... *DPPX/PT Version 2 General Information Manual* (GC34-2145) ... *DPPX/PT Version 2 Licensed Program Specifications* (GC34-2146).

PROGRAM PRODUCTS

**5662-257 - OS/VS1 BASIC PROGRAMMING EXTENSIONS**

**PURPOSE**

The OS/VS1 Basic Programming Extensions program is supported on S/370, the 3031, 3032, 3033, and 4300 Processors in S/370 mode. It can also run on the 308X Processors under VM. It provides support for the 4331 Model Group 2 Processor, the 3262 Printer mdls 1 and 11, the 3848 Cryptographic Unit, the 3375 Direct Access Storage, the 4341 Model Group 10 and 11 Processors and enhanced dump facilities.

**DESCRIPTION**

**RELEASE 1**

- Support for the 4331 Model Group 2 Processor.
  - Allows optimization of I/O Load Balancing algorithms.
- Support for the 3262 Printer mdls 1 and 11: The 3262 Printer mdl 1 is a 650 line-per-minute printer (nominal speed) using a 48-character-set print belt. The 3262 Printer mdl 11 is a 325 line-per-minute printer (nominal speed) using a 48-character-set print belt. Both printer models attach to the 4331 Processor. The OS/VS1 support allows the 3262 Printer to be used as a system printer, data management printer and as the output portion of a composite console.
- Enhanced Dump Facility I: The dump enhancements are:
  - Provide machine-readable abend dumps via a user SYSMDUMP data definition (DD). A SYSMDUMP will include the fixed nucleus, the partition and the pageable supervisor above the JES partition.
  - Allows multiple system dump data sets. This enhancement allows up to 99 system dump data sets which are installation-allocated and maintained.
  - Allows OS/VS1 handshaking with VM to have OS/VS system dumps taken via the VMDUMP command. This facility can be provided by initializing the VMDUMP parameter on the NIP member of SYS1.PARMLIB or at 'SPECIFY SYSTEM PARAMETERS' time or by using the VMDUMP keyword on the SET command.
  - Provides an in-storage console trace. The number of kilobytes to be reserved for a console trace area and the initial status of the trace can be specified on the NIP member of SYS1.PARMLIB or at 'SPECIFY SYSTEM PARAMETERS' time. The trace can be suspended and resumed (provided space was reserved) via the CNTRACE keyword on the SET command.
- Virtual Machine/VTAM Communications Network Application (VM/VCNA) support: VM/VCNA uses the IUCV (Inter-user Communication Vehicle) support provided by OS/VS1 Basic Programming Extensions to communicate with the VM/SP (Virtual Machine/System Product) control program. The IUCV support may be used by other privileged programs running on OS/VS1 Basic Programming Extensions.
- IOS Serviceability Enhancement: Prior to abending, a problem determination area is reserved and pertinent IOS data is stored to diagnose IOS abends.
- Support for 3848 Cryptographic Unit: The 3848 Cryptographic Unit is a channel-attached unit that enciphers and decipheres data. A new program product, the Cryptographic Unit program product (5740-XY6) can provide generation and management control functions for cryptographic keys.

**RELEASE 2**

- Support for the 4341 Model Group 2 Processor.
  - Allows optimization of I/O Load Balancing algorithms.
- Enhanced Dump Facility II: The dump enhancements are:
  - A dump management facility for system dumps.
  - Allows user machine-readable dumps to be taken via the DMDUMP command of VM/370.
  - Allows system dumps and user dumps to specify a VM userid for dumps taken via the VMDUMP command of VM/370.
- Provides support for the 3375 Direct Access Storage along with the program product Data Facility Device Support (5740-AM6).

**RELEASE 3**

- Support for the 4341 Model Group 10 and Model Group 11 Processors.
  - Allows optimization of I/O Load Balancing algorithms.
- Enhanced Dump Facility III.
  - Symptom strings will be provided for all system dump data sets except those being taken via the VMDUMP command of VM/370.
- Enhancements for the 3880 Control Unit Buffer.

- Support for the 3880 Storage Control Speed Matching Buffer feature for the 3375 (#6560).
- Support for the 3880 Storage Control Speed Matching Buffer feature for the 3380 (#6550)
- Provide support for the 3380 Direct Access Storage.
- Support for 4K Page Sizes.
  - Makes possible the execution of VS1 under VM on processors with 4K key-in-storage domains.

**RELEASE 4**

- Support for the 4341 Model Group 9 and 12, 4361 Model Group 4 and 5, and 4381 Model Group 1 and 2 Processors, which allows the OS/VS1 I/O load balancing algorithm to be optimized to the individual processor performance characteristics.
- Support for the 3380 Direct Access Storage and the 3380 Speed Matching Buffer of the 3880 (#6550). The channel commands for Dynamic Pathing are not supported. (The 3380 mdl AA4 can be used without this support.)
- Support for the 3880 Storage Controller, mdl 13.
- Support for the 4245 Printer including changes to SYSGEN for device recognition, and changes to allow their use as a DSO writer and JES writer.
- Support for the 3430 Magnetic Tape Subsystem.
- Addition of the System Authorization Facility Security Router, providing a standard interface common to MVS and VS1 for modules requesting security services and installation-written security processing routines.
- A repackaging of the Stand-Alone Dump program removing prior space limitations for several modules.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for ordering and installing OS/VS1 Release 7 prior to installing the OS/VS1 Basic Programming Extensions program product.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The OS/VS1 Basic Programming Extensions program product is supported on any IBM S/370, 3031, 3032, 3033, or 4300 Processors in S/370 mode. It can also run on the 308X Processors under VM.

**SOFTWARE REQUIREMENTS**

The OS/VS1 Basic Programming Extensions program product requires OS/VS1 Release 7 as a base. Also, Data Facility Device Support Release 1 Modification Level 1 is co-requisite with Release 3 of the Basic Programming Extensions and Data Facility Device Support Release 1 Modification Level 2 is co-requisite with Release 4 of Basic Programming Extensions.

**Starter System:** The starter system provided is a special OS/VS1 system ordered separately.

The starter systems provided have been updated from OS/VS1 Release 7 to include the OS/VS1 Basic Programming Extensions program product and require a minimum of 192K bytes of real storage. This starter system is only available to licensed users of the OS/VS1 Basic Programming Extensions program product.

A 3380-resident starter system with the OS/VS1 Basic Programming Extensions Release 4 program product applied will be available to licensed users of record of this program product. This starter system will be necessary for users with 3380 DASD as the only DASD attached to their processor. In addition to OS/VS1 Basic Programming Extensions Release 4, the user will require a license for OS/VS1 Data Facility Device Support Release 1.2 (5740-AM6). To install this starter system, the user will need the functions provided by the Data Facility Data Set Services (5740-UT3) program product, or its equivalent. The user may order the 3380 starter system with the Data Facility Data Set Services program product included in the starter system.

Starter systems residing on 2314, 3330, 3340 and 3350 DASD with the OS/VS1 Basic Programming Extensions Release 2 program product applied will still be available. These starter systems do not contain the OS/VS1 Data Facility Device Support program product, and therefore, do not support 3375 DASD.

Also still available is a 3375 starter system with Basic Programming Extensions Release 3 and Data Facility Device Support Release 1.1 applied.

The starter system has the basic elements necessary for system generation in a form that is directly usable by a majority of customers. The starter system functions with a variety of different I/O units at 'standard' addresses. Customers may use the starter system to perform system generation if there are appropriate matching units and addresses in their own configuration.

**PROGRAM PRODUCTS****OS/VS1 Basic Programming Extensions (cont'd)**

Dedicated Data Set Support is used in SYSGEN for the utility data sets in assemblies, link edits and data set copies.

The starter system runs on any IBM Processor supported by OS/VS1 which meets the minimum system requirements. RMS (Recovery Management System) routines for all S/370, 303X, 4300, 4361 and 4381 Processors are included in the system libraries, thus allowing processor independence of the Starter System.

Customers should be encouraged to match unit addresses with those of the starter system to the greatest degree practical. Unit addresses are established as part of the normal physical planning and cable order process; therefore, physical installation plans should be reviewed where appropriate. The following chart shows the devices supported by the starter system, the system functions for which they may be used, and the three character address assigned to each unit. The OS/VS1 starter system supports all the devices at the address specified.

RPQs ACCEPTED: No

Notes: The following notes are applicable to the "Starter System Requirements Chart":

1. DASD 3330/3333 mdl 1 and 11, 3340, 3375, 3380 and 3350 are generated on channel 1 and accessed on channel 1, with channels 2 through 4 as optional channels. (Some 3340 DASD are generated on channel 2 and accessed on channel 2, with channels 3 and 4 as optional.)
2. The three system generation utility data sets and the three object program data sets do not require additional direct access devices if sufficient space is available on the volumes that contain the new system and the starter system.
3. The 3138 and 3148 consoles use the 3158 console support (Display Mode).
4. 3286 mdl 2 optional printer for S/370 mdls 138/148.
5. 3138 and 3148 Console when IMPLIED in Printer/Keyboard mode.
6. 3420 Tapes are generated on channel 2 and accessed on channel 2, with channels 3 through 5 as optional.
7. The DLIB Installation and Build process requires space equal and additional to the distribution library space. The spindle(s) available after DLIB installation and build may be used for the new system being generated.
8. For 4300 Processors.
9. For 4331 Processors only.
10. 3375 and 3380 Starter Systems only.
11. 3775 requires OS/VS1 Data Facility Device Support program product.
12. 3375 and 3380 Starter Systems have addresses 180 and 181 only.
13. 3380 Starter System only.

PROGRAM PRODUCTS

OS/VS1 Basic Programming Extensions (cont'd)

STARTER SYSTEM REQUIREMENTS CHART

Min. Req'd	Function	Device	MPX Channel	Selector Chan 1	Device Address (Note 1, 6)			Selector Chan 4	Selector Chan 5 (Note 10)
					Selector Chan 2	Selector Chan 3			
1	System Console	3036	01A,01B						
1		3036 (Note 10)	0F2						
		3066	019		219				
		3158 (Note 3)	010,014						
		3213 (Note 4)	011,015						
		025							
		3210/3215 (Note 5)	009,01F		209,21F				
		3278-2A (Note 8)	01E						
		7443	01C,01D						
1	System Input	2540 Reader	00C,02C		20C				
		3505 Reader	012,029						
		1442 Reader/Punch	00A,02A						
		2400 (7-tr-DC) (Note 12)		180,181	280,281	380,381	480,481		
		2400 (9-track)		180,181	280,281	380,381	480,481		
	3420 (Note 10)		182,183	282,283	382,383	482,483			
		3430 (Note 13)		280,281,282	380,381,382	480,481,482	580,581,582		
				291,292,293	391,392,393	491,492,493	591,592,593		
				294,295	394,395	494,495			
1	Punch Output	2540 Punch	00D,02D		20D				
		1442 Reader/Punch	00A,02A						
		2400 (7-tr-DC) (Note 12)		180,181	280,281	380,381	480,481		
		2400 (9-track)		182,183,184	282,283,284	382,383	482,483		
		3525 Punch	013,026		280,281,282	380,381,382	480,481,482	580,581,582	
	3420 (Note 10)			291,292,293	391,392,393	491,492,493	591,592,593		
		3430 (Note 13)		294,295	394,395	494,495			
1	Print Output	3211	002,004,024		202				
		1403	00E,00F		20E				
		2400 (7-tr-DC) (Note 12)		180,181	280,281	380,381	480,481		
		2400 (9-track)		182,183	282,283	382,383	482,483		
		3420 (Note 10)			280,281,282	380,381,382	480,481,482	580,581,582	
		3430 (Note 13)		291,292,293	391,392,393	491,492,493	591,592,593		
		3800	018,028	118	218				
		3203-4,5	016,017						
			027						
		3262-1,-11 (Note 9)	00B,02B		20B				
		3262-5	00B,02B		20B				
		4245 (Note 13)	02F		20F				
3	New system	2305-2		1D0					
		2314 (or 2319)			130,131,132	230,231,232	330,331,332		
					133,134,135	233,234,235	333,334,335		
					190,191,192				
					193,194,195				
			3330-1/3333-1		150,151,152	250,251,252	350,351,352	450,451,452	
					153,154	253,254	353,354	453,454	
			3330-1,-11/3333-11		158,159,15A	258,259,25A	358,359,35A	458,459,45A	
					15B	25B	35B	45B	
			3340/3344		1C0,1C1,1C2	2C0,2C1,2C2	3C0,3C1,3C2	4C0,4C1,4C2	
					1C3,1C4	2C3,2C4,200	3C3,3C4,300	4C3,4C4,400	
						201,203,204	301,303,304	401,403,404	
						205,210,211	305,310,311	405,410,411	
						212,213,214	312,313,314	412,413,414	
			3350		148,149,14A	248,249,24A	348,349,34A	448,449,44A	
					14B	24B	34B	44B	
			3375 (Notes 10, 11)		120,121,122	220,221,222	320,321,322	420,421,422	
					123,160,161	223,260,261	323,360,361	423,460,461	
					162,163,1C8	262,263,2C8	362,363,3C8	462,463,4C8	
					1C9,1CA,1CB	2C9,2CA,2CB	3C9,3CA,3CB	4C9,4CA,4CB	
				1E0,1E1,1E2	2E0,2E1,2E2	3E0,3E1,3E2	4E0,4E1,4E2		
				1E3,1F0,1F1	2E3,2F0,2F1	3E3,3F0,3F1	4E3,4F0,4F1		
				1F2,1F3	2F2,2F3	3F2,3F3	4F2,4F3		
		3380 (Note 13)		170,171,172	270,271,272	370,371,372	470,471,472		
				173,1A0,1A1	273,2A0,2A1	373,3A0,3A1	473,4A0,4A1		
				1A2,1A3,1B0	2A2,2A3,2B0	3A2,3A3,3B0	4A2,4A3,4B0		
				1B1,1B2,1B3	2B1,2B2,2B3	3B1,3B2,3B3	4B1,4B2,4B3		

Starter System and Distribution Libraries (Note 7).

Three system generation utility data sets and the three object program data sets (Note 2).



## PROGRAM PRODUCTS

**TELEPROCESSING NETWORK SIMULATOR  
VERSION 2 RELEASE 2  
TPNS (5662-262)****PURPOSE**

Teleprocessing Network Simulator (TPNS) is a telecommunications testing package that enables a user to test and evaluate application programs, communications access methods, and communication control programs without the use of actual terminals. The purpose of TPNS is to provide controlled generation of message traffic into a telecommunications subsystem or application through the use of processing rather than by large amounts of terminal hardware and terminal operator time. TPNS provides the ability to simulate a specified network of terminals and their associated messages, allowing the user to alter network conditions and message loads during a run. Thus, TPNS can be used to stress-test telecommunications application programs with volume messages to evaluate the reliability and approximate performance characteristics under expected operating conditions.

**HIGHLIGHTS**

- Supports Start/Stop, Airlines Line Control (ALC), BSC, SDLC, and X.25 terminals as indicated below.
  - Provides simulation support for X.25 packet switching networks.
  - Simulates entire subareas in an MSNF environment.
  - Runs under any current release of OS/VS1, OS/VS2 (MVS), MVS/System Product Version 1 (MVS/SP V1), and MVS/Extended Architecture (MVS/XA) or subsequent releases of these SCPs unless otherwise specified.
  - Executes in 31-bit addressing mode under MVS/XA.
  - Automatically handles line protocols using a TPNS Control Program that executes in a 3705 or 3725 Communications Controller.
  - Utilizes flexible, easy-to-use script language.
  - Provides a script generator program.
  - Provides enhanced communication among terminal scripts based on user-defined events.
  - Provides a message generation trace facility to aid in the debugging of scripts, including logic tests.
  - Allows for comprehensive operator intervention and modification during the test run, either manually or automatically through the inclusion of operator commands in the message decks.
  - Variable message mix and traffic rate.
  - Paging of message scripts to reduce virtual storage requirements.
  - Message logging and time stamping for offline analysis.
  - Pre processor for checking syntax prior to run.
  - Online and offline reports.
  - Multiple networks may be simulated simultaneously and independently to multiple subsystems on one or more processors.
  - Logic tests on both input and output to allow dynamic changes in message mix during the test run.
  - Random generation of test data.
  - Multiple console support to allow remote console support of the simulator.
  - High-level message generation by having the TPNS Control Program automatically add necessary line control and terminal framing characters.
  - Line and SIT trace capabilities for access method debugging.
  - Drives application programs running under IBM data communication programs such as IMS, CICS, VSPC, TSO, TCAM, VTAM, BTAM, ACF/VTAM and ACF/TCAM.
  - Simulates parallel sessions.
  - Supports negotiable bind.
  - Supports data encryption.
  - Supports parallel links and multiple routing.
  - Supports Class of Service.
  - Supports Transmission Priority and Network Flow Control.
  - Supports configurable station, channel contact and FID4 Transmission Header.
  - Supports Session Outage Notification.
- Operates within the same S/370 as the application program under test (Simplex Mode) or with TPNS driving application programs in one or more processors (Duplex Mode).
  - Exercises the interfaces between the terminal control unit, communication lines and the application program as used in the operational system.
  - The ability to simulate S/S terminals up to 1200 bps.
  - Support for the extended color capability of the 3279 Color Display Station and 3287 Printer.
  - Support for the programmed symbols feature of the 3279 Color Display Station, the 3278 Display Station, the 3278 Printer and the 8775 Display Terminal.
  - Support for terminals utilizing a 230KB line attached to a TPNS 3705 or 3725 or a 256KB line attached to a TPNS 3725.
  - The ability to use application messages/data to generate TPNS messages. Data received in response to a previous message can be used in a succeeding message.
  - Condensed interval reports.
  - Enhanced logic testing - logic check can be performed at message generation time.
  - Console commands to alter the message sequence dynamically.
  - Line/terminal device status on interval reports.
  - Readable interpretation of SNA command codes and headers and X.25 packet headers on the log data set formatted output.
  - Message rates routed to the console in addition to the printer.
  - Ability to observe traffic of individual devices while executing via a monitor.
  - The capability to write messages to the console operator from the TPNS script or a user exit routine.

**DESCRIPTION**

TPNS Version 2 may be used to drive the online telecommunications system in the following manner:

- Simulate Start/Stop (S/S), Airlines Line Control (ALC), Binary Synchronous (BSC), Synchronous Data Link Control (SDLC) or X.25 terminals and the networks to which they would be attached.
- Simulate an X.25 packet switching network.
- Simulate entire subareas in a Multisystem Networking Facility (MSNF) environment.
- Generate data from descriptions of application messages and transmit those real messages to a running teleprocessing application program.
- Vary the frequency of message transmission within desired limits.
- Time-stamp and log all messages sent from and received by the simulated terminals.
- The user may analyze the message contents for accuracy of data transmitted. The user may also analyze the sending and receiving times to approximate application performance in response times and message rates.

Utilizing a 3705 or 3725 Communications Controller, TPNS supports a broad range of terminal types and provides flexible, generalized message generation facilities that can be used to simulate a wide variety of telecommunications operations. The following terminal and device types are simulated by TPNS:

- Start/Stop communication terminals on leased communications facilities:
  - 1050 Data Communications System
  - 2740 Communication Terminal mdl 1 (with Station Control and Record Checking)
  - 2740 Communication Terminal mdl 2 (with Station Control, Record Checking and Buffered Receive).
  - 2741 Communication Terminal

PROGRAM PRODUCTS

TPNS V2 (cont'd)

3101 Display Terminal (block mode, half-duplex mode, send break only)

6580 Displaywriter (communicating as a 2741 or mdl 33/35 TWX)

AT&T 83B3 Selective Calling System (supported in 3705 only)

Western Union Plan 115A Outstation (supported in 3705 only)

Western Union mdl 33/35 TWX (half-duplex mode, send break only)

- Start/Stop Communication terminals on switched communications facilities:

3101 Display Terminal (block mode, half-duplex mode, send break only)

Western Union mdl 33/35 TWX (half-duplex mode, send break only)

- Airlines Line Control (ALC) support is provided in the 3705 only for those remote terminals that communicate via the 6-bit line code known as Airlines Line Control. Specific features include full duplex line operation, support of direct polling, and the capability to specify the end-of-message character to be appended to messages transmitted by the simulated terminals.

- Binary Synchronous Communication Terminals:

3270 Information Display System mdls 1 and 2 (3271 mdls 1 and 2, 3274 mdl 1C, 3276 mdls 1, 2, 3 and 4, 3277, 3278, 3284, 3286, 3287, 3288, 3289) remote only, EBCDIC or ASCII

In addition, the following IBM BSC disciplines are supported:

BSC1 (Point-to-point leased BSC)

BSC2 (Point-to-point dial BSC (terminal answer only))

BSC3 (Multipoint BSC)

The types of BSC terminals which may be simulated using the above BSC 1, 2 and 3 line disciplines include the following:

1130

1800 Data Acquisition and Control System

S/3

S/7

S/34

S/36

S/360 mdl 20

S/360 mdl 25

S/360

S/370

2770 Data Communication System

2780 Data Transmission Terminal

3780 Data Communications Terminal

6670 Information Distributor

8100 DPPX Information System

6580 Displaywriter (communicating as a 2770, 2780 or 3780)

Note: TPNS provides no support for special features on these BSC 1, 2, and 3 devices. Multileaving (mdl 20 workstation) is supported (transparent mode only).

- Synchronous Data Link Control (SDLC) line discipline for Systems Network Architecture (SNA) terminals on leased half-duplex, leased full-duplex, or dial communication facilities. These terminals are also supported in an X.25 packet switching environment on leased full-duplex communication lines.

3270 Information Display System (SNA) (3271 mdls 11 and 12, 3274 mdl 1C, 3276 mdls 1, 2, 3, 4, 11, 12, 13 and 14, 3277, 3278, 3284, 3286, 3287, 3288, 3289)

3600 Finance Communication System

3650 Retail Store System (supported as 3600-Compatible Device)

3660 Supermarket System (supported as 3600-Compatible Device)

3614 Consumer Transaction Facility

3624 Consumer Transaction Facility

3730 Distributed Office Communication System

3767 Communication Terminal

3770 Data Communication System

3790 Communication System

4700 Finance Communication System (supported as 3600-compatible device)

5250 Information Display System (5251 Display Station and 5256 Printer)

S/34

S/36

8100 DPPX Information System

8100 DPPX/SP Information System

8100 DPCX Information System

8775 Display Terminal

General support for physical unit type 2 terminal controllers

General support for physical unit type 1 terminal nodes

General support for SNA subareas in an ACF 2 or ACF 3 MSNF environment

Note 1: In order to execute SNA Dial Communications, the application program must run under an OS/VS operating system which also supports SNA Dial.

Note 2: TPNS SNA simulation is not intended to simulate code residing in the logical control unit other than that code required to transmit and receive message traffic.

TPNS also provides support for devices attached to the 8100 systems via teleprocessing links or remote loop. The level of support for a remote loop is from the 3842 remote loop controller downward; i.e., TPNS simulates the entire remote loop with its attached devices.

Specific device support for 8100 systems includes functions of the 3276 and 3278 Displays, the 3287, 3289 and 3645 Printers, and the 8775 Display. TPNS also simulates a certain class of devices that use 'device headers' rather than the standard SNA headers. These devices include the 3641, 3642, 3643, 3646, 3647, and the 3289 mdl 3 with its attached devices. The 3644 is supported by allowing the user to specify the device header in the scripting statements.

Another level of simulation provided by TPNS is the simulation of an entire system in a Multisystem Networking Facility (MSNF) environment. In simulating such a system, TPNS performs the functions of the System Services Control Point (SSCP), the Network Control Program (NCP), and the physical and logical units in the system. The logical units in a simulated system generate messages in the same way that same-domain terminals simulated by TPNS generate messages. Subareas in the simulated system are supported independently by TPNS. A simulated NCP subarea may have the following attachments: Real link attachments to one or more communications controllers executing ACF/NCP/VS, simulated link attachments to other simulated NCP subareas, and simulated channel attachments to simulated host subareas. A simulated host subarea may have the following attachments: Real channel attachments to one or more communications controllers executing ACF/NCP/VS and simulated channel attachments to simulated NCP subareas.

In addition to simulating terminals and subareas on remote links, TPNS provides simulation support for an X.25 packet switching network. The specific X.25 facilities supported are consistent with the IBM interpretation of the CCITT Recommendation X.25. TPNS provides three different types of X.25 interfaces:

- TPNS appears as one or more data circuit-terminating equipment (DCE) interfaces to the system under test; i.e., TPNS simulates an entire packet switching network including the data terminal equipment (DTE) devices.
- TPNS appears as multiple DCE interfaces to the system under test, simulating a packet switching network between real DTEs. This form of simulation is called 'passthrough' and is independent of end-to-end protocols (such as SNA) and the types of DTEs involved.
- TPNS appears as one or more DTEs to the system under test which may be a real packet switching network

Each X.25 interface simulated by TPNS can support multiple permanent and/or switched virtual circuits. TPNS will simulate a variety of DTEs including SNA terminals using PSH or QLLC protocols for logical link control, SNA subareas using QLLC protocols, and X.25 native equipment.

**TPNS V2 (cont'd)**

Scripting facilities are provided by the TPNS language. The script describes the terminals, network configuration, and message rates desired by the user. In addition, the script defines telecommunications messages meaningful to the online application programs under test. Individual segments of information in the messages may be generated by different methods including random selection, table lookup, and constant insertion. TPNS provides a logic test capability of comparing for certain data or text received or sent by TPNS. Thus, scripts can vary message data from the simulated terminals based on the content of a prior response from the application program.

Preparation of scripts is simplified by providing common default values for the keyword parameters used in the scripting language. Messages may be generated from a single script for multiple terminals.

A message generation trace facility is available to aid in script debugging by providing a listing of the steps through message generation for a simulated terminal. A device level option specifies that trace records are to be written to the log data set. This facility also traces the execution of logic tests. The ITPLL postprocessor program will format the trace records from the log data set.

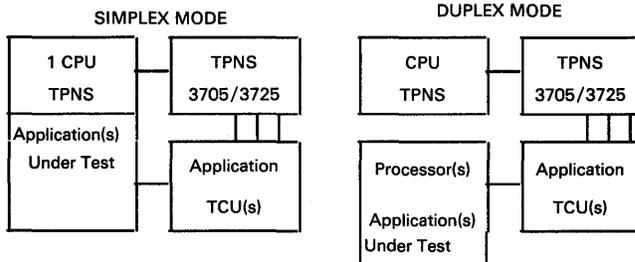
Multiple networks may be simulated within a single TPNS job to provide messages to drive multiple telecommunications applications or multiple CPUs.

A script generator program is provided as a part of TPNS Version 2. This program allows the user to generate automatically TPNS MSGTXT texts from data captured during running of an online application. The user needs to specify only the network configuration statements and provide these, along with the captured data, as input to the script generator. The network configuration statements may be updated by the script generator program to reflect the MSGTXT decks generated.

Several formats for the captured data can be used as input to the script generator:

- Data captured in the format of the TPNS Script Generator Field Developed Program.
- VTAM buffer trace.
- VTAM/PARS II trace.
- CCWTRACE option of GTF.
- Subsystem data capture. TPNS provides some sample IMS and CICS capture routines for 3270 terminals.

TPNS can operate in either simplex or duplex mode. In simplex mode, TPNS and the subsystem (the driven telecommunication application) under test reside in a single processor and execute in separate regions under OS/VS. In duplex mode, two or more processors are required. TPNS resides in one and drives various telecommunication applications in the other(s). Neither simplex nor duplex operation requires that either processor be dedicated to the test run. Dedicated duplex processors would be used primarily for critical application performance approximations. In either mode, TPNS requires a dedicated 3705 or 3725 Communications Controller (see exception below), and the application under test requires another transmission control unit (TCU) of the appropriate type required by the application programs.



For subarea simulation only, TPNS can share an ACF/NCP/VS communications controller with ACF access methods in a multi-tail environment, i.e., neither a dedicated communications controller nor a TPNS Control Program is necessary. When simulating terminals controlled by the system under test, such as non-SNA terminals, TPNS will continue to require a dedicated communications controller executing a TPNS Control Program.

TPNS can drive various application programs running under IBM data communication products such as IMS, CICS, VSPC, VTAM, TSO, TCAM, BTAM, ACF/VTAM and ACF/TCAM.

A pre-processor program is provided to syntax check network and message configuration script statements. Two post-processor programs are provided: One to list out the TPNS log tape in a formatted report, and one to selectively calculate a response time analysis by network communication line. The response time calculated by the post-processor is the time required for the application to respond to an input message. The user has, as his option, the ability to write his own response time analysis program using the various TPNS

time stamps. TPNS also provides functions for graphing the results of the analysis program.

The log tape formatting program has the capability to analyze the message traffic on the log tape for display terminals and construct formatted screen images to be printed. A device level option is available when executing TPNS Version 2 to specify that special display records are to be written to the log tape, and these special records will be used in producing the screen image outputs. The screen formatting feature is available for all terminals in the 3270 Information Display System, the 8775 Display Terminal, and the 5250 Information Display System.

Properly used, TPNS may reduce testing time and required testing resources while improving the thoroughness of testing for telecommunication applications.

TPNS can provide repeatability for functional testing, a collection of comprehensive transaction messages for regression testing, and message rate statistics for approximating application performance, response times and evaluation of telecommunication network design.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the following functions to install TPNS:

- Providing an appropriate OS/VS SCP including arranging OS/VS2 system authorizations to include necessary references to TPNS modules and placing the provided source, object and macro statements into appropriate OS/VS libraries.
- Generating a functional 3705 or 3725 Control Program for TPNS. Preparing high-level macro statements to describe type(s) of network(s) whose simulation is desired, and compiling the TPNS 3705 Control Program from provided libraries.
- Ordering and installing the necessary communications equipment to support the application and TPNS environment.
- Providing communication line connections between the TPNS communications controller and the application TCU with appropriate line adapters.

The *TPNS Program Reference Manual* provides information on how to connect the application TCU to the TPNS communications controller using modems, modem eliminators, or direct-attach cables.

If use of common carrier lines is planned, the customer is responsible for contacting the local common carrier and arranging for the necessary communication services.

- Arranging for appropriate engineering changes required by TPNS. The TPNS 3705 requires engineering change levels to include EC 311283 or REA 23-13007 if SDLC lines are to be used. This engineering change level must also be installed on the application 3705 if NCP Release 3.1 or later is used. If data set eliminators are being used for SDLC simulation, the application 3705 must have the previously mentioned EC or REA and the NCP must be level 3.1 or later. A TPNS 3725 requires an updated MIOC card (P/N 6089020) to provide accurate timestamping information.

The customer is responsible for the following functions to use TPNS in simulation tests:

- Determining and specifying significant network configuration, operational and timing alternatives to test.
- Developing the appropriate test data for meaningful transaction messages and application conditions.
- Executing the provided programs for transaction rate tables, or developing unique rate tables to characterize the application activity.
- Preparing TPNS scripts or message files to define the messages and operating parameters.
- Executing report programs to analyze message data transfers and performance approximations.
- Interpreting output results and modifying application programs and test parameters for subsequent runs.
- Developing specialized analysis programs to examine message data or time stamps for the TPNS log tape.

In connection with suggested customer use of TPNS, whether by formal proposal or not, the customer must be furnished, in writing, with the following statement as well as the other pertinent customer responsibilities as set forth above.

"The terminal network simulations provided by TPNS are believed to be sound, but IBM does not warrant or guarantee that users can or will achieve similar results on networks with actual terminals attached. Other IBM terminal devices announced as compatible with the IBM devices specifically simulated by TPNS may be supported in compatibility mode. The simulations will be equivalent only to the extent that the compatible devices function identically. It is the user's responsibility to determine and validate input data and



PROGRAM PRODUCTS

TPNS V2 (cont'd)

determine the extent to which these simulation results are relevant to the user's application and system environment."

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

TPNS is designed to run in an IBM S/370 Processor.

One tape drive is required if message logging to tape is desired. In addition, multiple drives may be specified for alternating tape reels of log messages.

For TPNS simulation runs, DASD storage space is required for the following partitioned data sets:

- User network/message definition records
- TPNS CPU and Control Program load modules
- Rate tables (optional)

For a TPNS Control Program system generation run, 800 tracks of IBM 3330 DASD storage (or equivalent space on IBM 3340, 3350 or 3380 DASD) is required for TPNS and TPNS Control Program macro libraries, object libraries and tables.

At least two communications controllers are required when executing TPNS (see exception above). One communications controller must be dedicated to TPNS during the simulation run, and must be either a 3705 Communications Controller (Mdl I or Mdl II) or a 3725 Communications Controller. TPNS can support multiple communications controllers if larger line configurations are required. The other required communications controller is the one used by the system under test.

A TPNS 3705 requires a type 1, type 2, type 3 or type 4 channel adapter, a type 2 or type 3 communications scanner, a minimum of 80K bytes of storage, and sufficient line adapters to simulate the line configuration required. If the 3705 has the 'N ROS' feature (#9566) installed, the loader and dump utilities must be those supplied in the System Support Programs for ACF/NCP/VS (SSP) program product (5735-XX3). If the 3705 has more than 256K bytes of storage, then SSP Version 1 Release 2 or later is required.

A TPNS 3725 requires a 3725 channel adapter, a 3725 communications scanner, and sufficient line adapters to simulate the line configuration required. The loader and dump utilities used must be those supplied in the SSP Version 2 Release 1.1 program product (5735-XXA).

The TPNS Program Reference Manual contains information for estimating TPNS communications controller storage requirements.

SOFTWARE REQUIREMENTS

TPNS executes in the virtual mode (V=V) or real storage (V=R) under any current release of OS/VS1, OS/VS2 (MVS), MVS/System Product Version 1 (MVS/SP V1) and MVS/Extended Architecture (MVS/XA) or subsequent releases of these SCPs unless otherwise specified.

The TPNS virtual region size required for a minimum network of up to five lines and five terminals is 704K bytes. The TPNS Program Reference Manual contains additional information necessary for calculating individual region requirements. The TPNS preprocessor will report the control block size required for a TPNS network for each run.

A TPNS Control Program is supplied to execute in the communications controller allocated to TPNS, and to provide line scheduling and I/O operations. This control program can be used only with TPNS, and it must be generated by the user according to the required line configuration.

The 3705 or 3725 Communications Controller and Network, when used by TPNS, will be serviced by Field Engineering.

DOCUMENTATION (available from Mechanicsburg)

Title	Order Number
Licensed Program Specifications	GH20-5323
General Information Manual	GH20-2487
Language Reference Manual	SH20-2489
Data Areas	LY20-2520
Reference Summary	GX20-2390
Program Reference Manual	SH20-2488
User's Guide	SH20-2490

RPQs ACCEPTED: No

MVS SYSTEM INTEGRITY APPLIES: Yes

PROGRAM PRODUCTS

**5662-280 - ACF/VTAM V2.1 (OS/VS1)**  
**5665-280 - ACF/VTAM V2.1 (OS/VS2 MVS)**  
**5666-280 - ACF/VTAM V2.1 (VSE)**  
**ADVANCED TELECOMMUNICATIONS FUNCTION**  
**for VTAM VERSION 2 RELEASE 1**

**PURPOSE**

Advanced Communications Function for VTAM (ACF/VTAM) Version 2 extends subsystem support, offers new and enhanced capabilities, and adds support of the communications adapter on the 4321 and 4331 processors (VSE only). Advanced Communications Function for VTAM Version 2 Release 1 (ACF/VTAM V2 R1) is a program product for users of OS/VS2 (MVS), OS/VS1 and VSE that offers additional capabilities for networks with single or multiple S/370, 30XX and 4300 processors in the areas of data communications, problem determination, ease-of-use, and network configuration, operation, management and control. ACF/VTAM Version 2 incorporates multisystem networking capabilities. Also included is support of the communications adapter for VSE systems, and channel-to-channel connections for OS/VS systems.

**OVERVIEW**

ACF/VTAM V2 provides telecommunications support for channel-attached and SDLC link-attached communication controllers\* in network control mode, for SDLC devices and BSC 3270 devices attached to a communications adapter (VSE only), and for locally attached devices. In addition, ACF/VTAM V2 controls the sharing of telecommunication resources between application programs, and supports the concurrent execution of multiple teleprocessing applications.

\* The term communication controller is used in these pages to refer to the IBM 3705 Communications Controller.

Using the communication controller or the OS/VS host system's channel-to-channel adapter, ACF/VTAM V2 provides for the direct transmission of messages between application programs and terminals. An application program need only be responsible for device control characters in data streams.

The types of devices supported are:

- SNA-SDLC devices.
- BSC 3270 devices.
- SNA and certain non-SNA channel-attached devices (including support of the 4331/4321 Loop Adapter feature on VSE and OS/VS1).
- Various Asynchronous (Start/Stop) and BSC devices through the Network Terminal Option (NTO) program product with ACF/NCP/VS.

The interface for application programs allows the user to control connections between application programs and other application programs or terminals, as well as to request data transfer. A single request for connection or input can be directed simultaneously to more than one terminal.

The ACF/VTAM V2 application program interface is upward compatible for the three virtual storage operating systems (VSE, OS/VS1 and OS/VS2 (MVS)). It is designed for long-term stability and to aid user teleprocessing growth.

The program operator facility of the application program interface allows an authorized application program to enter ACF/VTAM V2 operator commands and receive ACF/VTAM V2 operator messages.

Network operator control facilities are provided, enabling users to monitor and reconfigure their network to meet fluctuating requirements.

In OS/VS2 (MVS), ACF/VTAM V2 provides time sharing support through its integrated time sharing option (TSO/VTAM). TSO/VTAM extends the line and terminal sharing benefits of ACF/VTAM V2 to TSO users. TSO is a standard feature in OS/VS2 (MVS) that provides conversational time sharing facilities.

ACF/VTAM V2 enables the user to have cross-system communications providing resource sharing, distributed processing and increased resource availability.

Configuration Restart Facilities allow the ACF/VTAM V2 network to be reinstated after a failure or a normal deactivation occurs. Manual switching support to a backup processor or communication controller is provided.

**Encrypt/Decrypt Feature:** The ACF/VTAM Encrypt/Decrypt Feature (Feature #6000 for OS/VS only) for ACF/VTAM Version 2, in combination with the Programmed Cryptographic Facility program product (5740-XY5) or the Cryptographic Unit Support program product (5740-XY6) permits encryption and decryption of messages.

When supporting a communications controller, ACF/VTAM V2 is designed to operate with ACF/NCP/VS Release 2.1 or 3. Some of the capabilities provided by ACF/VTAM V2 are supported only in conjunction with ACF/NCP/VS Release 3. A summary of this support appears later in these pages.

**HIGHLIGHTS**

ACF/VTAM V2 R1 is a data communication access method based on Systems Network Architecture (SNA) that controls communication between elements in an SNA communication network. It uses the facilities of the operating system and of virtual storage to provide the following services:

- Device support:
  - SNA SDLC devices.
  - BSC 3270 devices.
  - SNA and certain non-SNA channel-attached devices (including support of the 4331/4321 Loop Adapter feature on VSE and OS/VS1).
  - Various Asynchronous (Start/Stop) and BSC devices through the Network Terminal Option (NTO) program product with ACF/NCP/VS.
- Support of SDLC devices and BSC 3270 devices attached to a communications adapter.
- Support of channel-attached and SDLC-link-attached communication controllers with ACF/NCP/VS, including multiple channel attachment and extended NCP ownership and interconnection.
- Support for channel-to-channel adapters for multisystem communication in OS/VS2 (MVS) and OS/VS1.
- ACF/VTAM V2 R1 hosts can function as intermediate nodes in the network, for example, when connected to each other via channel-to-channel adapters.
- Support for downstream load of devices via the Downstream Load Utility program product.
- Switched network backup support for SNA-SDLC devices for extended availability.
- Support of CICS/VS, IMS/VS, TSO, JES, VSE/POWER, VM/VCNA, NCCF, and many other related IBM subsystems and program products.
- Support of the Communications Network Management program products:
  - Network Communications Control Facility (NCCF)
  - Network Problem Determination Application (NPDA)
  - Information/System
  - Network Logical Data Manager (NLDM)
- Integrated multisystem networking capabilities.
- Simplified single-tape installation and ordering procedures (including multisystem networking capabilities).
- Ability to easily modify, replace or suppress ACF/VTAM messages to suit installation needs or preferences.
- Enhanced processing to improve network performance and reliability of large SNA messages sent from ACF/VTAM application programs.
- An interface for application programs to control connections between application programs and other application programs or terminals, as well as to request data transfer.
- Provides an application program interface (API) compatible with the ACF/VTAME and ACF/VTAM Version 1 Release 3 Record API on OS/VS2 (MVS), OS/VS1 and VSE, to facilitate migration.
- Application program interface (API) enhancement to allow programs to determine, at assembly and at execution time, what particular functions are supported with the given level of ACF/VTAM being used.
- Allows communication between two IBM subsystems or two user-written ACF/VTAM application programs, including parallel sessions.
- Permits flexibility in initiating sessions by allowing the two ends of a session to negotiate the session initialization parameters.
- Provides parallel links and transmission groups for increased bandwidth, multiple routes for communication route backup, and multiple priority levels for improved traffic control.
- Time Sharing Option (TSO) (OS/VS2 MVS) includes support for SNA/SDLC interactive terminals, non-SNA 3270 systems and, via the Network Terminal Option program product, the following selected Start/Stop terminals:

The 2741 Communications Terminal ... the 3101 Display Terminal (TWX Model 33/35) ... the 3767 Communications Terminal ... the 6733 Communication Module (CPT-TWX Model 33/35) ... the Western Union Teletypewriter Exchange Services (TWX

PROGRAM PRODUCTS

ACF/VTAM V2 R1 (cont'd)

Model 33/35) ... and the World Trade Teletypewriter Terminal (WTTY).

- Extensive capabilities to enhance the reliability, availability and serviceability of ACF/VTAM networks.
- Allows control of (a) communication controller(s) of one host processor to be transferred to another host processor. It also permits control of the terminals of a communication controller to be divided among multiple host processors.
- Dynamic buffer pool allocation to optimize the use of main storage.
- Session pacing to help avoid buffer overruns.
- Execution of ACF/VTAM V2 in a problem program partition, region, or address space, rather than as a system task or as part of the application.
- Dynamic display and dump of ACF/NCP/VS storage.
- SDLC data link test, terminal connectivity test, route test, Transmission Group trace, and intensive mode recording of SDLC data link errors, to assist in network problem determination.
- Dynamic collection of tuning statistics.
- Provides network operation and control facilities that allows users to monitor, control and reconfigure the network to meet fluctuating requirements. The network configuration may be changed while the network is being used.
- Capability to concurrently trace up to eight lines with ACF/NCP/VS.
- Ability to trace events that are occurring internally between ACF/VTAM V2 modules.
- Session outage notification to both ends of a session if the supporting route becomes inoperative.
- Provides flow control capability for enhanced management of network traffic demands.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices.
- Reliability and Availability Enhancements for OS/VS2 (MVS).
- Supports the CCITT X.21 switched protocols when the communication controller is natively attached to an X.21 network.
- Consolidated task-oriented reference library, including a Master Index.

ACF/VTAM Version 2 is intended as a complete replacement for ACF/VTAM (Releases 1, 2 and 3) and the Multisystem Networking Facility feature, as well as for ACF/VTAME.

ACF/VTAM V2 R1 is designed to operate with ACF/NCP/VS Releases 2.1 and 3. Some of the capabilities provided by ACF/VTAM V2 R1 are supported only in conjunction with ACF/NCP/VS Release 3. A summary of this support appears in "Migration and Planning Considerations". ACF/VTAM Version 2 operates without ACF/NCP/VS when used with a communications adapter.

**SPECIAL FEATURES:** The ACF/VTAM Version 2 Encrypt/Decrypt Feature (OS/VS only), in combination with the Programmed Cryptographic Facility program product, provides the following functions:

- Permits encryption and decryption of messages in single and multiple domain networks (when used in a multiple domain network, the Encrypt/Decrypt Feature is required in each domain that uses cryptography).
- Permits ACF/VTAM application programs generally to run unaltered with the Encrypt/Decrypt Feature and allows them to select encryption for particular sessions or for particular messages within sessions.

**DESCRIPTION**

**SUMMARY and ADVANTAGES**

ACF/VTAM V2 R1 is an SNA (Systems Network Architecture) access method with which users can build a wide variety of data communication networks. Using SNA within the network:

- Provides a consistent and comprehensive structure for communication system growth.
- Minimizes the effects of system changes.
- Distributes network functions away from host processors.
- Allows sharing of network resources.
- Supports many different kinds of communication devices.
- Extends system functions conveniently and effectively to users.
- Minimizes users' involvement in details of system operation.

ACF/VTAM V2 R1 supports a wide variety of related IBM programs, as well as user-written application programs, all of which can share the

network resources. This provides for a more efficient use of lines, terminals, communication controllers, channel-to-channel adapters, and other network resources, because they are not dedicated to a single application program.

**Provides an Interface for Application Programs:**

- Provides an application program interface (API) compatible with the ACF/VTAM Releases 1, 2 and 3 API on OS/VS2 (MVS), OS/VS1 and VSE. This facilitates migration. It is also compatible with the ACF/VTAME and VTAM Level 2 API.
- Provides for the direct transmission of messages between application programs and terminals, making the network communication elements, such as the communication links and the communication controllers, transparent to the application program. It permits use of resources without specifying knowledge of their location.
- The program operator facility of the application program interface allows an authorized user-written application program to enter ACF/VTAM V2 operator commands and receive ACF/VTAM V2 operator messages.

**Single and Multiple Host Environments Supported:**

- Can be used in a single-system environment, as well as in a multiple-system environment (with its integrated multisystem networking capability).
- In a multiple-system environment, ACF/VTAM V2 R1 can be connected\* to other processors that have installed one of the following IBM program products:
  - ACF/VTAM Version 2.
  - ACF/VTAM Releases 1, 2 and 3 with the Multisystem Networking Facility feature.
  - ACF/VTAME.
  - ACF/TCAM with the Multisystem Networking Facility feature.
- \* The connection can be through an SDLC cross-domain link, or through a channel-to-channel adapter (OS/VS systems only, including OS/VS guest operating systems on VM/370), or through a communication controller with the multiple channel attachment capability supported by ACF/NCP/VS (not applicable to ACF/VTAME), depending on the cross-domain connections supported by the other SNA hosts in the multisystem network.

This allows application programs and terminals that are controlled by ACF/VTAM V2 R1 to communicate with application programs in another domain of the multiple-system network. It also allows application programs and terminals controlled by another domain in the network to communicate with ACF/VTAM V2 R1 application programs.

Through adequate planning and network design, multisystem networking can be used to make IBM program products and user-written application programs, installed in one SNA host, available to users of other SNA hosts in the SNA network. In some cases, this may provide for:

- Significant extension of the services available to the end users of the various connected SNA hosts, without unnecessary duplication of resources.
- Backup services to the end users of the SNA network, when a failure occurs in certain elements of the network.
- Balancing of the load in the various hosts in the network.

**Extended NCP Interconnection:** Capabilities for interconnecting communication controllers in single and multiple system networks ... In ACF/VTAM V2, a communication controller may be link-attached via Transmission Groups to one or more channel-attached and/or link-attached communication controllers.

These capabilities can significantly expand the installation's configuration options. Also, they can improve the overall efficiency of the network and improve the ability of a host processor to take over a communication controller whose current owner (or a link to that owner) has failed or has been deactivated.

**Extended NCP Ownership:** As many as eight host systems can share the ownership of an NCP in a communication controller that is channel-attached\* and/or link-attached to another communication controller(s). If one of the host systems fails or gives up control of the communication controller, each of the remaining host systems is notified. This notification serves as a signal for using the enhanced take-over capability described below. All host systems that share ownership of an NCP in a communication controller can also share ownership of SDLC links that connect the communication controller to other communication controllers. A shared SDLC link is not deactivated until all owning host systems give up control of the link. Each of the host systems is notified if a link that it owns fails, or if the adjacent communication controller becomes inoperative.

PROGRAM PRODUCTS

**ACF/VTAM V2 R1 (cont'd)**

\* The channel and SDLC link attachments cannot exceed the number of channels and SDLC links supported by the communication controllers.

**Support of the Downstream Load Utility Program Product:** In OS/VS1 and VSE, ACF/VTAM V2 supports the Downstream Load Utility program product for IBM 3644 Automatic Data Units (ADU) and IBM 8775 Display Terminals. Downstream load support in ACF/VTAM permits the operation of:

- 8775s with Advanced Functions, when attached via either the 4331/4321 Loop Adapter feature or an SDLC line to a communication controller operating with ACF/NCP/VS, or an SDLC line to a communications adapter.
- 3644 ADUs when attached via the 4331/4321 Loop Adapter feature.

In MVS, ACF/VTAM supports Downstream Load Utility program product for 8775s with Advanced Functions and/or equivalent products such as the 7426 Terminal Interface Unit when attached via an SDLC line to a communications controller operating with ACF/NCP/VS.

**Switched Network Backup:** Switched network backup support for SNA-SDLC devices allows (a) control unit(s) associated with a failed or deactivated nonswitched line to be reactivated through an alternate, switched line, or (b) terminals associated with a failed or deactivated control unit (switched or nonswitched) to continue to receive communication support through reconfiguration to a backup, switched control unit.

**Support of the Network Communications Control Facility (NCCF) Program Product:** ACF/VTAM V2 provides an interface to support the problem determination and network operation facilities offered by NCCF.

**Network Terminal Option Program Product Support:** Provides support to users that want to move to an SNA data communications environment while continuing to access the following non-SNA terminal devices:

- 2740 Communications Terminal mdl 1.
- 2741 Communications Terminal.
- 3101 Display Terminal (TWX mdl 33/35).
- 3780 Data Communications Terminal (BSC).
- 6733 Typewriter Communication Module (TWX mdl 33/35).
- Western Union Teletypewriter Exchange Services (TWX mdl 33/35).
- World Trade Teletypewriter Terminal (WTTY) (nonswitched only).

**NLDM Program Product Support:** The NLDM program product, which runs as an application on NCCF, is supported in OS/VS2 (MVS) environments. ACF/VTAM will accept requests from NLDM to capture session initiation/termination data for all resources it controls and to continuously trace all data passing between selected network resources. The session data and trace data are sent to the NLDM application, where they are correlated to assist in performing session-level problem determination.

**Application-to-Application Communication:** Communication between two ACF/VTAM V2 applications offers users greater flexibility to design and implement more efficient application processing in a network. For example, a single application may provide centralized processing for other applications as well as terminal users. This may eliminate duplicate processing support, and optimize the use of system resources among multiple application programs. This facility also adds the flexibility for multiple sessions to operate concurrently between two application programs that reside within a single host system or across different host systems.

**Negotiable Session Initialization Parameters:** Permits increased application program control of sessions between user-written application programs that reside within a single host system or across different host systems. During session initialization, two application programs (via the ACF/VTAM V2 application program macro interface) can dynamically exchange certain session parameters to establish and/or modify transmission control and integrity of session data. With this capability, it may be possible for a user to simplify the predefined installation of intercommunicating application programs.

**Parallel Links:** Multiple active SDLC links between adjacent communication controllers ... Parallel links allow data traffic to flow simultaneously over two or more SDLC links between adjacent communication controllers. All such links can be operational and in use at the same time, and each can be activated or deactivated independently of the others. This capability can provide increased message flow and improve the availability and reliability of transmissions between communication controllers.

**Transmission Groups:** Logical groupings of transmission links between adjacent network nodes ... A user may define up to eight Transmission Groups, each with one or more SDLC links between adjacent communication controllers. A Transmission Group permits multiple SDLC links to be defined as a single logical link. Only a single TG containing a

single link is supported between adjacent subareas connected through a communications adapter. A single channel between a host and its channel-attached communication controller is also defined as a Transmission Group. If a link or links in a Transmission Group fails, session traffic will automatically be placed on remaining active links without loss of data. This enhances the reliability and availability of service between communication controllers. Multiple Transmission Groups and appropriate route selection permit a user to specify message traffic for different applications to flow through a network via pre-assigned Transmission Groups. For example, interactive processing may be assigned one group and batch processing may be assigned a different group, each with its own physical link support.

**Multiple Routes:** Multiple routes for SNA and non-SNA message transmission between nodes in a network ... A user may define up to eight routes for message transmission between two host systems or between a host system and a communication controller. When a session is initiated between two application programs or between a terminal and an application program, one of the routes is automatically selected to transmit the session traffic. The user may limit the selection to a particular route or to one of an ordered sequence of routes. Thus, it is possible to distribute the traffic for different sessions to different routes, dividing the load among several routes. Parallel sessions between two applications can take advantage of multiple routes so that failure of one route does not disrupt all sessions.

The ordered sequence of routes, determined by the installation, defines the set of alternate routes available for session traffic. In the event a route becomes inoperative during a session, the application program or terminal may request that the session be re-initiated. This causes automatic selection of one of the alternate routes. The user can then resynchronize the session data traffic and continue data communications and application processing via network routes that remain in operation.

**Multiple Priority Levels:** Three levels of transmission priority selectable by session ... A user can specify one of three message traffic priorities for a session between two application programs or between a terminal and an application program. For example, this permits message traffic for a time dependent session to be transmitted through a network ahead of other message traffic. That is, interactive processing may be given top priority by users while other network traffic, such as batch processing, is assigned to a lower priority by users.

**TSO/VTAM Support:** In OS/VS2 (MVS), ACF/VTAM V2 provides time sharing support through its integrated time sharing option (TSO/VTAM). TSO/VTAM extends the line and terminal sharing benefits of ACF/VTAM V2 to TSO users. TSO is a standard feature in OS/VS2 (MVS) that provides conversational time sharing facilities.

- TSO/VTAM allows installations to specify whether data is to be treated as 'confidential text' or not. Data not to be treated as confidential text remains unaltered in the ACF/VTAM V2 buffers and may aid in problem determination.
- Provides the capability to initiate and terminate a Generalized Trace Facility (GTF) trace for individual TSO/VTAM user sessions.
- ACF/VTAM V2 provides the ACF/VTAM V2 operator with a Display command option which provides for the specification of a TSO user identification. The output of the display will contain:
  - An indication that this is a TSO userid display.
  - The application name (for example, TSO0005).
  - The terminal name (for example, SNA3270B) associated with the specified userid.
  - The status as known by ACF/VTAM V2 of both the application and the terminal.
  - An indication as to whether the TSO/VTAM GTF trace is in effect for this TSO userid.

**Enhanced Restart of Host-to-Terminal Control Sessions:** In recovering from a host failure or a route failure on the host-to-terminal control session, a host system can recover its control session for a 3770 MLU, 3271-11, 12\*\*, 3275-11, 12\*\*, 3274-1C, 21C, 31C, 51C/SNA\*, 3684, 5285, 5288, S/32, S/34 or S/38 without disruption of existing sessions between the device and application programs. This permits user applications that are not affected by such a failure to continue processing during and after recovery of the control session. For other terminals, restart of the control session results in Session Outage Notification.

\* These products must be at the appropriate EC microcode level to provide this function.

\*\* Support of these devices is provided by ACF/NCP/VS R3.

**Enhanced Takeover of a Communication Controller:** In the event a host system fails or otherwise gives up control of a communication controller, any host system that is sharing ownership of the same communication controller will have its network operator notified about the lost host. Any of the notified host systems can take over control of

## ACF/VTAM V2 R1 (cont'd)

the devices mentioned above without disrupting their existing cross-domain sessions with application programs. It is unnecessary to deactivate corresponding cross-domain resource definitions before acquiring resources attached to the communication controller that were controlled by the lost host system.

**Enhanced Multiple Host System Restart:** In recovering from a failure situation, two host systems can restart their control session without disruption of existing cross-domain sessions between two application programs or between a terminal and an application program. This permits user applications that are not affected by such a failure event to continue operations during and after recovery of the host systems' cross-domain control session.

**Dynamic Buffer Allocation:** ACF/VTAM V2 can dynamically allocate main storage for buffer pools according to message traffic loads and availability of main storage resources. This gives users considerable flexibility to optimize the use of main storage for buffer pools and determine buffer pool space requirements that are consistent with throughput and response time.

**Inbound Pacing Support for 3270, 3730, 3790 and 8100:** This facility is supported as a user-selectable session establishment function under ACF/VTAM V2. Pacing of inbound message traffic for a user application program can help avoid buffer overrun.

**VTAM as a User Task:** Permits the operator to unconditionally terminate ACF/VTAM V2, without waiting for resources to be released. Upon termination, all system resources acquired by ACF/VTAM V2 are released, and the partition, region or address space may be used for other purposes.

**Dynamic Display of ACF/NCP/VS Storage:** Allows a network operator to display any contiguous 256 bytes of ACF/NCP/VS storage without disrupting normal ACF/NCP/VS operation. This display capability, provided in hexadecimal representation on a network operator console, can be useful in dynamically evaluating network problem situations.

**Dynamic Dump of ACF/NCP/VS Storage:** A network operator can invoke a dump of ACF/NCP/VS storage from a channel-attached or SDLC-attached communication controller. Since ACF/NCP/VS continues to operate during the dump process, the dump will represent ACF/NCP/VS status over a period of time. The dump contents are recorded and printed via the facilities of the appropriate System Support Program (SSP) for ACF/NCP/VS and can be useful in dynamically evaluating network problem situations.

**SDLC Data Link Test:** Offers the capability to dedicate one station on an SDLC link to testing while allowing the remaining stations on that link to remain active. When a station comprises a cluster control unit and its attached devices, the control unit is dedicated to the test and its attached devices are deactivated.

**Terminal Connectivity Test:** Provides the capability of initiating an echo test from the terminal end of a session to determine that a terminal and its connection to ACF/VTAM V2 are functioning properly. The test does not interfere with other stations on the link or with other devices on the same control unit.

**Route Verification and Error Notification Facilities:** A network operator can determine if a message route originating in his host is operative or inoperative. This permits a network operator to verify the availability of network routes and to take corrective action for routes that may have become inoperative. It also permits a network operator to verify that a route has been returned to service following a failure or deactivation. During the verification, appropriate resource owners are notified when an inactive or failed resource is encountered on a route.

In addition, if during network operation a route fails, an awareness message is issued at the host system end point(s), identifying the inoperative route to the network operator. This permits a network operator to take appropriate action to minimize the effects of an unusable message on network applications.

**Transmission Group Trace:** The SNA headers of message traffic over a Transmission Group between two communication controllers can be traced as if it were a single SDLC line. This allows for the collection of transmission control information without tracing the entire message.

**Intensive Mode Recording of SDLC Data Link Errors:** A network operator can dynamically invoke and terminate recording of information about temporary errors that may be occurring on an SDLC data link. This capability supplements support that records permanent error information and permits a user to collect additional information on SDLC data link errors. This detailed information may preclude the need for more specific testing to re-create an error.

**Tuning Statistics:** A tuning statistics function permits dynamic accumulation of data about the I/O interface to a channel-attached communication controller, a channel-attached 3790 or channel-attached host processor. Such data may aid a user in determining and selecting optimum values for start parameters and network definition.

**Operator DISPLAY Command:** DISPLAY command capabilities permit a network operator (or programmed operator application) to obtain information about the status of network resources; that is, nodes, lines,

terminals, logical units, physical units, application programs and buffers. Such information may be useful for status purposes, for performance analysis or to determine if an action is required for a failing element in the network.

This information provides both detailed status to the network operator and serves also as an aid for problem determination. When appropriate, the resource's status will have an identifier appended to it indicating that it is either a virtual resource (i.e., a Network Terminal Option resource) or, has been reconfigured by the Dynamic Reconfiguration facility or, in the case of network backup, has been acquired from another host system's domain. Session and resource status information is included in the display output to aid the network operator in resource management.

**Multiple Line Trace:** Provides the capability to trace concurrently a maximum of eight lines with ACF/NCP/VS. The trace data is recorded on a file and may be printed using the ACF/TAP (Trace Analysis Program) System Support Program (SSP) of ACF/NCP/VS.

**VTAM Internal Trace:** ACF/VTAM provides:

- The ability to trace events that are occurring between ACF/VTAM V2 modules.
- The ability to terminate or initiate the VTAM Internal Trace Facility at VTAM initialization time.
- The ability to have the VTAM Internal Trace records recorded on an external file.

**Session Outage Notification Enhanced Awareness of Session Outages:** If the route supporting a session becomes inoperative, then, via SNA protocols, the session ends are made aware of the outage. Session re-initiation may be requested as described under "Multiple Routes".

**Flow Control Management of Network Traffic Demands:** Via SNA protocols, the flow of message traffic is dynamically regulated between a host system and a communication controller and between two host systems. Continuous feedback is exchanged between network resources in order to regulate network traffic and reduce the possibility of network congestion. When necessary, the feedback triggers local flow control mechanisms in ACF/VTAM V2. Applications and local terminals may be temporarily prevented from introducing more data into a congested network.

**Dynamic Reconfiguration of Nonswitched SNA-SDLC Devices:** Allows the network operator to selectively add or delete supported nonswitched SNA-SDLC devices, without disrupting other network functions. This capability supplements the ACF/NCP/VS generation process, and supports temporary configurations in a non-disruptive fashion until a permanent network control program generation can be done.

**In OS/VS, ACF/VTAM V2 Usage of Application Program Private Area Can Be Limited:** ACF/VTAM V2 allows an installation, when defining an application program, to limit the amount of private area storage ACF/VTAM V2 may request to queue data arriving for the application program.

**Reliability and Availability for OS/VS2 (MVS):**

- Capability to have the application program span multiple address spaces:

ACF/VTAM V2 permits application program interface (API) requests from a single application program to originate from different address spaces and to reference a single application program access method control block (ACB). This multiple address space facility can provide application programs with enhanced capabilities for error isolation and session protection. This capability will also allow application program design flexibility by permitting individual sessions to be assigned to their own address space while being allowed to reference a single ACB. Improved operation may also be achieved by grouping sessions with similar characteristics or functions to be performed in one address space.

- Levels of error isolation:

To minimize the disruption caused by an error detected while ACF/VTAM V2 is processing, ACF/VTAM V2 attempts to isolate the error to:

- The failing API request.
- The session issuing the API request.
- The task containing the session.
- The application program.

Also, if a task or address space is terminated while processing for other than ACF/VTAM V2, ACF/VTAM V2 attempts to isolate the disruption to the task structure or address space involved.

PROGRAM PRODUCTS

ACF/VTAM V2 R1 (cont'd)

- OS/VS2 (MVS) authorized path mode of operation for ACF/VTAM V2 application program interface (API) macro instructions and exit routines:

An ACF/VTAM V2 authorized application program may use the ACF/VTAM V2 API macro instructions and exit routines in the OS/VS2 (MVS) authorized path mode of operation (via the system request block (SRB) mode of operation). All API macro instructions (except for the OPEN, CLOSE, MODCB, TESTCB, GENCB and SHOWCB macro instructions) can be used in this mode of operation. Selection of authorized path mode is under control of the application program via API macro instruction operands.

All exit routines associated with an ACF/VTAM V2 application program can make use of this authorized path mode of operation. The selection of authorized path mode is specified when the application program is defined.

Application programs selecting the authorized path mode of operation may realize improved ACF/VTAM V2 performance.

**CCITT X.21 Support:** ACF/VTAM V2 supports the following CCITT X.21 switched functions when attached to an X.21 network through a communication controller:

- Address calling.
- Auto answer.
- Call progress signal.
- Direct call.
- Closed User Groups.
- Abbreviated Address Calling.

RELATED IBM PROGRAMS

The following related IBM programs and program products are supported by ACF/VTAM V2 R1:

TYPE	PROGRAMS	MVS	VS1	VSE
DB/DC	CICS/VS	*	*	*
	IMS/VS	*	*	
Job Entry	FTP	*	*	*
	JEP			*
	JES1/RES		*	
	JES2/RJE	*		
	JES2/NJE	*		
	JES3/RJP	*		
	JNF		*	
	VSE/POWER RJE			*
Interactive	IIPS/IIAS	*	*	*
	IIS	*	*	*
	TSO	*		
	VM/VCNA		*	*
	VSE/ICCF <sup>1</sup>			*
	VSPC	*	*	
	VS APL <sup>1,2,3</sup>	*	*	*
	BTP Version 4	*	*	*
Device Support	DSLU	*	*	*
	DSX Release 2	*	*	*
	GDDM <sup>1,2,3,5</sup>	*		
	GDDM <sup>1,5</sup>		*	
	GDDM <sup>1</sup>			*
	Host Command Facility	*	*	*
	Host Prep (8100/DPCX Support)	*	*	*
	IDWS		*	
	MVS/IDWS	*		
	NTO	*	*	*
	Programmable Store System Host Support	*	*	*
	SSS Release 4	*	*	*
Systems and Communications Network Management	Information/System (MVS <sup>2,4</sup> ; VSE <sup>6</sup> )	*		*
	NCCF Release 2	*	*	*
	NLDM (8)	*		
	NPDA Release 2 <sup>7</sup>	*	*	*
Distributed Data Processing	DISOSS/370 <sup>1,5</sup>	*	*	
	DISOSS/VSE <sup>1</sup>			*
	VSE/OCCF <sup>4</sup>			*

<sup>1</sup> Supported through CICS/VS.  
<sup>2</sup> Supported through TSO/VTAM.  
<sup>3</sup> Supported through VSPC.  
<sup>4</sup> Supported through NCCF.  
<sup>5</sup> Supported through IMS/VS.  
<sup>6</sup> Supported through VSE/ICCF.  
<sup>7</sup> For VSE, Release 2 supports NPDA Release 2.  
<sup>8</sup> VTAM PTF required.

**Note:** Refer to the appropriate product documentation for information on programming support for specific devices supported and other related IBM program capabilities.

User programs properly coded to use the ACF/VTAM Version 1 application program interface (API) will also be supported by ACF/VTAM Version 2. Refer to "Compatibility" for further information.

CUSTOMER RESPONSIBILITIES

To install and use ACF/VTAM Version 2, the customer must:

- Design the single system network.
- Order and install all required communications equipment.
- Install ACF/VTAM V2 R1.

## ACF/VTAM V2 R1 (cont'd)

- Define the network to ACF/VTAM.

When ACF/VTAM Version 2 supports a communications controller, the customer also must:

- Install ACF/NCP/VSE (unless all terminals are local, i.e., channel-attached to the host).
- Define the network to ACF/NCP/VSE (if applicable).

To use the ACF/VTAM V2 R1 multisystem networking functions, the customer must:

- Design the multiple-system network.
- Order and install any additional communications equipment (e.g., intersystem links between interconnected communication controllers) or channel-to-channel adapters required.
- Install ACF/VTAM V2 R1.
- Install ACF/NCP/VSE (if required).
- Define the multisystem network to ACF/VTAM and ACF/NCP/VSE (if required) in each system.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

ACF/VTAM Version 2 Release 1 is designed to run in a virtual storage environment in any IBM system configuration that supports the OS/VS2 (MVS), OS/VS1 or VSE operating system as specified in "Programming Requirements".

The host processor instruction set must include the Compare and Swap and the Compare Double and Swap instructions.

For remote or cross-domain communications, ACF/VTAM V2 R1 requires a communications adapter feature (standard on the IBM 4321 processors and optional on the IBM 4331 processors), a 3705-I, 3705-II or 3705-80 Communications Controller, with the appropriate level of ACF/NCP/VSE, or a channel-to-channel adapter connecting it to another ACF/VTAM V2 R1 host (OS/VS only).

**Storage Considerations:** Requirements for host processor storage and for disk storage for ACF/VTAM data sets can be calculated by using the *ACF/VTAM Planning and Installation Reference* manual. Requirements for disk storage for NCP data sets can be calculated by using the *ACF/NCP/VSE Installation* manual. Storage requirements for communication controllers can be calculated by using the *ACF/NCP/VSE Installation* manual.

#### SOFTWARE REQUIREMENTS

ACF/VTAM Version 2 is designed to run with the following operating system releases:

- OS/VS2 (MVS) Release 3.8
- OS/VS1 Release 7.0
- VSE/AF Release 3

ACF/VTAM Version 2 will also run on subsequent releases or modifications of these operating systems, unless otherwise stated in the announcement documentation of future releases or modifications of these operating systems or for ACF/VTAM Version 2. ACF/VTAM Version 2 does not support prior releases of these operating systems.

ACF/VTAM V2 R1 will run in a VM/370 environment using VSE, OS/VS1 or OS/VS2 (MVS) in a guest virtual machine.

The Time Sharing Option of ACF/VTAM (TSO/VTAM) operates only under OS/VS2 (MVS).

The use of certain ACF/VTAM facilities (such as delayed configuration restart of the ACF/VTAM Encrypt/Decrypt Feature) requires the Programmed Cryptographic Facility program product (5740-XY5) or the Cryptographic Unit Support program product (5740-XY6).

For remote communication when supporting a communications controller, ACF/VTAM requires the ACF/NCP/VSE program product Releases 2.1 or 3, running in the communication controller.

Communication between ACF/VTAM Version 2 domains can also be established for OS/VS hosts without a communication controller by connecting these hosts via channel-to-channel adapters.

#### COMPATIBILITY

The ACF/VTAM V2 R1 application program interface (API) is upward compatible with the ACF/VTAM Version 1, ACF/VTAME, and VTAM level 2 API. Where related IBM programs (for example, CICS/VS, IMS/VS, VSE/POWER, JES1/RES, JES2/RJE, JES2/NJE, JES3/RJP, TSO, VSPC, NCCF, etc.) operate with ACF/VTAM Version 1, ACF/VTAME or VTAM level 2, compatibility is retained for the level(s) of those programs that are current at the availability of ACF/VTAM V2 R1 on the appropriate operating system release, except for the cases where support for specific release level(s) of these products has been indicated elsewhere in these pages. Recompilation of the related IBM programs is not required.

Application programs that use the macro language and control block record mode interface of ACF/VTAM Version 1, ACF/VTAME, or VTAM level 2, should continue to operate without recompilation on the same operating system with ACF/VTAM V2 R1, provided that these programs do not depend on the internal processing characteristics of these access methods.

For ACF/VTAM Version 2, the length of the access method control block (ACB) has increased. Application programs that have been properly coded using the *ACF/VTAM Programming* manual to run on ACF/VTAM Version 1 or ACF/VTAME will run without reassembly on ACF/VTAM V2 R1.

Program operator application programs that have been properly coded using the *ACF/VTAM Programming* manual to run on ACF/VTAM Version 1 or ACF/VTAME will also run on ACF/VTAM V2 R1.

Application programs written for ACF/VTAM Version 1, ACF/VTAME, or VTAM level 2 may require changes to take advantage of the additional functions offered by ACF/VTAM V2 R1.

#### MIGRATION and PLANNING CONSIDERATIONS

A checklist of migration considerations for current users of ACF/VTAM Version 1 Releases 1, 2 and 3, ACF/VTAME, VTAM level 2, and BTAM-ES is included in the *ACF/VTAM Version 2 General Information* manual. Additional information on migration will be included in the *ACF/VTAM Version 2 Programming* and the *ACF/VTAM Version 2 Planning and Installation Reference* manuals.

#### MULTISYSTEM CONSIDERATIONS

Initially, host processors that are to participate in a multiple-domain network can install ACF/VTAM with single-domain networks and then the domains can be connected later. This permits an existing domain to continue operating while the multiple-domain network is being developed.

In a multiple-domain environment:

- The ACF/VTAM V2 R1 functions are supported for each respective ACF/VTAM V2 R1 host system.
- An ACF/VTAM V2 R1 host system can coexist in the network with ACF/VTAM Version 1 Releases 1, 2, and 3, ACF/VTAME, ACF/TCAM Version 1 Release 1 and ACF/TCAM Version 2 Releases 1, 2 and 3 host systems, at the level of function supported by these host systems and the intermediate NCPs.
- Cross-domain connections through a communications adapter to a communications controller require ACF/NCP/VSE Release 2.1 or Release 3 in the controller.

#### ACF/NCP/VSE CONSIDERATIONS

When supporting a communications controller, the following ACF/VTAM V2 enhancements are supported only in conjunction with ACF/NCP/VSE R3:

- Parallel Links.
- Transmission Groups.
- Multiple Routes.
- Multiple Priority Levels.
- Extended NCP Connectivity.
- Extended NCP Ownership.
- Network Flow Control.
- Session Outage Notification.
- Enhanced Restart of Host-to-Terminal Control Sessions.
- Enhanced Takeover of a Communication Controller.
- Enhanced Multiple Host System Restart.
- Route Verification and Error Notification Facilities.
- Transmission Group Trace.
- Support of Release 2 of the Network Terminal Option Program Product.
- Support of the CCITT X.21 Switched Interface.
- Support of intermediate routing nodes for NCPs.

ACF/VTAM V2 with ACF/NCP/VSE Release 2.1 continues support of NTO Release 1.

PROGRAM PRODUCTS

ACF/VTAM V2 R1 (cont'd)

The VTAM-NCP support table that follows lists the releases of each product through which SSCP-PU, SSCP-LU, and LU-LU sessions are supported. It can be used to plan migration from previous releases of VTAM to ACF/VTAM V2R1.

NCPs	NCP5	V1 R1	V1 R2	V1 R2.1	V1R3 (7)	V2	V2	V3	V3
VTAMs						3705	3725	3705	3725
VTAM2	yes	yes (1)	yes (2)	yes (2)	no	no	no	no	no
V1R1	yes	yes	yes	yes	yes (3,4)	no	no	no	no
V1R2	no	yes	yes	yes	yes (5)	no	no	no	no
V1R3	no	no	yes	yes	yes (5)	yes	yes	yes	yes
V2R1	no	no	no	yes	yes (5)	yes	yes	yes	yes

Notes:

- (1) With applicable VTAM Level 2 PTFs.
- (2) OS/VS only, with applicable VTAM Level 2 PTFs:  
- OS/VS1: UX14242.  
- OS/VS2 (MVS): UZ28810.
- (3) Not supported on VSE.
- (4) With applicable ACF/VTAM V1R1 PTFs:  
- DOS/VS Release 34: UD17664.  
- OS/VS1: UX14243.  
- OS/VS2 (MVS): UZ28811.
- (5) With applicable ACF/NCP/VS V1R2 or V1R2.1 PTFs when connected to ACF/NCP/VS V1R3 or later.
- (6) OS/VS only, with applicable ACF/VTAM V1R1 PTFs:  
- OS/VS1: UX14243.  
- OS/VS2 (MVS): UZ28811.
- (7) With EREP PTFs for Link Problem Determination Aid (LPDA) level maintenance data records.
- (8) OS/VS2 (MVS) only, with ACF/VTAM V1R3 PTFs UZ90205, UZ90206, UZ90207 and UZ90208. (ACF/VTAM V1R3 for OS/VS1 and DOS/VS does not support sessions with ACF/NCP for the 3725.)
- (9) With applicable ACF/VTAM V1R3 PTFs:  
- OS/VS2 (MVS): UZ62633.  
- OS/VS1: UX18990.  
- DOS/VS: UD26545.
- (10) With ACF/VTAM V2R1 OS/VS2 (MVS) PTF UZ59682. (PTFs not required for OS/VS1 and DOS/VS systems.)
- (11) With ACF/VTAM V2R1 OS/VS2 (MVS) PTF UZ90186. (PTFs not required for OS/VS1 and DOS/VS systems.)
- (12) With applicable ACF/VTAM V1R3 PTF when the network contains any ACF/VTAM V2R2 or ACF/NCP V3 node(s):  
- OS/VS2 (MVS): UZ56422.  
- OS/VS1: UX17328.  
- DOS/VS: UD23966.
- (13) With ACF/VTAM V2R1 OS/VS2 (MVS) PTF UZ56421 when the network contains any ACF/VTAM V2R2 or ACF/NCP V3 node(s). (PTFs not required for OS/VS1 or DOS/VS systems.)

PTFs may be required in addition to those stated above. Contact your IBM support center for updated install information and recommended service before installing these products.

OTHER CONSIDERATIONS

As a result of some of the new capabilities in ACF/VTAM V2 R1, minor network operational differences may exist with ACF/VTAM Version 1.

ACF/VTAM application programs generally will not need to be changed to operate with the Encrypt/Decrypt feature. However, there exist several SNA sense codes that deal only with unrecoverable errors associated with the Encrypt/Decrypt feature, and existing application programs that are not now using the Encrypt/Decrypt feature may need to be changed to handle these sense codes properly. Application programs that already operate properly with the Encrypt/Decrypt feature on ACF/VTAM Version 1 require no further modification to work properly with the ACF/VTAM Version 2 Encrypt/Decrypt feature.

In a mixed ACF/VTAM-ACF/TCAM multisystem environment, the ability of ACF/VTAM to access device characteristics of terminals controlled by ACF/TCAM is limited to those indicators defined and maintained by ACF/TCAM. In particular, the ability to determine the physical device address of a 3271-11, 12 used in the copy function is not supported.

When using the ACF/VTAM V2 R1 capability to modify, replace, or suppress ACF/VTAM messages, it should be noted that user modification of information required for problem diagnosis, such as IBM-supplied command syntax and defaults, might impair the standard serviceability characteristics of the product and may increase the documentation requirements for reporting a problem to IBM. The

IBM-supplied command CSECT should be retained for problem re-creation.

CONVERSION

**CONVERTING from BTAM or BTAM-ES to ACF/VTAM V2 R1:** Conversion to ACF/VTAM from applications that use BTAM through CICS/VS, IMS/VS, or other IBM subsystems or programs that also support ACF/VTAM, will, in most cases, involve little or no reprogramming. ACF/VTAM V2 supports concurrent use of BTAM-ES and ACF/VTAM V2 in the VSE host. The use of ACF/NCP/VS in the Partitioned Emulation Programming (PEP) mode will ease the transition from BTAM to ACF/VTAM V2 R1 since it allows concurrent use of BTAM and ACF/VTAM by the IBM subsystem or program and permits gradual conversion of communication links and terminals from BTAM/ES to ACF/VTAM with ACF/NCP/VS. This will help to avoid or minimize disruption of the services provided by the application to its users.

Conversion to ACF/VTAM from application programs that use the BTAM macros directly involves reprogramming those applications. The recommended approach is to redesign those applications to use the IBM subsystems (such as CICS/VS or IMS/VS) and obtain multiple benefits, besides ACF/VTAM support, including:

- The intrinsic advantages of using the various data management, multi-tasking, device support, and other functions in the IBM subsystems that exploit and expand the capabilities offered by the operating system.
- Support for a wide variety of existing IBM terminals and other devices.
- Continued updating of support for new IBM terminals and other devices.
- Intersystem communication capabilities (on CICS/VS and IMS/VS).
- Little or no effect on the applications as new releases of the operating system and access methods become available.
- High level interface for application programmers that masks many of the complexities of communications programming.
- Relief to the application programmers from many of the tedious tasks involved in writing communication programs, thus providing more time for the development of the actual applications and capabilities requested by the end users.
- Availability of many programming tools and techniques that extend the capabilities of the IBM subsystems and increase the productivity of the application programmers through IBM program products that operate on the IBM subsystems (such as DL/I, DMS, GDDM, etc.).

As an alternative, the existing BTAM or BTAM-ES applications could be recoded to use the ACF/VTAM macros directly.

MIGRATING from ACF/VTAME to ACF/VTAM V2 R1

On VSE systems, ACF/VTAME application programs will run without recompilation on ACF/VTAM V2 R1, if they have been coded to use the ACF/VTAM API correctly (see the "Compatibility" section).

Recompilation of ACF/VTAME application programs is required for them to run with ACF/VTAM V2 R1 on OS/VS1 or OS/VS2 (MVS). Changes may be required to the portions of the application programs that are dependent on VSE functions and facilities.

The main considerations for applications and networks in a migration from ACF/VTAME to ACF/VTAM V2-VSE are the same as for migration from ACF/VTAM Version 1 Release 2 to Version 2. They are documented in the *ACF/VTAM Version 2 Programming* and the *ACF/VTAM Version 2 Planning Installation Reference* manuals. Following are some additional considerations for network definitions and operation related to communications adapter support:

- ACF/VTAM V2 has no line type default in the GROUP statement; SDLC must be explicitly coded.
- The INBFRS operand of the LINE definition statement for SDLC and BSC lines in the communications adapter must be changed to MAXBFRU.
- The syntax of the MODIFY command is slightly different in ACF/VTAM V2. The ACF/VTAME syntax is also accepted to ease migration.
- Some messages will differ from the corresponding message in ACF/VTAME (message-ID, additional information, terminology).
- Files for configuration restart have to be defined, if specified. Configuration restart is not supported in ACF/VTAME.

In addition to the above, for multi-domain networks, the following considerations also apply:

- PATH statements must be coded for cross-domain routes where the destination subarea is the adjacent subarea.

**ACF/VTAM V2 R1 (cont'd)**

- Configurations containing ACF/VTAME nodes that are providing an 'IRN' routing function must be migrated to ACF/VTAM in a specific order. See the *ACF/VTAM Version 2 Planning and Installation Reference* manual for a description of this order.

Note that ACF/VTAME and ACF/VTAM cannot be run concurrently on the same host processor, except when using VM/370.

**DATA SECURITY, AUDITABILITY and CONTROL**

ACF/VTAM V2 R1 enables the installation to establish and maintain the integrity of the data communication network. The installation can control sessions between application programs and terminals.

In particular, auditors will find the following functions to be of interest:

**Control**

- Application-to-application communication
- Negotiable sessions initialization parameters
- Transmission group
- Multiple priority levels
- Application program interface

**Integrity/Recovery**

- NCCF/NPDA
- Error isolation
- Multiple routes
- Parallel links
- Switched network backup
- Route verification
- Trace facilities

ACF/VTAM V2 R1 also provides a confidential text capability. The data on sessions defined by the user to contain confidential text is not included in buffer traces. Moreover, buffers containing confidential text are cleared before being returned to the buffer pool.

In OS/VS systems, the ACF/VTAM Encrypt/Decrypt Feature can provide increased facilities to safeguard the information transmitted between logical units in the network.

User management is responsible for the selection, application, adequacy, and implementation of these features and for appropriate application and administrative control.

**PERFORMANCE and STORAGE CONSIDERATIONS**

Machine requirements are included in the Specified Operating Environment section of these pages. Estimated storage requirements will be included in the *ACF/VTAM Version 2 Planning and Installation* manual.

The design objectives for ACF/VTAM V2 R1 are to have total storage requirements and path lengths approximately the same as for an equivalent ACF/VTAM Version 1 Release 3, and a minimal increase over an equivalent ACF/VTAME system.

Specific user storage requirements will be dependent on the specific configuration and upon the following user-specified areas and functions:

- I/O buffer areas.
- Number and organization of terminals.
- Number and type of macro instructions used.
- Number and size of NLDM program product trace buffers selected (Optional).

Response time in a single system environment depends on a variety of processor and data communication load factors, such as:

- Line speeds.
- Number, type and organization of terminals.
- Number and type of ACF/VTAM commands and exits used.
- Amount of processing done by the application programs.

Response time in a multiple-system environment depends on the factors above and on various network load factors, including the number of nodes traversed.

The actual performance impact (if any) to a customer will vary depending upon his particular hardware and network configuration.

**DOCUMENTATION:**  
(available from Mechanicsburg)

*Systems Network Architecture Concepts and Products* (GC30-3072)  
... *Advanced Communications Function for VTAM (ACF/VTAM)*  
*Version 2 General Information* (GC27-0608).

*ACF/VTAM Licensed Program Specifications* will be available at program product availability.

PROGRAM PRODUCTS

ACF/VTAM V2 R1 (cont'd)

ACF/VTAM VERSION 2 TERMINAL SUPPORT CHART

Device or SubsystemName	Controlling Device-Model	PU <sup>2</sup>	S <sup>3</sup>	NS <sup>4</sup>
<b>Channel-Attached SNA</b>				
3270 Information Display System	3274-1A,-21A,-31A	2		
3790 Communication System	3791	2		
3730 Distributed Office Communication System	3791	2		
4331 Loop Adapter		2		
<b>Link-Attached (SDLC) SNA</b>				
3270 Information Display System	3271-11,-12	1 <sup>6</sup>		X
	3274-1C <sup>5</sup> , -21C <sup>5</sup> , -31C <sup>5</sup>	2		X
	3274-51C <sup>5</sup>	2	X	X
	3274-52C	2	X	X
	3275-11,-12	1 <sup>6</sup>		X
	3276-1,-2,-3,-4	2 <sup>10</sup>		X
	3276-11 <sup>5</sup> , -12 <sup>5</sup> , -13 <sup>5</sup> , -14 <sup>5</sup>	2	X	X
3600 Finance Communication System	3601,3602	2	X	X
	3614,3624	2	X	X
3630 Plant Communication System	3631,3632	2		X
3650 Retail Store System	3651-A50,-B50	2	X	X
3660 Supermarket System	3651-A60,-B60	2	X	
	3661	2	X	
3680 Programmable Store System	3684	2	X	X
3694 Document Processor	3694-1A,-1B,-1C,-1D,-2A,-2B,-2C,-2D	2	X	X
3730 Distributed Office Communication System	3791	2	X	X
3767 Communication Terminal	3767	1	X	X
3770 Data Communication System	3771,3773,3774,3775,3776 <sup>5</sup> ,3777 <sup>5</sup>	2	X	X
3790 Communication System	3791	2	X	X
5280 Distributed Data System	5280	2	X	X
5520 Administrative System	5520	2	X	X
5937-S1 Industrial Terminal	5937	1 <sup>6</sup>		X
6670 Information Distributor	6670	1	X	X
8100 Information System (DPCX)	8130,8140	2		X
8100 Information System (DPPX)	8130,8140	2		X
8100 Information System (DPPX/SP)	8130,8140	2		X
8775 Display Terminal	8775-11,-12	2	X	X
8815 Scanmaster I	8815	2	X	X
Series/1	Series/1	2	X	X
System/32	System/32	2	X	X
System/34	System/34	2	X	X
System/36	System/36	2	X	X
System/38	System/38 <sup>8</sup>	2	X	X
<b>Channel-Attached Non-SNA</b>				
3036 Console	3036 <sup>7,13</sup>			
3270 Information Display System	3272-1,-2			
	3274-1B <sup>7</sup> , -1D <sup>7</sup> , -21B <sup>7</sup> , -21D <sup>7</sup> , -31D <sup>7</sup>			
4331 Display/Printer Adapter				
<b>Link-Attached (BSC) Non-SNA</b>				
3270 Information Display System	3271-1,-2			X
	3274-1C <sup>8</sup> , -21C <sup>8</sup> , -31C <sup>8</sup> , -51C <sup>8</sup>			X
	3275-1,-2			X
	3276-1 <sup>8</sup> , -2 <sup>8</sup> , -3 <sup>8</sup> , -4 <sup>8</sup>			X
3780 Data Communications Terminal	3780	1 <sup>9</sup>		X
5275 Direct Numerical Control Station	5275 <sup>11</sup>			X
5937-S1 Industrial Terminal	5937 <sup>8</sup>			X
System/34	System/34 <sup>8</sup>			X
System/36	System/36 <sup>8</sup>			X
8100 Information System (DPPX)	8130 <sup>8</sup> , 8140 <sup>8</sup>			X
8100 Information System (DPPX/SP)	8130 <sup>8</sup> , 8140 <sup>8</sup>			X
<b>Link-Attached (Start/Stop) Non-SNA<sup>9</sup></b>				
2740 Communications Terminal	2740-1	1	X	X
2741 Communications Terminal	2741	1	X	X
3101 Display Terminal	3101 <sup>12</sup>	1	X	X
3767 Communications Terminal	3767-1,-2	1	X	X
World Trade Teletypewriter Terminal (WTTY)	WTTY	1		X
Western Union Teletypewriter Exchange Services Terminal	TWX Model 33/35	1	X	X

Notes:

- 1 All of these terminals have both single and multiple-system support.
- 2 PU TYPE.
- 3 Switched line support.
- 4 Nonswitched line support.
- 5 Capable of supporting cryptographic sessions.
- 6 Supported as a PU Type 1 3270.
- 7 Supported as a 3272-1,-2.
- 8 Supported as a 3271-1,-2.
- 9 Supported through the Network Terminal Option (NTO) program product with ACF/NCP/VS.
- 10 With the SDLC/BSC switch set to SDLC.
- 11 Supported as a 3275-1,-2.
- 12 Supported as a TWX Model 33/35.
- 13 OS/VS only.

The user should be aware that many terminal and control unit special features are transparent to programming and are therefore readily usable even though not specifically identified. Appropriate line adapters and hardware attachment features must be included in the system configuration.

Terminals that are functionally equivalent to those specifically supported by ACF/VTAM Version 2 may also function satisfactorily with ACF/VTAM Version 2; the customer is responsible for establishing equivalency. IBM assumes no responsibility for the impact that any changes to the IBM-supplied programs or products may have on such terminals.



PROGRAM PRODUCTS

ACF/VTAM V2 R1 (cont'd)

TERMINAL PRODUCTS SUPPORTED BY TSO/VTAM WITH ACF/VTAM VERSION 2

Device or Subsystem Name	Controlling Device-Model	Terminal-Model	LU Type
<b>Channel-Attached</b>			
3270 Information Display System	3272-1,-2 3274-1A,-21A,-31A	3277-1,-2 3277-1,-2 3278-1,-2,-3,-4,-5 3279-1A,-1B,-1C,-1D	0 2 2 2
	3274-1B,-1D,-21B, -21D,-31D	3277-1,-2 3278-1,-2,-3,-4,-5 <sup>1</sup> 3279-1A,-1B,-1C,-1D	0 0 0
3790 Communication System <sup>2</sup>	3791-1A,-1B,-1C,-2A,-2B 3276-12	3277-1,-2 3278-2	2 2
<b>SDLC</b>			
3270 Information Display System	3271-11,-12 3274-1C,-21C,-31C, -51C	3277-1,-2 3277-1,-2 3278-1,-2,-3,-4,-5 3279-1A,-1B,-2A,-2B	0 2 2 2
	3275-11,-12 3276-11,-12,-13,-14	3278-1,-2,-3,-4,-5 3279-1A,-1B,-2A,-2B	0 2 2
3767 Communication Terminal	3767-1,-2,-3		1
3770 Data Communication System	3771-1,-2,-3 3773-1,-2,-3 3774-1,-2 3775-1		1 1 1 1
3790 Communication System <sup>2</sup>	3791-1A,-1B,-1C,-2A,-2B	3277-1,-2	2
8775 Display Terminal System/34 <sup>3</sup>	8775-11,-12 5340-CXX,DXX,EXX,FXX	5251-11 5251-12 5291-1 5292-1	2 2 2 2
System/36 <sup>6</sup>	5360 - all models	5251-11 5251-12 5291-1 5292-2	2 2 2 2
System/38 <sup>7</sup>	5381 - all models	5251-11 5251-12 5291-1 5292-2	2 2 2 2
<b>8100<sup>2</sup>/DPPX, DPPX/SP and DPCX</b>			
8130 Processor	8130-A21,-A22,-A23, -A24 3276-11,-12,-13,-14	3277-1,-2 8775-1,-2 3278-1,-2,-3,-4 3279-1A,-1B,-2A,-2B	2 2 2 2
8140 Processor	8140-A31,-A32,-A33 -A34,-A41,-A42 -A43,-A44,-A51, -A52,-A53,-A54 3276-11,-12,-13,-14	3277-1,-2 8775-1,-2 3278-1,-2,-3,-4 3279-1A,-1B,-2A,-2B	2 2 2 2
<b>BSC</b>			
3270 Information Display System	3271-1,-2 3274-1C,-21C,-31C, -51C	3277-1,-2 3277-1,-2 3278-1,-2,-3,-4,-5 3279-1A,-1B,-2A,-2B	0 0 0 0
	3275-1,-2 3276-1,-2,-3,-4	3278-1,-2,-3,-4 3279-1A,-1B,-2A,-2B	0 0
System/34 <sup>5</sup>	5340-CXX,DXX,EXX,FXX	5251-11 5251-12 5291-1 5292-1	2 2 2 2
System/36 <sup>6</sup>	5360 - all models	5251-11 5251-12 5291-1 5292-2	2 2 2 2
System/38 (as a 3271-2)			2
<b>8100/DPPX<sup>3</sup> &amp; 8100/DPPX/SP<sup>3</sup></b>			
8130 Processor	8130-A21,-A22,-A23, -A24 3276-11,-12,-13,-14	3277-1,-2 8775-1,-2 3278-1,-2,-3,-4,-5 3279-1A,-1B,-2A,-2B	0 0 0 0
8140 Processor	8140-A31,-A32,-A33, -A41,-A42,-A43, -A44,-A51,-A52, -A53,-A54 3276-11,-12,-13,-14	3277-1,-2 8775-1,-2 3278-1,-2,-3,-4,-5 3279-1A,-1B,-2A,-2B	0 0 0 0
<b>Start/Stop<sup>4</sup></b>			
2741 Communications Terminal	2741	2741	1
3101 Display Terminal	3101	3101	1
3767 Communications Terminal	3767	3767-1,-2	1
World Trade Teletypewriter Terminal	WTTY	WTTY	1
Western Union Teletypewriter Exchange Services Terminal	TWX	Model 33/35	1

Notes:

- 1 3278-5 does not attach to 3274-1B or 3274-21B.
- 2 Supported in Data Stream Compatibility mode only.
- 3 Supported with the DPPX 3270 Data Stream Compatibility program product and DPPX/SP Data Stream Compatibility program product.

- 4 Supported through the Network Terminal Option (NTO) program product with ACF/NCP/VS.
- 5 Supported with the System/34 3270 Device Emulation program product (5726-EM1).



PROGRAM PRODUCTS

ACF/VTAM V2 R1 (cont'd)

- <sup>6</sup> Supported with the System/36 System Support program product (5727-SS1), the Communications feature (#6001) and the 3270 Device Emulation feature (#6003).
- <sup>7</sup> Supported with the System/38 Control Program Facility program product (5714-SS1) and the appropriate communications features with 3270 device emulation.

RPOs ACCEPTED: No

MVS SYSTEM INTEGRITY APPLIES: Yes



**VIRTUAL MACHINE/SYSTEM PRODUCT  
VM/SP (5664-167)**

**PURPOSE**

The VM/System Product provides usability and performance extensions to VM/370; it is recommended for users running DOS/VS, VSE, VS1, SVS and MVS under VM/370 on processors supported by those SCPs, or users with high-speed paging devices, and CMS intensive users. The VM/System Product is designed to run on S/370 mdls 135, 135-3, 138, 145, 145-3, 155II, 158, 158-3, 158AP, 158MP, 165II, 168, 168-3, 168AP, 168MP and on 4321, 4331, 4341, 4361, 4381, 3031, 3031AP, 3032, 3033 Model Group N, 3033, 3033S, 3033AP, 3033AP-2, 3033MP, and the 2K storage protect key version of the 3081-D16 Processor Complex in S/370 mode.

**SPECIAL SALES INFORMATION**

**Note:** Information on the availability of the VM/SP High Performance Option Licensed Program (5664-173) for VM/SP Release 3 will be available prior to the availability of VM/SP Release 3.

SQL/DS on VM/SP Release 3 will be supported on AP/MP, the 3081-D16 Processor, and the VM/SP High Performance Option concurrent with the above stated availability.

The VM/System Product Release 3 contains all the function previously available in the VM/370 Release 6 SCP, its priced extensions program products (VM/BSE and VM/SE), VM/SP Release 1, and VM/SP Release 2. Refer to the appropriate pages for an overview of the functions provided in each of these products.

**DESCRIPTION**

**Multiprocessor Support:** The VM/System Product will offer to users of VM/370 the reliability and availability characteristics of a full multiprocessor environment. The VM/SP will support the 158MP, 168MP and 3033MP configurations with up to 16 channels per processor and a maximum of 32 channels per MP configuration.

**3042 Attached Processor Model 2 Support:** The VM/System Product, when generated in multiprocessor mode, will support I/O on both sides of a 3033 Attached Processor complex when the complex includes a 3042 Attached Processor mdl 2.

The 3042 mdl 2 offers a standard group of 6 channels, and an optional feature adds another group of 6, for configurations of 18, 22, 24 or 28 channels in a 3033 Attached Processor complex.

**3081 Processor in MP Mode:** When the 3081 is structured so that a channel set is available to each of the two integral central processors, the multiprocessor mode of VM/SP should be specified. This permits up to 16 channels per central processor and up to an aggregate capability of 24 channels. The 3081 Processor may be structured to limit a single channel set to one of the two central processors inherent in 3081 (AP mode).

**Note:** VM/SP does not simulate multi-processing for virtual machines other than under Single Processor Mode. A virtual machine will be dispatched by VM/SP on only one of the two processors in an MP configuration unless the Single Processor Mode of the VM/SP is in effect.

**Enhanced Attached Processor Support:** Several significant enhancements to the VM/370 AP environment are available in the VM/System Product, notably:

- Improved locking logic that may result in a reduction in contention on the global system lock.
- Extended channel error recovery.

In addition, for both the AP and MP environments, several CP commands have been improved to extend the system status and processor activity data available to the system operator.

**Improvements in Resource Management**

**Throughput Improvements:** May be achieved in the following environments:

- Systems with real storage bottlenecks.  
When a real storage bottleneck is indicated, the resource manager may reduce the effect and increase the level of multiprogramming. This is achieved through the use of improved scheduling and paging algorithms, which give rise to smaller working set size estimates and higher page steal ratios. The net result is that a given real storage size appears more able to contain the given load with improved throughput.  
The resource manager also migrates swap tables of interactive users and frees up real storage for other purposes. This may increase the level of multiprogramming and improve throughput.
- Storage bound systems with long running non-interactive users and high multiprogramming levels.  
Such systems devote a large part of their paging activity to swapping the long running users in and out of storage as each is given a timeslice. The resource manager reduces this paging overhead by swapping the longest running users into real storage

less frequently but keeping them there for longer periods. This may lower the overall level of paging activity with accompanying reduction in supervisor overhead and some increased throughput.

- Systems that need more paging space than is available on preferred paging devices.

The resource manager maintains active user pages on the high speed or primary paging devices using a page migration scheme. Page wait due to slow access times of secondary devices is reduced and improved processor utilization and throughput may result.

**Improved Response to Trivial Interactions:** May be achieved in the following environments:

- Where terminal interactions occur for both single trivial commands and nontrivial transactions during terminal I/O.

The resource manager distinguishes between the two types of transactions by tracking the resource consumption rate and giving higher priority to the smallest consumer.

- Where transactions are characterized by a wide range of resource requirements.

The fair share algorithms of the resource manager, which are effective in both compute-bound and paging-bound environments, distinguish between the different resource requirements of the users. Consequently, a better interactive/non-interactive split is achieved with improved responsiveness to trivial transactions.

**Improved Installation Management:** Over the services provided in the following environments:

- Where multiple users require a specific percentage of the processor.

The SET FAVOR command with percentage option may now be specified for more than one user.

- Where CMS batch facilities run non-interactively.

Directory priority controls may now be utilized to make CMS batch facilities either fully non-interactive to minimize impact on the system, or fully interactive to encourage its use.

**CP Performance Improvements**

The storage management algorithm for returning free storage to the dynamic area was modified. A check is made every hour and also upon a user logging off, to determine if any dynamic area pages obtained for free storage purposes can be returned to the dynamic area.

The set favored command accepts a percentage specification of 100. This specification is handled as a special case by the scheduler where the designated user will be kept at the top of the run list.

CMS disk I/O (Diagnose 18) takes advantage of ECPS:VM/370 for CCW translation. The improvement is available with the existing ECPS:VM/370 assist on the 3135-3, 3138, 3145-3 and 3148 Processors. The improvement is also available with the ECPS:VM/370 assist on the 4341 Processor.

**Addition to ECPS:** ECPS for VM/370 on S/370 mdls 135-3, 138, 145-3 and 148, and on the 4321, 4331, 4341 and 4361 Processors has been enhanced to accelerate the processing of the DIAGNOSE Interface between a virtual machine and CP. Because CMS is a heavy user of DIAGNOSE, the CMS user may receive improved performance.

Operation of VM/SP on a 4321 processor is recommended in a VM/CMS-only environment.

**Small CP Option:** Small CP option reduces real memory requirements for CP which makes more pageable storage available to virtual machines.

**Shadow Page and Segment Table Maintenance:** VM/SP reduces overhead associated with maintaining shadow tables used to run virtual systems.

Multiple shadow tables will be maintained to reduce the overhead associated with building shadow tables when a different address space within a virtual machine is dispatched.

Shadow table entries will be selectively invalidated when VM/SP (extended by the VM/SP) steals a page from a virtual machine.

Shadow tables can be eliminated for V=R users running a production system.

Shadow table maintenance will be reduced for areas in a virtual system where the virtual address is equal to the real address.

**Extended Support:** VM/SP will support operating systems that utilize the S/370 Extended Facility of the 3031, 3032, 3033 and 3081 Processors, and the S/370 Extended Feature of the S/370 mdls 158 and 168, provided the S/370 Extended Feature is installed on the hardware. Thus, MVS/Systems Extensions and MVS/System Product can be run under the VM/System Product on these processors.

**VM/SP (cont'd)**

**MVS Guest Environment:** Release 1 of the MVS/System Product (JES2, program number 5740-XYS, and JES3, program number 5740-XYN) will be supported as guest operating systems under the VM/System Product.

The cross-memory services of Release 2 of the MVS/System Product (JES2 and JES3) will be supported in the guest operating system environment under the level of VM/System Product which is most current at the time of availability, or Release 2 of MVS/System Product. However, cross-memory services will use the hardware microcode implementation of the 3033 Extension Feature (Feature #6850) only when executing under VM/SP High Performance Option (5664-173).

**RELEASE 3 ENHANCEMENTS**

- **SQL/DS Support**  
SQL/DS is a Relational data base Licensed Program (5748-XXJ). CP and CMS enhancements have been included to allow SQL/DS Release 2 to operate on VM/SP Release 3 without a guest VSE operating system and without VSE/VSAM. These extensions have been provided in a generalized fashion so that other applications may take advantage of them. The CP/CMS Extensions for Application Programs sections below describe this support.
- **System Product Interpreter**  
The System Product Interpreter is a new command and macro processor. It can be used for interpreted applications, command processing and generation, for macros such as those used by the System Product Editor, as a desk calculator, mathematical problem solver, or for any other purpose for which an interpreted simple-to-use language is suitable. Syntax is in a high level form which is easy to learn.
- **Highlights of the System Product Interpreter include:**
  - Extended Control Structure:
    - If-Then-Else
    - Select-When-Otherwise-End
    - Do-Interactive-End
    - Iterate and Leave
  - Full set of arithmetic, character, and logical operators
  - Selection of Standard functions
  - Free Format, Mixed Case
  - Interactive Debug
  - In line Function and Subroutine calls
  - Decimal and Scientific arithmetic capability
  - Built-in string parsing instructions
- The System Product Interpreter will be the primary interpretive command and macro processor for VM/SP in the future. It is intended that all future enhancements will be applied to the System Product Interpreter. EXEC and EXEC2 will remain supported and will coexist with the more powerful System Product Interpreter.
- **Programmable Operator Enhancements**  
Several enhancements to the Programmable Operator Facility have been added. Among them are:
  - Message routing with nicknames - allow messages to be routed to other than the logical operator or to multiple operators via CMS "TELL". This enhances the ability to have SPOOL and/or TAPE operators at the remote site in addition to a system operator at the host.
  - Remote Node Availability - ability for periodic signaling between a host and remote system and alerting the host operator of the inability to communicate with a remote system. Improved availability is also provided with the capability to recover from Programmable Operator Facility ABENDs.
  - Enhanced text comparison - allows multiple text comparison strings in a routing table entry with logical operations on the strings.
  - EXEC Action Routines - ability for action routines to be written in all EXEC languages supported by CMS, including the new System Product Interpreter.
  - LOG recording and error handling enhancements.
- **Enhanced Serviceability**
  - Symptom Records - A new record will be created that will assist in problem identification. Information from this record can be useful in communicating problems to the IBM support center. The VM Interactive Problem Control Program System Extension (VM IPCS/E 5748-SA1) Release 2 at the then current service level is required to implement this enhancement.
  - S/370 Program Event Recording (PER) support - This enhancement provides CP command support to facilitate debugging in a virtual machine. It uses the S/370 hardware program event recording (PER) feature to monitor successful branches, instructions fetched within an address range, alteration of storage within an address range, and alteration of a specific general purpose register. In addition, the support provides the ability to trace within multiple ranges, compare altered storage and registers to specific values and execute CP commands on specific events.

- **CP Extensions for Application Programs**  
Several extensions to CP have been made to support Application programs:
  - A DASD Block I/O System Service allowing a virtual machine fast, device independent asynchronous access to fixed size blocks on CMS formatted virtual DASD I/O devices.
  - Inter-User Communication Vehicle (IUCV) extensions to provide:
    1. Fast communications through data specification in the parameter list and related protocol extensions.
    2. Extended mask capability for individual IUCV control interrupts
    3. Expanded trace capability
    4. Support for the DASD Block I/O System Service
  - Diagnose Zero support of time zone differential from Greenwich Mean Time
- **CMS Extensions for Application Programs**  
A number of enhancements to CMS have been included to support applications written to run on CMS:
  - CMS File System Extensions - The CMS File System Extensions include:
    - 512-byte length physical DASD blocks - A new block size of 512 bytes is supported and is available through a new option on the CMS FORMAT command.
    - DASD Block I/O Support - New and extended CMS commands and functions are provided to initialize CMS disks for use with the CP DASD Block I/O system service.
  - Update-in-Place  
The update-in-place facility allows you to write blocks back to their previous location on disk rather than in a new slot. The filemode number 6 differentiates CMS files with the update-in-place attribute from regular CMS files.
  - CMS IUCV Support  
Support for IUCV communication has been introduced into CMS. This support will allow multiple programs within a virtual machine to use IUCV functions. Included is the ability to initialize a CMS machine for IUCV communication and to invoke IUCV functions via new CMS macros. These macros will also allow the user to specify path-specific exits for IUCV external interrupts. CMS IUCV support can be used to access a CP DASD Block I/O system service.
  - CMS Wait on ECB - The ability to wait on an ECB or a list of ECBs will be supported via a new CMS macro. This macro will provide the capability to wait on OS and VSE format ECBs.
  - CMS ABEND Exit - A general CMS abnormal exit capability will be provided so that user programs may specify the address of a routine to get control before CMS ABEND recovery begins. An exit is established and cleared through a new CMS macro.
  - RDTERM Direct - A new option on the RDTERM macro will allow a program to read an input line directly from the console. Lines already stacked in the program or console stack will not read. This function will enable a program to prompt a terminal user for a response without disturbing the contents of the program or console stack.
  - Immediate Command Extensions - The immediate command capability of CMS will be extended by allowing users to define their own immediate commands.
  - Enhancements to GLOBALV  
The GLOBALV command has been enhanced to use the EXECCOMM interface available in EXEC2 and the System Product Interpreter. This makes it possible to set and retrieve global variables by specifying the name of the variable on the GLOBALV command call.
  - Removal of the CMSSEG Segment  
The discontinuous saved segment CMSSEG has been removed by merging modules from the CMSSEG segment into the CMS shared nucleus.
  - Enhancements to TELL EXEC, DEFAULTS EXEC  
The TELL EXEC has been enhanced to allow the use of the MSGNOH command instead of the default of MSG command for local messages. The DEFAULTS EXEC has been changed to support the enhancement made to the TELL EXEC.
  - EXECOS Command  
EXECOS is a new CMS command that resets the OS environment under CMS without returning to the interactive environment. It is intended for use in an EXEC2 or System Product Interpreter EXEC that either invokes several OS programs sequentially or invokes the same OS program repetitively. If VSAM is running, VSAM cleanup is also accomplished.
- **CMS Performance Enhancements**

**PROGRAM PRODUCTS**
**VM/SP (cont'd)**

- LISTFILE and RENAME  
The LISTFILE and RENAME functions, formerly executed in the transient area, are now reentrant, and have been moved to the CMS shared nucleus.
  - XEDIT Interface  
Applications can have access to files in storage. They can read and write specific records without the overhead of using the disk or the program stack to transfer data to or from XEDIT.
  - Enhanced VSAM Support
    - VSE/VSAM Release 3 Support  
CMS will support VSE/VSAM Release 3 which includes significant enhancements designed to improve catalog reliability and integrity while providing additional serviceability and usability. VSE/VSAM Release 2 is not supported.
    - 3380 DASD Support  
VM/SP Release 3 will support the use of 3380 DASD by VSE/VSAM through the OS/VSAM environment display.
    - Assembler Language VSAM Support  
All of the VSE/VSAM macros and their options and a subset of the OS/VSAM macros are supported by CMS. The OS/VSAM Assembler language macros supported for use in CMS are contained in the OSVSAM MACLIB that is distributed with VM/SP.
    - VSEVSAM Command  
VSEVSAM is a new CMS command which allows VSAM users to obtain the VSE/VSAM Assembler language macros from the Optional Source Statement Library tape. The VSEVSAM command creates the VSEVSAM MACLIB containing all of the VSE/VSAM Assembler language macros and some VSE MACROS.
    - CATCHCHECK Command  
CATCHCHECK is a new CMS command which allows CMS VSAM users to invoke the VSE/VSAM Catalog Check Service Aid to verify a complete catalog structure.
  - New and Improved System Product Editor (XEDIT) Functions  
Enhancements to the System Product Editor (XEDIT) to provide new or improved support in the following areas:
    - Prefix macro support
    - Selective line editing
    - Screen Control
    - Additional SET RESERVED capabilities
    - Extended data stream (color)
    - Vertical screen split
    - Several new functions intended to provide additional data manipulating capabilities
    - Modifications to miscellaneous existing XEDIT functions to improve flexibility and/or consistency between related subcommands

XEDIT provides all of the major capabilities available in EDIT. It is IBM's intent to provide all future VM/SP editing enhancements to XEDIT. XEDIT has attempted to provide the most useful capabilities available in various editors. A compatibility function for Display Editing System 5796-PJP (EDGAR) was provided in VM/System Product Release 1 to assist EDGAR users in the transition to XEDIT. Its primary purpose was for migration only.

A subset of the EDGAR functions was provided to aid in migration. Not all EDGAR commands or functions are supported in the same manner as in EDGAR. There will not be any changes or enhancements to this migration support. It is recommended that all those using this migration support should complete the migration to XEDIT when VM/SP Release 3 is installed. New XEDIT users should not use the EDGAR migration functions.
  - Enhanced Publications  
The following publications have been revised and restructured to provide increased usability. The books have a new cover design, with a graphic that is printed in various colors according to the major task associated with a particular book. New binders are available for storing the manuals. Labels for the binders are also available.
    - VM/SP General Information, GC20-1838  
The content of this manual has been generalized to provide an executive level description of VM/SP. It also provides customer management and staff with information needed to evaluate the applicability of VM/SP to their installations.
    - VM/SP Introduction, GC19-6200  
This manual has been completely rewritten to provide basic information about VM/SP. It describes what VM/SP is and what it can do for the general user.
    - VM/SP Release 3 Guide, SC24-5240  
This manual is specifically intended to provide current users of VM/SP with a synopsis of the functional enhancements offered by the new release. It will improve customer productivity by describing new functional enhancements, defining the related user interfaces, and giving examples of their use. It includes details for migrating from VM/SP Release 2 to VM/SP Release 3 and identifies new and changed modules.
  - VM/SP Installation Guide, SC24-5237  
This manual provides procedural information about the VM/SP install process. It is published expressly to satisfy the requirements associated with the installation and service tasks.
  - VM/SP Planning Guide and Reference, SC19-6201  
This manual, previously titled *VM/SP Planning and System Generation Guide*, has been revised to better meet the requirements of the planning task. This book identifies the hardware and software planning considerations for a VM/SP system, and the system definition files that must be prepared for a system generation.
  - VM/SP Terminal Reference, GC19-6206  
This manual, previously titled *VM/SP Terminal User's Guide*, is completely reorganized and revised for ease-of-use. It discusses the characteristics of terminals in general, and the physical characteristics of different terminals and consoles. It contains a typical session that gives working examples from logon to logoff.
  - VM/SP System Product Interpreter User's Guide, SC24-5238  
This manual is a step-by-step guide to using the System Product Interpreter for new users.
  - VM/SP System Product Interpreter Reference, SC24-5239  
This manual is a complete compilation of reference information for using the System Product Interpreter.
  - VM/SP System Product Interpreter Reference Summary, SX24-5126  
This publication provides quick synoptic reference information about System Product Interpreter statements and their use.
- Additionally, two previously announced functions will be available in VM/SP Release 3. They are:
- The Missing Interrupt support announced July 6, 1982. This function will monitor system I/O activity for interrupts not completing within a certain time period and attempt to correct the condition. See Programming Announcement 282-116 for additional information.
  - Support for the Speed Matching Buffer for the IBM 3375 announced July 30, 1982. This support provides the capability to use the hardware when connected to a 1.5 megabyte channel. This includes paging, spooling, and/or mini disks.
- RELEASE 2 ENHANCEMENTS**
- Programmable Operator Support  
The Programmable Operator facility can be used in a VM/SP system to reduce or eliminate system operator messages. This facility provides the capability to log messages, suppress messages, redirect messages, execute commands, and pre-program message responses, all under the control of an editable message routing table in a CMS file.
  - The Programmable Operator facility can be used by a stand-alone VM/SP system or can allow the operation of a remote VM/SP system to be controlled by an operator at a host VM/SP system. Remote operation of a VM/SP system requires Release 2 or Release 3 of the RSCS Networking program product on both VM/SP systems. Installation of the RSCS Networking Release 3 program product will provide enhanced display utilization.
  - New CMS End-user Functions  
Numerous end-user functions are being provided to assist the non-professional user as well as the professional user in utilizing the system. These functions are provided to enhance the system usability and to improve user productivity. These functions provide:
    - The new VM/SP SENDFILE and RECEIVE commands may be used in conjunction with the TSO/E Interactive Data Transmission Facility TRANSMIT and RECEIVE commands to exchange files between VM/SP Release 2 and MVS/TSO systems connected through an NJE/NJI network.
    - Enhanced full screen capability to display information about Reader Spool files. Allows the ability to review/browse through files, to discard files, or initiate other actions such as copy, or forward the file to other media/users.
    - A full screen capability to display file information (information presented is similar to what LISTFILE provides today) and issue CMS commands that perform some type(s) of action on the file(s) being displayed. Program function keys are also assigned to useful functions like EDIT, SORT or HELP.
    - Enhanced command capability such as:
      - a. Header Option on Print.

PROGRAM PRODUCTS

VM/SP (cont'd)

- b. DISK LOAD extended to allow sequence identification and the ability to load a file and retain its original date/time.
- c. Ability to specify '=' for any file identifier in the fileid2 operand of the COMPARE command.
- d. LISTFILE enhanced to allow 'STACK', 'ARGS', 'BLOCK', 'TRACE', 'FIFO', 'LIFO' and extended pattern matching options.
- e. UPDATE extended to keep a record of missing PTF files.
- f. A new command to display environmental status such as userid, nodeid, date, time, zone.
- New CMS Productivity Aids for the DP Professional CMS has been enhanced to provide the DP professional user with several productivity enhancements to make their system implementation easier. These productivity enhancements provide:
  - A CMS facility to allow I/O between a device and an EXEC program.
  - The ability to dynamically extend the CMS nucleus.
  - A routine to display at the console or stack virtual reader file characteristics.
  - An enhanced CMS QUERY command to display CMSLEVEL information such as product name, release identification, service level and information regarding virtual disks that are accessed. In addition, QUERY command results can be stacked.
  - A GLOBALV command which allows a user to maintain a collection of named values whose lifetime is either within a single IPL, within a session or across sessions.
  - The ability to specify that portions of a line should be displayed, highlighted, protected, and/or masked using the VM/SP editor.
  - The ability to directly access EXEC 2 variables. Variables may then be inspected and/or set from a program.
- DIAL Command support for remote BSC 3270 users. This support provides the ability for remote BSC 3270 users to issue the DIAL command. The remote 3270 will appear to be a locally attached terminal to the dialed virtual machine.
 

In addition, this support removes the previous restriction of 16 remote communication lines. The maximum number of remote communication lines is now 256.
- CMS Nucleus Restructured. The CMS nucleus has been restructure to provide a CMS system which is more flexible and extendible for development, serviceability and maintenance purposes.
- CMS Tokenization. The eight-byte tokenization restriction has been eliminated for parameter passing.
- Starter System Full Screen Support. The ability to operate the new CMS editor in full screen mode has been extended to the VM/SP Starter System running second-level. Previously, the new CMS editor would only run in single line mode.
- HELP Files. The HELP files can now be placed on disks other than the S-DISK.
- CMS/DOS Upgrade. CMS/DOS support has been upgraded to VSE/Advanced Functions Release 3 and VSE/VSAM Release 2 including support for the 3375 DASD.
- Command Retrieve Capability. The CP SET Program Function command is enhanced to include the option "RETRIEVE". When specified, the system will save input lines. When the specified program function key is pressed, the saved input lines are redisplayed in the reverse sequence of entry. The number of saved lines depends upon buffer size and input line length.
- QUERY Command Enhanced. The QUERY command is enhanced to allow the user to specify the operands "USERID" or "CPLLEVEL". The Query USERID command responds with the userid and with the system identifier of the system that the user is logged on to.
 

The query CPLLEVEL provides information relative to the software product's name (e.g., VM/SP), release number, service level number, Nucleus Creation Date and time, along with the IPL date and time.
- Enhanced ASCII Support. ASCII support has been enhanced to support the 3101 user with the following:
  - Screen Management - Controlled scrolling of output.
  - Prompting - Linefeed prompting can be selected to allow data to be entered starting in column 1.

- Read operations can be command-chained to write operations.
- Linesize Control option has been added.
- Enhanced 3800 Support. This enhancement allows the RSCS Networking Release 3 program product to pass to CP the 3800 attributes defined in an NJI header created by a system using the NJI protocol. This will also allow files created in these systems to print properly on a 3800 controlled by VM/SP Release 2. Copy group and burst attributes remain unsupported.
- Support for 3375 DASD. VM/SP Release 2 will support the 3375 Direct Access Storage Device with the 3800 Storage Control Models 1 or 2.
 

The new DASD will be supported as a paging, spooling, system residence, T-disk, mini-disk and as a dedicated device to a virtual machine operating system that supports the 3375 DASD.
- Support for 3380 DASD. VM/SP Release 2 will support the use of 3380 DASD by VSE/VSAM through the OS/VSAM environment of CMS only.
- Support for the new Speed-Matching Buffer (Feature #6550). The 3880 Speed-Matching Buffer Feature support allows attachment of the new high speed 3380 DASD to processors with channel speeds slower than those normally required by the new devices. Refer to Announcement Letter 280-61 for details regarding the hardware support.
 

VM/SP support for the Speed-Matching Buffer is provided for use of CMS, via Diagnose 18, as well as by the CP component of the operating system.
- Trace Table Recording Facility. A new serviceability enhancement is provided to record a history of system operations on spool. This facility is controlled by a new Class C command. Selective recording of CP trace entries by type, VMBLOK address, interrupt code and device type is provided. In addition, user generated information from a virtual machine and CP information can be included.
 

A utility program is also provided. This utility provides the user with the capability to print the collected information or display it on a terminal.

As a customer convenience, the Class 2 SCP Stand-alone Device Support Facility is being shipped in conjunction with VM/System Product. Device Support Facility is a utility used to initialize DASD volumes or mini disks and performs data analysis and recovery either stand-alone or in a virtual machine under VM/SP.

RELEASE 1 ENHANCEMENTS

**Dynamic SCP Transition To and From Native Mode:** An installation can have the ability to run another SCP in native mode on the same system used for running VM/SP with a minimum of disruption to the system's operation; it is possible to switch from VM/SP to another SCP, run that SCP in native mode and then switch back to VM/SP without IPLing the system. The guest SCP must run in a V=R area. It can be MVS, SVS or VS1 in non-handshaking mode.

When the transition is made to native mode, the OS/VS SCP is operating without VM/SP. The performance of the OS/VS system will be equivalent to that OS/VS system running native with the same amount of storage and the same I/O configuration it was using in the VM/SP V=R area. When the installation again requires VM/SP services, the operator returns control to VM/SP and the installation again has all the advantages that result from using VM/SP.

This gives an installation operational flexibility that it did not have before. It is possible to run both VM/SP and OS/VS in native mode on the same system, without the disruption of an IPL when a switch is made between VM/SP and OS/VS. This capability is particularly valuable when running an application that cannot be shut down, such as DB/DC.

**Note:** This function is not supported for MVS on the 4300 processors.

**Single Processor Mode:** It is possible to run VM/SP in Single Processor Mode (SPM). SPM will allow an installation to restrict VM/SP to a single processor of an AP or MP system, leaving the other processor for the exclusive use of a virtual machine running MVS. In SPM, MVS must be IPLed in a V=R area. MVS will then initialize the other processor and run in AP or MP mode.

**IPL Command Enhancement:** This enhancement allows a user to activate an OS/VS1 system without any operator intervention. It is similar to the capability provided by the DOS/VSE Automatic System Initialization (ASI) Facility.

**Virtual Machine Storage Preservation:** In VM/SP, during a warm start or an abnormal termination by VM/SP, the virtual storage of specified virtual machines will be preserved. Specifically, virtual machine IPL was changed so that it no longer uses a page of the user's virtual storage, and the V=R area under VM/SP will be preserved during warm start. In addition, specific virtual machines can be

PROGRAM PRODUCTS

**VM/SP (cont'd)**

identified such that at VM/SP abend, or when that virtual machine is abnormally terminated by VM/SP, the registers and main storage for that virtual machine will be saved.

The improved integrity of virtual storage is particularly beneficial to IMS/VS users running in a virtual machine who need to have storage preserved so that they can run a stand-alone program to recover IMS/VS Log Buffers. In addition, stand-alone dumps that are IPL'd from an external storage device will now accurately reflect the user's virtual storage, because VM/SP will no longer use a page of that storage.

**Single Console Image Facility:** This support enables the operator of a virtual machine to control multiple virtual machines from one physical terminal. Availability is improved in cases where there is a console failure because control can be automatically passed to the virtual console of another user. This capability is available for use by any guest machine.

Functions that enhance the reliability, availability and serviceability characteristics of the VM/SP system include:

- An enhancement that will detect missing I/O interrupts and notify a system operator of the problem.
- Enhancements to allow an installation to dynamically allocate space for a dump after an IPL and to reserve sufficient contiguous DASD space for one or more system dumps.
- Expansion of the checkpoint limit for spool files from the current limit of 2,048 to a new limit of 9,900, the maximum allowable number of spool files in the system.

New functions that enhance the integrity and security of the VM/SP system include:

- A system option that will automatically clear allocated T-Disk DASD space and prevent access to residual data.
- A function to prevent the system operator from being automatically logged on during an automatic system restart if the operator was not logged on the primary system console when the system ABEND occurred.
- An enhancement to the SPTAPE command to support the DUMP and LOAD functions for CP DUMP reader files.

**Full Screen Console Support Via SIO Interface:** Full screen console support will enable a guest machine (for example, VSE DOC or OS/VS DIDOCS) and CP to share a locally-attached display terminal controlled by CP. The guest machine can use a display terminal as a graphics device in full screen mode while CP shares the terminal and uses it as a line device. A Start I/O (SIO) instruction is the interface for this support. A guest machine can use either the existing DIAGNOSE interface or the SIO interface, but not both simultaneously.

**Systems Network Architecture (SNA) Support:** Full VM/370 operator console capabilities are provided to the SNA terminal users. These console functions include full CP/CMS command processing capabilities, CMS editor processing mode and full screen support for 3270 display terminal devices. This support requires that the Virtual Machine/VTAM Communications Network Application (VM/VCNA) program product and its prerequisites be installed.

**Inter-User Communication Capability:** The inter-user communication vehicle (IUCV) facilitates the transfer of messages among virtual machines and between a virtual machine and CP.

- All IUCV interfaces are provided to the user at a macro level.
- A user can selectively establish and terminate communications paths.
- Two users can establish multiple paths between themselves.
- A virtual machine can receive messages and reply either synchronously without an interrupt or asynchronously via an external interrupt.
- An installation can restrict the number of messages outstanding on each communication path.
- A receiver can selectively reject messages.
- IUCV coexists with VMCF and provides extended inter-user communication capabilities.

**CP Spooling Enhancements**

- Association of a form number with each spool file and spool device. Features of form number support are:
  - An eight character alphameric form number.
  - Optional automatic prompting of the spool operator for forms changes.
  - Optional "setup mode" to allow the spool operator to align forms.

- Ability to order, change, purge, transfer, spool-to-tape and query spool files by form number.
- Default form numbers that are installation specified.
- Optional installation specified translation from user form numbers to operator form numbers.
- Ability to transfer spool files between the reader and printer queues, or the reader and punch queues.
- Capturing of the Load FCB, Fold and Unfold CCWs in a virtual printer spool file, and their subsequent execution on the real printer.
- Ability to select spool files for the QUERY command based on their hold status.
- An enhanced header page and a new trailer page for printed output. A file sequence number helps the spool operator distribute output correctly.
- Additional spool operator information:
  - A "waiting" message when a real spool device finishes work.
  - Ability to display the number of records left to print or punch in the currently active spool file.
  - Display of the distribution code and the new file sequence number for each file printed or punched.
- Ability for the installation to specify classification titles for selected spool file classes. The title will be printed on the separator page, and optionally on each page of output.
- Ability to specify the distribution code on SPOOL command.
- Increase in the allowable copy count to 255.

**Spool Files to Tape:** This support provides Class D commands which enable the spooling operator to store to tape, or retrieve from tape, those unit record output files which he or she wishes to schedule for real output at some later time on the VM/SP system. The restored files will retain the same characteristics as the original files, but will be assigned new spool-ids to avoid duplicate identification within the spooling system. The spooling operator can store or retrieve spool files selectively (by class or spool-id) or completely. An option is provided to allow the operator to scan the tape.

**Spooling of Accounting Records:** This support provides the installation with the ability to spool accounting data to a designated virtual machine with a designated class. The data can be spooled to provide punched output or spooled to a virtual machine's reader for additional processing. This eliminates the need to have a real card punch online at all times to get accounting records.

**CMS File System Enhancements:** The file system enhancements will provide the user with a more efficient and flexible file system. Specifically, the enhancements are:

- Removal of the limitations on the size of CMS disks and the number of files per CMS disk.
- Support for physical block sizes of 800, 1024, 2048 and 4096 bytes.
- Efficient handling of variable length files.
- Selective directory updating.
- Fixed Block Mode (FBM) device type support.
- Concurrent open for read and write of CMS files.
- CMS access to one system disk and up to 25 minidisks concurrently.

**Interactive Help Facility Under CMS:** The help facility is an informational, online display service available at the CMS terminal to guide the user in using CP and CMS commands and reacting to CP and CMS messages. As a result, the user can, in most cases, avoid referencing manuals during CMS sessions.

With the enhanced HELP Facility of VM/SP, the user will be able to issue CMS (including editor) and CP commands directly from the screen on which a HELP file is displayed. Because HELP files will be viewed via the new CMS editor, scrolling and locate facilities will be improved.

**The New CMS EXEC Interpreter:** VM/SP CMS will provide the user with more advanced EXEC processing capabilities and improved performance. The new EXEC interpreter:

- Accepts words of up to 255 characters each.
- Allows commands to be issued either to CMS or to specified subcommand environments; for example, to an editor.
- Provides new string manipulation functions.
- Provides arithmetic functions for multiplication and division.
- Provides debugging facilities.

**VM/SP (cont'd)**

- Supports user-defined functions and subroutines.
- Improves execution time.
- Coexists with the current CMS EXEC interpreter.

**The New CMS Editor:** The new CMS editor provides:

- Full screen support for 3270 display stations, including: multiple views of the same file or of different files, selective column viewing and automatic wrapping of lines larger than the screen.
- Ability to extend and tailor editor commands with a powerful macro mechanism which uses the new CMS EXEC interpreter.
- Extended string search facilities to improve text processing.
- Enhanced functions to handle program development including automatic update generation.
- Ability to define the screen format according to individual preferences.
- Data import and export facilities.
- Coexistence with the CMS editor.
- 3278-5 and 3279 terminal support.

**CMS OS Loader Capability:** The CMS OS Loader will enable OS relocatable load modules to be used under CMS. The load modules may be loaded from an OS partitioned data set or a CMS load library. This support also provides a facility to list, copy or compress members of a CMS load library and to merge CMS load libraries.

This support further allows use of the OS/VS Linkage Editor to create a CMS LOADLIB or a LOADLIB member. This is accomplished using the existing LKED command. The supported Linkage Editor options are defined in the *CMS Command and Macro Reference* (SC19-6209).

**CMS Use of CP Page Management Interfaces:** CMS now takes advantage of the existing page control interfaces to better communicate the true working set of pages to CP, thus better utilizing the page frame resources of the real machine.

**CMS Tape Command Performance Improvement:** To decrease overhead, a large block-size (4K) is supported for tape dump.

**CMS Support of Labeled Tapes:** CMS processes labelled tapes as follows:

- VOL 1 Labels
  - Processed by DOS or OS OPEN simulation routines.
  - Processed by CMS TAPPDS of TAPEMAC commands.
  - Displayed or written by CMS TAPE command.
- HDR Labels
  - Processed by DOS or OS OPEN simulation routines; exits are provided to allow access to user-written routines to process standard user (UHL) labels.
  - Processed by CMS TAPPDS or TAPEMAC commands.
  - Processed by a CMS macro designed for use in assembly language programs in conjunction with other CMS tape macros.
- EOF/EOV Labels
  - Processed by DOS or OS CLOSE simulation routines; exits are provided to allow access to user-written routines to process standard user (UTL) labels.
  - Processed by a CMS macro designed for use in assembly language programs in conjunction with other CMS tape macros.
- Non-Standard Labels
  - User exits are provided in DOS or OS OPEN and CLOSE simulation routines and in TAPPDS or TAPEMAC commands to allow access to user-written routines to process non-standard labels.

**Note:** The following are supported:

  - Label processing for tapes which are read backwards.
  - Multi-volume files.
  - ASCII labels.

**CMS Support of Unlabeled Tapes:** CMS will process unlabeled tapes.

**Enhanced Support for the 3270 Information Display System Which Includes:**

**APL Text Feature:** The 3270 APL-TEXT feature provides the 3270 user with access to the full APL, TEXT and EBCDIC character sets. This makes it possible for the user to interact with the VS APL program product as well as text processing applications which run under CMS. This support extends the APL-TEXT function to users with 3274 Controllers/3278 Display Stations.

**Intensified Display:** VM/System Product takes advantage of the intensified display feature of the 3270 Information Display System as follows:

- The "Current Line" of the CMS Editor will be intensified.
- All CMS Edit messages will be intensified.
- An application program may supply a 3270 Start Field order and an attribute byte in a DIAGNOSE 58, CCW Code 19 (Virtual Console Interface) data stream. This provides an application program with the ability to define a field as normal intensity, intensified or non-display.
- Messages from the system operator or other users will be intensified.
- The re-display of user input is intensified so that it may be distinguished from output. The SET command will activate or deactivate intensification of input re-display.

**Support for the Enhanced Display Terminals:** The following terminals and associated printers are supported:

- 2250 mdl 3 Display Unit
- 2840 Display Control mdl 2
- 3250 Graphics Display System
- 3251 Display Station
- 3255 Display Control Unit
- 3258 Channel Control Unit
- 3262 Printer mdls 3 and 13
- 3274 Control Unit mdl 1B, 21B (3272 compatible)
- 3274 Control Unit mdl 1C, 21C, 31C, 51C (TP - BSC only)
- 3274 Control Unit mdl 1D, 21D, 31D (3272 compatible)
- 3276 Control Unit/Display Station mdl 2 (1920 character screen)
- 3276 Control Unit/Display Station mdl 3 (2560 character screen)
- 3276 Control Unit/Display Station mdl 4 (3440 character screen)
- 3278 Display Station mdl 2 (1920 character screen)
- 3278 Display Station mdl 3 (2560 character screen)
- 3278 Display Station mdl 4 (3440 character screen)
- 3278 Display Station mdl 5 (3564 character screen)
- 3279 Display Station (Multi-color display screen)
- 3268/3287/3289 Printer (Copy command support only)

This includes support for the 96-character set (94 characters plus space and null), and PF keys 13 through 24.

The VM/SP support for the 3279 provides a new data stream for communicating between the device and the host, multiple colors for data display, programmable symbol-set capability and extended highlighting attributes; extended highlight functions are character underscore, reverse video and blinking character. These attributes can be set and reset for the different areas of the display screen. VM/SP support for color enables the user to select colors for CP messages, virtual machine output, redisplay of user input, user input area and the CP status area.

**Support for the 3880 Storage Control Models 1, 2 and 3**

**Support for the 3800 Printing Subsystem as a Virtual Spooling Device:** The VM/SP will allow extended use of the font, image and copy capabilities of the 3800 Printing Subsystem. A user is able to print a file on a real 3800 or on any real spooling device supported by CP Spooling running in conjunction with the VM/SP.

**Dedication of Remote 328X Printers:** Remote bisynchronous 328X printers can now be dedicated to guest machines. This support further allows the Remote Spooling Communication Subsystem (RSCS) program product to spool and print VM/370 files on the 328X printers. (For further information, see the RSCS documentation.)

**Support for the 3289 Printer Model 4:** The 3289 mdl 4 is a 400 line-per-minute printer, functionally compatible with the 3203 Printer mdl 4 except in the area of UCS buffer load.

**Support for the 3262 Printer Models 1 and 11:** The 3262 mdls 1 and 11 are, respectively, 650 and 325 line-per minute printers.

**Support for the 3262 Printer Model 5:** The 3262 mdl 5 is a channel-attached 650 lines-per-minute printer functionally compatible with the 3262 mdl 1.

**Support for the 4245 Printer Model 1:** The 4245 Printer mdl 1 is a channel-attached, 2,000 line-per-minute printer.

**Support for the 8809 Tape:** The 8809 is a two-speed tape drive (12.5 ips and 100 ips). It is supported at 12.5 ips in VM/370. The stand-alone dump-restore utility (DDR) supports the device at 100 ips to provide high-speed backup capability when executing on a stand-alone processor and 3310/3370 DASD.

**Support for the 3310/3370 Direct Access Devices:** The 3310/3370 are direct access devices that use Fixed Block Architecture. The Direct Access Storage Compatibility Feature (#7901) of the 4331 Processor for emulation of 2314, 3330 or 3340 format data on the 3310 or 3370 is supported. VM/SP supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system other than VM/SP or CMS.

**PROGRAM PRODUCTS**
**VM/SP (cont'd)**

**3380 DASD Support:** VM/SP supports the 3380 Direct Access Storage with the 3880 Storage Control mdls 2 and 3, using the Data Streaming Feature on the 3031, 3032 and 3033 Processors, or attached to a 3MB channel on the 4341 and 4381.

The 3380 DASD is supported by VM/SP as a paging, spooling, SYSRES, T-disk or mini-disk device and as a device dedicated to a virtual machine operating system that supports the 3380 DASD.

The 3380 DASD offers a new level of reliability and performance, with increased capacity for online data storage.

**Note:** VM/SP does not support the dynamic path selection capability of the 3380 DASD mdl A4.

**Missing Interrupt Handler:** System I/O activity is monitored to detect interrupts not occurring within an installation specified period of time. An attempt at corrective action is made and a message is sent to the system operator to advise of the results.

**Note:** Missing Interrupt Handler support for Release 2 of VM/System Product is available 4Q 1982.

**CUSTOMER RESPONSIBILITIES**

- Ordering and installing all of the required communications facilities.
- Generating the appropriate 3704/3705 Communications Controller programs.
- Allocating and formatting direct access storage space for the VM/SP control program, the CMS system residence area and user work areas.
- Generating and updating user directory and virtual machine descriptions.
- Making the final evaluation as to which programs should be run under VM/SP in his environment.
- Training personnel to operate the VM/SP system.
- Teaching users VM/SP commands and how to operate the remote terminals.

**Note:** To run SVS under the VM/System Product, PTF UY77568 must have been applied to the SVS system.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

VM/System Product is designed to run on IBM S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155II, 158, 158-3, 158AP, 158MP, 165II, 168, 168-3, 168AP, 168MP and on the 4321, 4331, 4341, 4361, 4381, 3031, 3031AP, 3032, 3033 Model Group N, 3033, 3033S, 3033AP, 3033AP-2, 3033MP and the 2K storage protect version of the 3081 Model D16 Processor Complex. **Note:** Support of the VM/System Product High Performance Option licensed program (5664-173) for VM/System Product Release 3 will be available in first quarter 1984.

VM/SP Release 3 support of AP/MP and the 3081-D16 Processors will be available in first quarter 1984. **Note:** The VM/SP requires as a prerequisite the application of EC #274276 (shipped in June 1980) to the 3031 uniprocessor and 3031 attached processor.

**Real Storage Requirement:** The VM/System Product requires a minimum user accessible storage of 512K.

Minimum machine requirements are listed for information only. Depending upon the number of terminals used, the total workload of the system, and the desired response time, all users should consider increasing real storage size as appropriate.

**Display Terminal Support:** The IBM 3278 mdl 5 and 3279 display terminals are supported.

**Notes**

1. VM/System Product supports a cardless environment. By using the facility to spool accounting records and altering the system generation procedures to use tape devices, the requirement for a card reader/punch can be eliminated. Specific details are contained in the *VM/SP Planning and System Generation Guide*.
2. Specific details relevant to the minimum configuration required for hardware maintenance should be directed to the Field Engineering Division.

**ECPS:VM/370 Support**

Model No.	VM/370	Availability
135-3	Level 18	EC #149136 and later
138	Level 18	EC #149136 and later
145-3	Level 18	EC #356901 and later
148	Level 18	EC #147710 and later
3031	Level 19	EC#274276 and later
3131AP	Level 19	EC#274276/388860 and later
4321	Level 19	At shipment of processor
4331MG1	Level 19	EC 364290 and later

4331MG2	Level 19	EC 364415 and later
4341MG1	Level 19	EC 154315 and later
4341MG2	Level 19	EC 856093 and later
4361	Level 20	at shipment of processor
4381	Level 21	EC 866902 and later

**Notes**

1. The VM/System Product will execute on the 135-3, 138, 145-3 and 148 processors at earlier EC levels, but the hardware assist will not be used.
2. The 3031, 4321, 4331, 4361 and 3031AP Processors support only a subset of ECPS:VM/370 function.
3. If users running the VM/SP on S/370 mdls 135-3, 138, 145-3 or 148 with ECPS for VM/370 also choose to use the shadow table maintenance functions of the VM/SP, they will not realize the full benefit of ECPS. This is because the shadow table maintenance algorithms will be used in preference to some ECPS algorithms.
4. CMS disk I/O (Diagnose 18) has been modified to take advantage of ECPS:VM/370 for CCW translation. The improvement is available with the existing ECPS:VM/370 assist on the S/370 135-3, 138, 145-3 and 148 Processors. The improvement is also available with the ECPS:VM/370 assist on the 4341 and 4381 Processors.
5. The ECPS:VM/370 and ECPS:MVS options on the 4341 Model Group 1 are mutually exclusive. The 4341 Model Group 1 Processor MVS users who have specific throughput or terminal response requirements and who plan to run the MVS/System Products in conjunction with the VM/SP should carefully review their configurations to ensure that executed performance needs are met.
6. The ECPS:VM/370 and ECPS:MVS options may be concurrently utilized on the 4381 and 4341 Model Group 2 Processor, whenever ECPS:VM/370 and ECPS:MVS are both selected at IML time. With this joint selection, functions of the shadow table bypass assist defined in *Virtual Machine Assist and Shadow Table Bypass Assist* (GA22-7074) are included. These functions are designed to enhance the performance of MVS running under VM/370 in a V=R environment with the VM/System Product.

**Shadow Table Bypass Support:** On the 3031 and 3031 AP processors, an engineering change (EC #276271 and later) is available to improve the performance gains of the shadow table function of the VM/SP. Because system performance is dependent on a number of variables, IBM will not warrant that improvement in performance will be realized in all cases where the VM/SP shadow table function is activated.

**SOFTWARE REQUIREMENTS**

VSE/VSAM Release 3 program product support and CMS/DOS services for VSE/Advanced Function Release 3 are supported by VM/SP Release 3.

**COMPATIBILITY**

Application programs that currently execute under the VM/Basic System Extensions program product or the VM/System Extensions program product or the VM/System Product Release 1 and are not dependent on internal CD or CMS structure and/or control blocks, should also run on the VM/System Product Release 2.

For ease of migration, the existing CMS editor continues to be supported in the VM/SP. However, the existing CMS editor EV Migration macros. If he or she desires, the user can invoke the existing CMS editor.

The new VM/SP editor includes among its enhancements some of the functions contained in the Display Editing System (DES) IUP, order number 5796-PJP. Macros are provided to aid users in migrating from DES to the new editor by providing a DES display format for command input. The Macros provide a SYGSET of the EDGAR functions. Not all functions will work exactly as EDGAR native mode.

**CONVERSION**

SPOOL file information has been changed in Release 3. A conversion aid will be available via the SPTAPE function to allow those users who currently have VM/SP Release 1 or Release 2 installed and do not want to perform a COLD start the ability to migrate their SPOOL files to VM/SP Release 3.

VM/SP Release 2 Programmable Operator Routing Tables must be converted to the VM/SP Release 3 routing table format. A CMS EXEC will be provided to aid in this conversion.

Other than the optional compatibility macros announced in VM/SP Release 1, and the above items, no conversion aids are required to move from VM/Basic System Extensions Release 2, VM/System Extensions Release 2, or VM/SP Releases 1 or 2 to Release 3 of VM/SP.



PROGRAM PRODUCTS

VM/SP (cont'd)

**DOCUMENTATION**  
(available from Mechanicsburg)

Title	Order Number
Virtual Machine System Product:	
Introduction	GC19-6200
Glossary and Master Index	GC19-6207
Planning and System Generation Guide	SC19-6201
Operator's Guide	SC19-6202
System Programmer's Guide	SC19-6203
System Messages	SC19-6204
OLTSEP and ERROR Recording Guide	SC19-6205
Terminal User's Guide	GC19-6206
Remote Spooling Communications Subsystems (RSCS) User's Guide	GC20-1816
CMS Command and Macro Reference	SC19-6209
CMS User's Guide	SC19-6210
CP Command Reference for General User's	SC19-6211
Operating Systems in a Virtual Machine	GC19-6212
Interactive Problem Control System (IPCS) User's Guide	GC20-1823
VM/SP Quick Guide for General Users	SX20-4400
VM/SP Commands (General Users) Reference Summary	SX20-4401
VM/SP Commands (Other than General Users) Reference Summary	SX20-4402
EXEC 2 Reference	SC24-5219
System Product Editor User's Guide	SC24-5220
System Product Editor Command and Macro Reference	SC24-5221

RPOs ACCEPTED: No

5664-169 - VM/XA MIGRATION AID RELEASE 1 and 2

PURPOSE

The VM/XA Migration Aid is provided for the MVS user who will be migrating to MVS/XA. It is designed to operate on any 4381 Group 1 and Group 2 Processors, 4381, 3081, 3083 or partitioned 3084 Processor. Its purpose is to support, concurrently, one MVS/SP production virtual machine and one or more MVS/XA test machines. VM/System Product CMS will be supported for VM/XA Migration Aid installation and service, and for MVS/XA conversion requirements. The objectives of the VM/XA Migration Aid are: Maximize performance and provide high availability and recoverability of the MVS/SP production machine ... support one or more MVS/XA test machines with extended test facilities.

RELEASE 2 ENHANCEMENTS

- Support of additional production and test environments (VSE/AF and OS/VS1):  
Support is provided to allow VSE/AF (Release 3 at Service Level 8205 and beyond) and OS/VS1 (Release 7 with Basic Programming Extensions Release 3) to run in non-paging mode either in the V=V area, or to run as a preferred guest in the V=R area. This will extend the capability of the VM/XA Migration Aid to those VSE/AF and OS/VS1 customers who have the need to migrate to MVS/XA.
- Full support for the 3203 mdl 5 Printer:  
Provides full support of the 3203 mdl 5 Printer including error recovery, device simulation, and the printing of SPOOL files.
- Full support for the 3380 and 3375 DASD:  
Provides full support for the 3375 and 3380 for minidisks, utilities (format, directory, dumping and restoring), and for all system data (paging, spooling, tdisk, directory and nucleus) and error recovery.
- Support for the 3088 as a dedicated channel-to-channel adapter:  
Allows use of the 3088 as a dedicated channel-to-channel adapter for the inter-connection of processors.

DESCRIPTION

THE VIRTUAL MACHINE

A virtual machine control program manages the resources of 4381 Group 1 and Group 2 Processors, 3081, 3083 or partitioned 3084 Processor to provide virtual processor, I/O, and storage support through the implementation of virtual machines.

A virtual machine user appears to have the functional capabilities of a dedicated system available (either S/370 or extended architecture). The terminal acts as the virtual systems console for the virtual machine. Other users may be running batch, or testing jobs concurrently, and also having the functional characteristics of dedicated system.

Each user can specify the configuration required; the number, type and I/O addresses of all devices to be used; and from 64K bytes to 999 million bytes of storage, provided sufficient resources are available with the real machine's configuration.

Each user's virtual system comprises an operator's console (the user's terminal), a virtual processor, a virtual storage size ranging from 64K bytes to 999 megabytes, and virtual I/O channels and I/O devices. Virtual machine configurations may also include dedicated transmission control units and channel-to-channel adapters. Virtual I/O devices are controlled by the virtual machine's operating system and not by the VM/XA Migration Aid with the exception of those virtual unit record devices that are spooled by the VM/XA Migration Aid to/from disk. The basic device support for the proper number and type of I/O devices must be generated into the virtual machine's supervisor or nucleus.

- Processor or timing dependencies may not exist. For example there is no reliance on a certain action or activity being completed within a fixed interval of time.
- The Diagnose instruction may not be used for machine control by an operating system running in a virtual machine.
- Limited dynamic modification of channel programs is permitted.

Note: See the *General Information Manual* for further clarification.

THE CONTROL PROGRAM

The control program of the VM/XA Migration Aid creates and controls virtual machines, multiprogramming the resources of the real computer to offer concurrent execution of multiple virtual machines.

All virtual machines execute under Start Interpretive Execution, providing the basic mechanism for control by permitting either the control program or Start Interpretive Execution hardware feature to trap and process all interrupts and privileged instructions.

Execution under the VM/XA Migration Aid does not require communication between the control program and the virtual machine operating system since, subject to the restrictions listed above, the virtual machine interface is that of the real machine. Communication is

available between the virtual machine and the control program through use of the Diagnose interface: The CMS provided utilizes the DIAGNOSE instruction for many operations including I/O operations.

**TIME MANAGEMENT:** The control program periodically gives each virtual machine access to the real processor for a small amount of time, called a "time-slice". Since the primary focus is the preferred virtual machine and since one entire processor is being dedicated to that virtual machine, the scheduling of that virtual machine is straightforward. "Round Robin" scheduling will be used by the 'master' processor which runs all other virtual machines so that each V=V virtual machine will get a share of the processor resource.

**STORAGE MANAGEMENT:** Each virtual machine's storage is created and controlled by the control program as virtual storage and is organized into 4K blocks called pages and 1M blocks called segments. For each virtual machine, the control program creates and maintains a set of segment and page tables to describe the virtual storage and to reflect the allocation in real storage. The active pages from all virtual machines and from the pageable routines of the control program compete for available page frames. When the number of page frames available for allocation falls below a threshold value, the control program determines which virtual storage pages currently allocated to real storage are relatively inactive and initiates suitable page-out operations.

**VIRTUAL I/O MANAGEMENT:** Because virtual machines execute in emulation mode, the control program gains control whenever an I/O instruction is issued by a virtual machine operating system. If necessary the control program copies into its own work area the channel command list, and pages into real storage all virtual storage locations required for data transfer. If a virtual device is a minidisk, any cylinder numbers specified are modified to reflect the true location of the data; the virtual device address number is mapped to the real device address. The virtual machine is given a condition code to indicate the status of the START I/O operation, and the control program reflects the interrupts caused by the I/O operation to the virtual machine.

**SPOOLING:** The control program spooling facilities allow multiple virtual machines to share unit record devices by intercepting and modifying the Start I/O operations to those virtual unit record devices designated as spooled in the virtual machine configuration. The control program uses its paging I/O mechanism to create the disk records which act as intermediate storage between the real unit record devices and the virtual machines.

The spooling facilities allow data files to be transferred between virtual machines or between different operating systems executing at different times in the same virtual machine. In addition, virtual machine console input/output data may be spooled to disk for later printing.

**CONTROL PROGRAM COMMANDS:** The control program commands allow control of the real computing system and the VM/XA Migration Aid and provide user control of virtual machines and associated control program facilities. The control program commands can be used at any time without regard to which operating system is executing in the virtual machine. A user's privilege class(es), defined as part of the virtual machine configuration, define the allowable subset of the control program commands.

EXTENDED ARCHITECTURE SUPPORT

The VM/XA Migration Aid will exploit the extended architecture by providing support for extended real storage, extended virtual storage, hardware assisted emulation for S/370 and extended architecture virtual machines, and the new extended architecture channels.

**LARGE REAL STORAGE:** The VM/XA Migration Aid will support all real storage configurations allowed by the extended architecture (extended architecture provides for offerings of real main storage up to two gigabytes).

**LARGE VIRTUAL STORAGE:** Extended architecture includes a new mode which allows the use of 31-bit storage addresses and one-megabyte storage segments. Extended architecture virtual machines can define storage sizes up to 999 megabytes of storage. The System/370 Extended Architecture virtual machine can use CCWs in either S/370 format (format 0) or extended architecture format (format 1) for its I/O operations. Translated channel programs are always in extended architecture format.

The VM/XA Migration Aid will allow MVS/370 virtual machines to define storage sizes up to 32 megabytes.

**START INTERPRETIVE EXECUTION:** A new instruction, Start Interpretive Execution, is associated with the extended architecture emulation facility. The emulation facility is used by the VM/XA Migration Aid to provide hardware support for several areas of virtual machine operation, such as: Interval timer, prefixing, address translation, and privileged instruction handling.

The VM/XA Migration Aid will dispatch all virtual machines by executing the Start Interpretive Execution instruction. The virtual machine receives control in emulation mode and will continue to

## VM/XA Migration Aid (cont'd)

execute in this mode until an interruption or interception condition occurs.

The VM/XA Migration Aid also simulates the Start Interpretive Execution instruction to allow the VM/XA Migration Aid to be tested and serviced in a virtual machine.

**NEW CHANNEL SUPPORT:** The VM/XA Migration Aid will support the new extended architecture channel interface. At the control unit interface, 3081/3083/3084/4381 channels are similar to S/370 channels. However, at the programming interface, 3081/3083/3084/4381 channels permit the offloading of some function from the SCP to the channels. Many of the S/370 channel functions have been replaced with new ones that are MP and performance oriented. The hardware now handles the alternate path and I/O queuing management.

The I/O supervisor of the VM/XA Migration Aid will use new extended architecture I/O instructions in order to communicate with the channels. In the extended architecture, interrupts are recognized by class instead of by channel. There is no software association of devices to control units or channels. Subchannels are the addressable units in extended architecture and represent individual devices. The new extended channels use new CCW formats allowing addressing up to two gigabytes.

### PRODUCTION MVS/SP VIRTUAL MACHINE

**PREFERRED VIRTUAL MACHINE:** Preferred virtual machine means that the preferred virtual machine executes with minimum interpretive execution. The preferred virtual machine derives performance benefits from a one to one virtual to real storage addressing. The size of this preferred area is specified in megabyte increments and physically begins at absolute zero of real storage.

**Note:** Only MVS/SP version 1 (release 1 with enhancement and release 3) is supported as the preferred virtual machine.

**SET ADDRESS LIMIT:** The integrity of the preferred virtual machine is enhanced by the VM/XA Migration Aid use of the Set Address Limit instruction. Using the Set Address Limit instruction will cause the System/370 Extended Architecture channel hardware to restrict I/O operations for dedicated devices for the preferred virtual machine below its boundary, and restrict for all other I/O above the boundary.

**VIRTUAL S/370 I/O:** The VM/XA Migration Aid supports S/370 architecture virtual machines, with all S/370 I/O operations being automatically intercepted out of Start Interpretive Execution. The virtual I/O simulation routines will recognize an S/370 virtual machine and convert all of its I/O from S/370 to S/370 Extended Architecture I/O operations. The S/370 virtual machine will have no knowledge of the extended architecture processor on which it is running as the virtual I/O simulator will maintain the S/370 interfaces. Virtual S/370 I/O will be simulated as if each virtual device is on a non-shared S/370 subchannel.

**MASTER/DEDICATED MULTIPROCESSING SUPPORT:** Master/Dedicated MP support provides a multiprocessing environment where the 'master' processor performs most VM/XA Migration Aid control program (CP) work, and then runs virtual machines when all control program work is completed. The 'dedicated' processor is used to run only the MVS/SP V1 preferred virtual machine.

**DEDICATED PROCESSOR:** With Dedicated Processor support, the MVS/SP preferred virtual machine is run in the 'dedicated' processor and all other virtual machines are run in the 'master' processor. Dedicated Processor support therefore eliminates all contention from the other virtual machines for that processor's compute power. If the 'dedicated' processor is not used to run an MVS/SP preferred virtual machine, that processor will be placed in an enabled wait state.

**DEDICATED PROCESSOR I/O:** The preferred virtual machine will have a 'fast path IOS' to handle most S/370 SIOF initiation and I/O interrupts without having to go to the 'master' processor.

This is done in a Master/Dedicated MP system by devoting an interrupt subclass to the dedicated devices of the preferred virtual machine. By running the preferred virtual machine on the dedicated CPU enabled only for the dedicated interrupt subclass, the operating system can eliminate the overhead of stacking and unstacking I/O interrupts for other virtual machines and can avoid CPU switching.

**PREFERRED VIRTUAL MACHINE RECOVERY:** The facility attempts to resume execution of the preferred virtual machine after the VM/XA Migration Aid has terminated with an abend and initiated and automatic restart.

### SYSTEM PROGRAMMER TEST FACILITIES

**VIRTUAL MP:** The Virtual Multiprocessor facility will provide functional simulation of a S/370 Extended Architecture multiprocessing computing system. The virtual MP facility is provided through extensions to virtual machine definition, dispatching, and command processing. Console commands are provided to create and destroy, stop, start and query virtual processors.

**Note:** Virtual MP will only be supported for extended architecture virtual machines.

**VIRTUAL MACHINE DEBUGGING:** The debugging facilities of VM/XA Migration Aid will provide a significant tool to aid in debugging a virtual machine or virtual MP in the extended architecture environment. For example:

- A BEGIN command starts execution of the virtual machine's processor (or the virtual extended architecture MP).
- To look at a virtual machine's storage, the DISPLAY facility displays storage at the user's terminal, and the DUMP facility prints storage to the user's virtual printer.
- A STORE command can be used to alter storage and certain architected areas of the virtual machine (such as general registers, control registers, and PSW).

**TRACE FACILITY:** The trace function provides the ability to trace the following events in a virtual machine:

- Any activity against an I/O device or against a range of devices.
- Any storage alteration or alteration within a range of storage. A value may be specified such that the event traced is signaled when that value is set.
- Any general register alteration may be traced with an optional value to be set.
- Selected mnemonics and special instructions can be traced.

**ACCOUNTING:** Accounting records are created when:

- A virtual machine logs off.
- A minidisk, t-disk, or a dedicated device is detached.
- A user application issues a diagnose instruction.
- The operator enters a CP ACNT command.

These records are used to measure the usage of system resources. This information can be used to account for virtual machine resource utilization.

**SYSTEM LOADER:** The VM/XA Migration Aid Loader provides the facility to perform system generation directly under CMS or build a load tape or card deck for system generation as a standalone operation in a S/370 or 370-XA real or virtual machine. System generation directly under CMS is limited to systems which, including their preferred region, will fit within the free storage available within the CMS virtual machine.

**ADDITIONAL FUNCTION:** The following functions, available in the VM/System Product, will be available in this migration aid:

- Channel Check Reflection - for MVS/SP RAS.
- Machine Check Reflection - for MVS/SP RAS.
- Vary Processor - for VM/XA Migration Aid RAS.
- VMCF - for the VM/XA Migration Aid recording and accounting.
- VMSERV - for the VM/XA Migration Aid service.

### VM/XA MIGRATION AID DEVICE SUPPORT LIST

#### Supported DASD:

- 2305 mdl 2
- 3330 mdl 1, 11
- 3333 mdl 1, 11
- 3340
- 3344
- 3350 mdl A2, B2, C2
- 3375 (Dedicated Only)
- 3380 (Dedicated Only)
- 3850 (Dedicated Only)

#### Supported DASD Control Unit:

- 2835 mdl 2
- 3830 mdl 2, 3
- 3851 (Dedicated Only)
- 3880 mdl 1
- 3880 mdl 2, 3, 11, 13 (Dedicated Only)
- 3880 Speed Matching Buffer (Dedicated Only)

#### Tapes Supported:

- 3420 mdl 3, 4, 5, 6, 7, 8

#### Tape Control Unit Supported:

- 3803

#### Printers Supported:

- 1403 mdl 2, 3, 5, N1
- 3211 mdl 1
- 3262 mdl 1, 5, 11

PROGRAM PRODUCTS

**VM/XA Migration Aid (cont'd)**

3800 (Dedicated Only)  
4245 mdl 1

**Readers/Punches Supported:**

3525 mdl P1, P2, P3  
3505 mdl B1, B2  
2540 mdl 1  
2501 mdl B1, B2

**Unit Record Control Unit Supported:**

3811  
3505  
2821

**Display Printers Supported:**

(Key operator initiated copy only)

3287 mdl 1, 1C, 2, 2C  
3286  
3284  
3288  
3289 mdl 1, 2

**Terminals/Consoles Supported:**

3277 mdl 2  
3278 mdl 2, 3, 4  
3279 mdl 2A, 2B, 3A, 3B (4 Color Only)

**Terminal Control Unit Supported:**

3274 mdl 1B, 1D  
3274 mdl 21B, 21D, 31D  
3272 mdl 2

**Transmission Control Unit Supported:**

3704 (Dedicated Only)  
3705 (Dedicated Only)

**Miscellaneous Supported:**

CTCA (Dedicated Only)

**ALTERNATE PATH SUPPORT:** The control required for alternate path management is provided by the extended architecture channels.

**DEDICATED DEVICES:** Dedicated devices can be accessed through multiple paths by a virtual machine if there are multiple paths to the real device. Minidisks and simulated devices however will be accessible only through the first path. The Channel Path Identifiers will be the same for the dedicated device as for the real device which supports it.

**Note:** Support for 3340 and 3344 alternate tracks is only provided in dedicated mode by the virtual machine.

**CUSTOMER RESPONSIBILITIES**

- Allocating and formatting direct access storage space for the control program and the CMS system residence area.
- Generating and updating user directory and virtual machine descriptions.
- Making the final evaluation as to which operating systems should be run under the VM/XA Migration Aid in the customer's environment.
- Generating the VM/XA Migration Aid system.
- Training personnel to operate the system.
- Teaching users VM/XA Migration Aid commands.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The VM/XA Migration Aid is supported on all models of the 4381 and 308X Processors operating in 370/XA mode to provide multiple MVS/XA testing environments.

**STORAGE ESTIMATES:** The resident nucleus for the VM/XA Migration Aid will be approximately 1M, and the minimum supported storage size will be 4M.

**SOFTWARE REQUIREMENTS**

Assembler H Version 2 Release 1 (5668-962) is required for system generation of the VM/XA Migration Aid and for the service of this product.

**PROGRAM INTERFACES:** The VM/XA Migration Aid Release 1 will support only the following systems:

- MVS/System Product Version 1 (JES2 or JES3) in a V=R preferred area in UP mode.
- MVS/XA in a V=R preferred area in UP mode.
- VM/SP in a V=R preferred area in UP mode.

- VM/SP High-Performance Option in a V=R preferred area in UP mode.
- MVS/System Product Version 1 (JES2 or JES3) in a V=V area in UP mode.
- VM/SP in a V=V preferred area in UP mode.
- VM/SP High-Performance Option in a V=V area in UP mode.
- MVS/XA in a V=V area in UP or virtual MP mode.
- VM/XA Migration Aid in a V=V area in UP or virtual MP mode.
- CMS in a V=V area.

**Note:** MVS System Product means either MVS/SP Release 1 enhancement or Release 3 and later releases.

The VM/XA Migration Aid Release 2 is designed to support the following operating systems as virtual machines:

- All of the Release 1 environments plus:
  - OS/VS1 in a V=V or a V=R preferred area in UP mode.
  - VSE/AF in a V=V or a V=R preferred area in UP mode.

**PACKAGING:** The VM/XA Migration Aid will be shipped with the combined components of:

1. VM/XA Migration Aid Control Program
2. VM/XA Migration Aid CMS
3. Dump Viewing Facility

**COMPATIBILITY**

While the VM/XA Migration Aid is a Virtual Machine Facility, its functions will not be equivalent to any of IBM's VM/370 Products. For example, VM/XA Migration Aid does not support:

1. The following devices (except when used in a dedicated mode by an MVS Virtual Machine)
  - 3375
  - 3380
  - 3800
  - 3850
  - 3705
2. Interactive Networking
3. Program products (excluding RSCS, Pass-Thru Virtual Machine, Remote 3270 Display Option and Assembler H Version 2)
4. Remote terminals (other than through Pass-Thru Virtual Machine program product with the Remote 3270 Display Option program product)
5. Monitoring facilities
6. CMS use other than for installation and service of the VM/XA Migration Aid, and migration from MVS/SP to MVS/XA

The VM/XA Migration Aid user is an MVS customer who is ready to migrate to MVS/XA and would like to continue MVS/SP production work while testing MVS/XA and associated subsystems. On a 3081 Processor, MVS/SP, MVS/XA, VM/SP or VM/SP High Performance Option may run as the preferred virtual machine on one processor of the complex, and cannot be run in virtual AP or MP mode. The test virtual machines and CMS activity will run on the other processor of the complex.

**FIELD ENGINEERING CONSIDERATIONS**

**IMPROVED RAS:** This product uses some of the 4381 Group 1 and Group 2 Processor or 308X hardware RAS features to provide system availability enhancements and to put emphasis on recovery. The following will have a positive effect on RAS:

- Reflection of machine checks to S/370 virtual machines.
- Preferred Virtual Machine Recovery.
- Extended Architecture channel processor.
- Set Address Limit.
- CP trace table entries.

**RELIABILITY**

**MACHINE CHECK REFLECTION:** This function reflects machine checks to the MVS/SP preferred virtual machine to improve the reliability and availability of the preferred virtual machine.

**ERROR RECORDING:** EREP records are created when I/O and machine errors occur. These error records are built by the CP modules that handle error recovery. An analysis of these records can provide valuable information concerning current and potential hardware problems.

## VM/XA Migration Aid (cont'd)

### AVAILABILITY

**SCHEDULER:** The objective for the scheduler in the VM/XA Migration Aid is the support of a specific environment: The migration of MVS/SP to MVS/XA. There will be no external controls in the VM/XA Migration Aid since the environment is very specific. Since the primary focus for performance is the preferred virtual machine and one entire processor is being dedicated to that virtual machine, the scheduling of that virtual machine is straightforward. "Round Robin" scheduling will be used on the 'master' processor which runs all other virtual machines so that each virtual machine will get a share of the processor.

**VIRTUAL MACHINE TERMINATION (SOFT ABEND FUNCTION):** In order to reduce the number of system terminations, every attempt will be made to isolate an error to a virtual machine. That virtual machine will be reset or the error will be reflected to the virtual machine via machine check or I/O error. In some instances, diagnostic information will be taken and the system will continue operation.

**MISSING INTERRUPT DETECTOR:** The VM/XA Migration Aid will have a missing interrupt detector. The MVS missing interrupt handler will be able to take appropriate actions for any of its missing interrupts. The time intervals will be based on the device type. Upon detection of a missing interrupt, the operator will be notified.

**HOLD AND FREE COMMAND:** A LOGON option can be used to prevent a user from logging on to the VM/XA Migration Aid. If an installation has a user that repeatedly causes system abends, that user can be denied access to the VM/XA Migration Aid by using the HOLD LOGON command, until the problem is solved. When the problem is solved, access can be restored via the FREE LOGON command.

**PREFERRED VIRTUAL MACHINE RECOVERY:** This facility attempts to resume execution of the preferred virtual machine after the VM/XA Migration Aid has terminated with an abend and initiated an automatic restart.

### SERVICEABILITY

**MAINTENANCE AND SUPPORT SYSTEM FACILITY (MSSF):** MSSF support will be included in this product. In addition, limited support is provided for handling the MSSF commands when they are issued by a virtual machine. Some MSSF commands will be fully handled by the VM/XA Migration Aid product for a virtual machine. Other MSSF commands may be issued by the virtual machine but will have an error response indicated.

**ABNORMAL TERMINATION DUMPS:** Abnormal termination (ABEND) dumps may be taken when the control program (CP) detects internal errors. There are two types of ABENDS, hard and soft. A hard ABEND is taken when an error condition is detected that cannot be isolated to a single virtual machine or system integrity is endangered. A soft ABEND is taken when an error can be isolated to a single virtual machine or when system integrity is not endangered. When a hard ABEND is taken, optionally all control program storage may be written onto the dump device, and then the system is optionally warm started. When a soft ABEND is taken, only selected pages of control program storage are written into a spool file and the affected virtual machine is given a system reset. The affected virtual machine is notified, if possible.

**STAND-ALONE DUMPS:** A stand-alone dump utility (S/A DUMP) will be provided with the VM/XA Migration Aid. There will be versions of the S/A DUMP utility that can be IPLed from any supported TAPE device or control program formatted DASD device that is not a control program SYSRES device. The VM/XA Migration Aid stand-alone utility will support the use of the IPL device as the dump device for tapes. The output devices supported by the S/A DUMP utility will be tape and printer (except advanced function printers such as the 3800).

**VM/XA MIGRATION AID CMS:** VM/XA Migration Aid CMS will be supported only for the service, installation and conversion requirements of the VM/XA Migration Aid. No program products, IUPs, or FDPs that run under CMS, except RSCS, PVM, the Remote 3270 Display Option and the Assembler H program product, will be supported.

**SERVICE:** The VM/XA Migration Aid will use the PLC type modification concept, and there will be no versioned modules in the control program.

**CP TRACE:** The CP TRACE facility maintains a history of system activity by recording events in a trace table. Two types of events are tracked:

1. Control Program Events - Significant activities within control program. Examples are resource allocation/deallocation and privileged operation simulation.
2. I/O Events - I/O device activities. Examples are I/O operation initiation and I/O interrupts.

Each event is recorded as a trace table entry using the extended architecture TRACE instruction. A trace table entry contains a trace table entry code, a time stamp and up to 20 bytes of event-unique information. The trace table entry code defines the event being traced, and the time stamp reflects the time-of-day when the entry was made. Each trace table entry will have a CPU identifier.

### EXECUTION CHARACTERISTICS

**START INTERPRETIVE EXECUTION:** Start Interpretive Execution will provide many benefits to the virtual machine environment such as privileged instruction handling, prefixing, and timer handling. (Start Interpretive Execution will also take care of the function provided by shadow tables.) Once a virtual machine is dispatched under Start Interpretive Execution, the control program need not get involved unless there is an I/O interrupt, an external interrupt, or an intercept condition.

**EXTENDED ARCHITECTURE CHANNEL GROUP:** The System/370 Extended Architecture channel group allows much of the function in the I/O Supervisor to be done by the floating channel group microcode. In addition, since any device can be accessed by any processor, the control program overhead for path selection and processor affinity will be deleted.

**LARGE REAL STORAGE:** Extended architecture allows up to 2 gigabytes of real storage.

### SERVICE PROGRAMS

**DIRECTORY PROGRAM:** The VM/XA Migration Aid directory program will run only under CMS.

**LOADER:** The VM/XA Migration Aid loader can be run in S/370 mode or System/370 Extended Architecture mode.

**FORMAT/ALLOCATE:** The VM/XA Migration Aid format program can only be invoked as a CP command.

**DASD DUMP RESTORE:** This service routine has two versions, one that runs stand-alone on a S/370 mode machine, and one that runs under CMS.

### SECURITY

The VM/XA Migration Aid will include several facilities to ensure the security and integrity of the system. Minidisk security will be provided by a password facility to control both read-only and read-write access. The VM/XA Migration Aid will examine channel programs to determine if the access mode is being violated by the channel program.

The password will not be shown on the command lines for LOGON and AUTOLOG. For the LOGON command, the password must be entered where the area is print inhibited. For the AUTOLOG command, there is no password. The directory entry for the autologged virtual machine will indicate that the virtual machine can be autologged on and the userid of the virtual machine that can autolog it on.

### DOCUMENTATION

(available from Mechanicsburg)

*VM/XA Migration Aid General Information* (GC19-6213), is available. Additional publications will be available at general availability.

PROGRAM PRODUCTS

**VM/SYSTEM PRODUCT HIGH-PERFORMANCE OPTION  
5664-173**

**PURPOSE**

VM/SP High-Performance Option is a performance-oriented extension to VM/System Product for the high-end user. It is recommended for users who can utilize the capability of the 308X Processor Complex; users who can benefit from performance and RAS enhancements to MVS guest machine environments; and users who can benefit from performance enhancements in the CMS intensive environment.

**DESCRIPTION**

**RELEASE 1**

- Support for the Segment Protection Extension to VMA on the IBM 308X Processor Complex.

This enhancement utilizes the Segment Protection Extension to VMA on the IBM 308X Processor Complex to reduce overhead incurred in managing segments shared among users.

Shared segments are defined as read-only sections of data and executable code. In previous VM/SP systems and on processors without this VMA extension, segment protection is provided by a software scan to check if a segment was modified by the last user of the segment. By utilizing the new microcode assist on the 308X, the VM Control Program scan for a changed page has been eliminated. In addition, duplication of shared pages, page tables, and swap tables that would otherwise have been required for a dyadic processor has been eliminated, making more real storage available for user applications in the CMS environment.

This reduction in overhead is expected to improve performance in CMS environments when protected shared segments are in use.

**Note:** VM/SP High-Performance Option Release 1 runs only on the 2K storage protect key version of the model D16 of the IBM 3081 Processor Complex. All other models of the 3081 are supported by Release 2 of the High-Performance Option.

**RELEASE 2**

- 308X Processor Complex Support

The VM/System Product High-Performance Option supports all models of the 3081, 3083 or partitioned 3084 Processor Complex operating in S/370 mode.

Support is accomplished by providing 4K Storage Protection Key support for VM/SP High-Performance Option and guest operating systems. On these processors, only 4K storage protection can be invoked. The appropriate level of the guest SCP which supports the 4K storage protection keys is required (e.g., MVS/SP Version 1 Release 1 Enhancement, MVS/SP Version 1 Release 3, or VM/SP Release 2 as a guest under VM/SP High-Performance Option).

VM/SP (with or without VM/SP High-Performance Option) continues to provide 2K Storage Protection Key support for the 2K storage protect key version of the 3081 model D16 (as well as other 2K key processors), allowing operation of guest systems that use 2K storage protection (for example, DOS/VSE, VS1, MVS 3.8, etc.).

**Note:** It is IBM's direction to support VSE/AF and VS1/BPE as guests under VM/SP High-Performance Option on machines with 4K storage protection keys.

- Preferred Machine Assist Support

In conjunction with hardware and microcode, the Preferred Machine Assist support offers a new mode of operation on the 3033 and 308X Processor Complexes. In this mode of operation the preferred MVS/SP guest (MVS/System Product Version 1 Release 1 Enhancement and subsequent releases) is in direct control of the processor, dedicated channels, and I/O devices if VM/SP services are not required.

The preferred MVS/SP guest operates in supervisor state. It can start and retry I/O operations, process I/O interrupts and initiate error recovery operations directly. The direct control of hardware resources eliminates the VM/SP overhead associated with instruction simulation and indirect I/O operations.

The Preferred Machine Assist further permits the MVS/SP V=R preferred guest (MVS/System Product Version 1 Release 3 and subsequent releases) to use storage in excess of 16 MB on the 3033 and 308X Processor Complexes. This allows additional performance potential for storage constrained MVS/SP preferred guests.

Since Preferred Machine Assist allows an MVS/SP V=R virtual machine to operate in supervisor state and utilize the 3033 Extension Feature, previous restrictions to using Single Processor Mode (SPM) or Non-Disruptive Transition (NDT) functions while running MVS/SP Version 1 Release 3 are eliminated.

- Support for the 3033 Extension Feature Enhancement to VMA

VM/SP High-Performance Option allows those 3033 users having the 3033 Extension Feature (#6850) to increase performance of an MVS/SP guest machine (MVS/System Product Version 1 Release 3 and subsequent releases). This also removes existing restrictions to use of Single Processor Mode (SPM) or Non-Disruptive Transition (NDT) for customers installing MVS/SP Version 1 Release 3 on a 3033 with the 3033 Extension Feature. 3033 Extension Feature Enhancement to VMA is required for this capability.

VM/System Product High-Performance Option also supports the newly announced ECPS:MVS enhancement for the 4341 Model Group 2 and 4381 Processors.

- Additional Support for the 3033 Models U24 and A24

The 4K Storage Protection Key support in VM/SP High-Performance Option allows all 24 MB of storage on 3033 models U24 or A24 to be configured online. This support allows the VM/SP installation to dynamically reconfigure storage to meet workload and maintenance requirements.

Previously VM/SP would not IPL if any of the storage physically beyond the first 16 MB were configured online. This restriction held even if the storage above the physical 16 MB line were assigned to logical addresses under 16 MB via a configuration panel (for example, to temporarily replace damaged storage).

VM/SP High-Performance Option removes this restriction and also allows a model 2 Attached Processor Complex (a 3033 A24 and a 3042 model 2) to be split into two uniprocessors with VM/SP on either or both sides and utilize all of storage.

As with the 308X, this support is provided only for guest operating systems using 4K storage protection. Guest operating systems using 2K storage protection continue to be supported on the 3033 models U24 and A24 by configuring the storage above 16 MB offline.

- Enhanced Availability in the MVS/SP V=R Environment

This addition to VM/SP increases the availability of MVS/System Product (MVS/SP) by preserving the V=R virtual machine environment in the event of a Control Program (CP) failure. If CP terminates with an ABEND, an attempt is made to save the MVS/SP V=R virtual machine status, to automatically re-IPL VM/SP, and to resume execution of the MVS/SP V=R guest.

When the MVS/SP V=R virtual machine is operating in Preferred Machine Assist mode, additional recovery capability is available. In most cases where CP enters a disabled wait state, an attempt is made to pass control to the preferred guest. The preferred guest can then continue in native state until the operator re-IPL's VM/SP.

Information about operational considerations will be available in *Operating Systems in a Virtual Machine* with the availability of VM/SP High-Performance Option Release 2.

- Operational Enhancements to Single Processor Mode

These operational enhancements facilitate transition to and from Single Processor Mode. They allow an installation to vary use of the second processor in an AP, MP, or dyadic complex between the Control Program (CP) and the MVS/SP V=R virtual machine without a re-IPL of MVS/SP.

**RELEASE 3**

- Support for up-to-32 MB by CP

VM/SP High-Performance Option allows use of up-to-32 MB of real storage by the Control Program (CP). This will give CP additional storage to augment the dynamic paging area for guest machines and will provide relief for installations which are currently constrained by storage capacity. The Extended Addressing Enhancement to VMA RPO is required on the 3033.

- Support for the 3880 model 11

VM/SP High-Performance Option will provide support for the new IBM 3880 Storage Control model 11.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The VM/System Product High-Performance Option is designed to run on the IBM S/370 models 1551I, 158, 158-3, 158AP, 158MP, 1651I, 168, 168-3, 168AP and 168MP; on the IBM 4341, 4381, 3031, 3031AP, 3032, 3033U, 3033N, 3033S, 3033AP, 3033AP-2 and 3033MP Processors; and the IBM 3081, 3083 or partitioned 3084 Processor Complex in S/370 mode.

**Real Storage Requirements:** For a VM/SP system that is running VM/SP High-Performance Option, a minimum of 1 MB real storage is required.



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Nov 83

PROGRAM PRODUCTS

**VM/SP High-Performance Option (cont'd)**

**SOFTWARE REQUIREMENTS**

**Prerequisites:** VM/System Product Release 1 is a prerequisite for VM/SP High-Performance Option Release 1 and 2. VM/SP Release 2 is a prerequisite for VM/SP High-Performance Option Release 3. (Note: VM/SP High-Performance Option does not support the Small CP option for VM/System Product).

**COMPATIBILITY**

Application programs that currently execute under the VM/System Product and are not dependent on Internal CP or CMS structure and/or control blocks, should continue to run on the VM/System Product with VM/SP High-Performance Option.

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**PROFESSIONAL OFFICE SYSTEMS (PROFS)  
5664-176**

**PURPOSE**

The Professional Office System is designed to provide a comprehensive and easy-to-use set of office system and principal support functions for non-DP and DP users. Operating as a VM/SP application program, PROFS offers a wide range of automated office functions for the executive, professional, and secretary. Electronic preparation, storage, retrieval, and dissemination of office correspondence within a single system or across multiple VM/SP systems can contribute to increased productivity and improved communications.

**HIGHLIGHTS**

The PROFS licensed program is based on and extends the functions of the PROFS Programming RPQ. IBM will withdraw from marketing the PROFS PRPQ, 5799-BEX (P09033), at the availability of the PROFS licensed program, 5664-176. The PROFS licensed program can produce major benefits for users including the potential for:

- Improved productivity because of enhanced communications among PROFS users via the PROFS document library, as well as communications with VM/CMS users via the VM/SP R2 SEND-FILE and RECEIVE functions, and message facilities.
- Increased principal, secretarial, and clerical productivity by using the PROFS document filing, search, and retrieval capabilities.
- Increased principal, secretarial, and clerical communications and productivity by using the scheduling services in PROFS.
- Improved text production with PROFS through simplified use of the VM/SP editor and the Document Composition Facility (DCF) together with proofreading facilities.

Significant capabilities of PROFS include:

- Easy-to-use 3270 display interface
- Support for line-mode devices
- Message exchange among users
- People and facilities scheduling
- Facilities for informal notes or formal documents
- Document preparation aids
- Document formatting and printing
- Online information filing, search, and retrieval
- Electronic document distribution
- Electronic routing slips
- Online help information
- A follow-up/action function
- A remind function
- Spelling verification and word usage aid

Enhanced capabilities of the licensed program are:

- Improved 3270 menus, screens, messages and HELP text
- Improved calendar and scheduling facility
- Spelling, linguistic and composition aids
- Additional problem determination aids
- Restructured publications for ease-of-use
- Customer '800' telephone line to report program defects

**DESCRIPTION**

**3270 User Interface:** PROFS offers a broad range of office and personal services functions. Selection and invocation of these functions is simplified through a set of menu and information entry/display screens, and the 'help' facility. The screens are designed to guide the inexperienced user through PROFS and to also provide fast access to the desired function for the more advanced user.

Many screens are used to present a list of choices for user selection. For example, the first screen in PROFS shows a selection list of major functions. The user selects the desired program function key corresponding to the desired function. An alternate method of selection through commands can be used by more experienced users to go directly to a desired function without the aid of menu screens.

Additional information about PROFS functions is available to the user through messages and the 'help' facility. Messages are used to advise about the status of a requested function and to alert about entry errors. The user can also invoke the 'help' facility to obtain 'how to' information about PROFS functions.

**Line-Mode Device Support:** There are commands available to PROFS users with line-mode devices. These commands, a subset of the PROFS commands available to 3270 users, will help the user create, send, and process memos, notes and messages, as well as help the user maintain the in-basket, mail log, and note log.

**Document Preparation:** PROFS provides facilities which simplify the entry, change, and correction process for documents with simple format requirements. The PROFS document preparation facility uses IBM-supplied or customer-tailored formats to prompt the person creating a document for standard information such as addressee, subject, reference, copy, list, etc. Author information such as name, title, and department can be automatically inserted via the PROFS author profile facility.

Formatting controls may be entered by the user, although most format controls for basic documents (memos and letters) are provided automatically.

On completion of the document, PROFS lets the user print, mail, file, delete, set aside temporarily, distribute drafts for review, or further update the document.

**Proofreading:** PROFS also provides a comprehensive set of proofreading services to help correct spelling errors and improve usage of words. It can be used to improve user documentation in several ways:

- Spelling verifications and spelling aid
- Synonyms
- Confusable word usage aid
- Phrase checking
- Dictionaries

The spelling verification and spelling aid facilities can be invoked for any document. Once invoked, spelling verification will cause any misspelled words to be highlighted. The user can correct the misspelled word or invoke the spelling aid that shows the most probable correct spelling for the word. The correctly spelled word will replace the misspelled word when selected by the user.

The synonym facility is based on the American Heritage Dictionaries published by Houghton Mifflin Company. It can be used for any word in a document and will display a list of synonyms if available. Any of the synonyms can be selected to replace the word in the document. PROFS uses Roget's II The New Thesaurus, copyright 1982 by Houghton Mifflin Company, for its list of synonyms.

The confusable word usage aid is used to determine if homonyms (words that sound the same or similar, but are spelled differently), have been used correctly by the author. Incorrect or suspicious usage is highlighted.

The phrase checking facility highlights phrases in the document which are awkwardly worded.

The dictionary facility contains medical, legal, American English and United Kingdom English dictionaries. One or more personal user dictionaries can also be created and maintained through the facility. These personal dictionaries can contain as many words as the user wishes to have recognized by the spelling verification facility.

**Document Storage, Distribution, and Receipt:** PROFS library services provide a central storage point for documents. Library services allow documents of different types, different access controls, and distribution controls to be placed in and retrieved from the PROFS library. Documents are kept in the library and need only be present temporarily on a user's personal storage for such things as viewing, printing, or updating. PROFS manages the task of document storage and flow control.

PROFS distribution functions allow PROFS users to send documents to other PROFS users. System and RSCS printers can be used to print documents for delivery through normal mail services outside of PROFS. PROFS uses RSCS and the VM/SP services to distribute and receive information from other PROFS systems.

Documents which require the attention of another person may be forwarded with an appropriate routing slip attached. Documents may also be restricted from further distribution.

The document receipt function lets recipients view, print, file, or forward the document to another user, as well as hold it for review at a later time.

The acknowledgement of mail receipt is provided for mail that flows between PROFS users. A person's mail may be forwarded to another user, to himself or another system, or to a printer to be printed and delivered.

**File, Search, and Retrieval:** Documents in the PROFS library are indexed so that they can be located using a variety of search terms. Information about the document such as author, date, subject, and addressee, is extracted for indexing when a document is created. Other identifying information, such as searchable key-words, can be provided as needed by the document originators and recipients.

Documents that meet the user-specified search criteria may be viewed at the terminal, printed, forwarded, or retrieved to the user's personal storage. Draft documents can be retrieved, changed, and refiled in the PROFS library.

Index records can also be maintained for documents that are not created by PROFS. The physical location of externally stored documents may be determined by utilizing the search facility. The index record can be mailed by PROFS and have a routing slip associated with it.

**Formatting and Printing:** Actual document formatting is performed by DCF. PROFS helps the user by using predefined formatting controls and printing options. For some applications, formatting will be controlled by customer pre-defined formats. Special formats will

## PROFS (cont'd)

require end-user specification of DCF format controls and/or GML tags.

Documents can be printed on VM/SP system and RSCS-supported printers. An interface is provided for adapting output for final printing on 6670 and 6640 devices. Printing specifications, such as number of copies and printer type, can either be selected from screen menu options or can be preset for each printer.

**People and Facilities Scheduling:** PROFS users can establish a personal calendar for scheduling appointments and meetings, recording daily diary items, planning vacations, or setting up 'to do's'.

Appointments may be added, changed, and deleted at any time. Users, through the System Administrator, can specify who can view or update their individual calendars. Appointments can be made confidential or personal so they are not viewable by others. Calendar entry descriptions may be updated and used as a diary.

The display function provides the capability to view the calendar for a day or a month at a time, and to page forward or backward to a desired day or month. Daily or monthly schedules may be printed.

PROFS calendar provides a powerful function which helps the user schedule meetings involving groups of PROFS users. Date range for the meeting as well as duration and meeting attendees may be specified. PROFS then searches for available time slots on all attendees' schedules. When the user selects from these possible times, a notice is sent to each attendee, showing time, purpose and location of the meeting, and who scheduled it. The user can also search for open times within a date range, based on the amount of open time required.

**End-User Services:** Besides providing the support functions noted above, PROFS has several 'service' functions that help people do other administrative tasks. One such function is the PROFS scheduling facility, described above. Following are other services:

**Notes and Message Facilities:** Short, informal communications can be routed between users when there isn't a need for a memo or letter.

Notes can be saved, responded to as they are read and forwarded to others. Both messages and notes may be sent to a list of people. PROFS nicknames may be used in the addressing of this electronic correspondence.

With the message facility, a user can have an interactive 'conversation' with other active users.

**Online Help Facility:** Many of the menus in the system have several levels of information to help the user understand what can and cannot be done.

**Follow-up File:** As part of the mail handling facility, PROFS lets users assign due dates to documents for follow-up. These dates can also be used as search arguments.

**Remind Function:** A reminder function is available to display a message on the user's terminal at a preselected time. The message is accompanied by an audible tone, if available. The message may optionally be repeated at a specified interval up to nine times.

**Security of Documents and Calendars:** PROFS runs in its own virtual machines and the library contents are owned by PROFS. Therefore, both PROFS and its libraries receive the normal protection of the virtual machine environment. The functions of PROF, as used in inter-virtual machine communications and PROFS, qualifies general users requesting access to members of the library as follows:

When a document is stored, the author can specify that it may be retrieved and viewed only by the author or the person(s) to whom it was sent. Calendars may be viewed and/or changed only by those individuals specifically authorized.

User management is responsible for the selection of all security features and for appropriate application, adequacy and administrative controls. Where natural-language text and/or data is to be transmitted via public communications facilities, management may wish to consider the use of encryption.

### CUSTOMER RESPONSIBILITIES

Installation of PROFS will require system programmer and system administrator resources. There should also be a knowledgeable individual available for user guidance in text creation and administration. In addition, the establishment of competency groups (e.g., administration centers, word processing centers, help centers) may be required for specialization and user assistance.

**Installation:** Installation of a licensed program is the customer's responsibility.

PROFS is a set of load modules, CMS EXECs, text decks, and supporting files. A VM/SP nucleus generation is required to install PROFS.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

PROFS is designed to operate on any currently supported VM/SP IBM S/370, 4331, 4341, 4361, 4381, 303X, 308X in S/370 mode only, 3084 in partitioned processing mode only or 4321 Mdl J11 or larger Processor with a minimum main storage size of one megabyte. A DASD device which is supported by VM/SP is also required. One 9-track tape drive is required to install PROFS.

Device support under PROFS is provided through the VM/SP and RSCS Networking program products. This support consists of the following:

- 3270 Display Stations

PROFS supports IBM 3270-type display terminals with at least 24 lines.

PROFS supports the following IBM display stations:

- 3275 mdl 2
- 3276 mdls 2, 3, and 4
- 3277 mdl 2 (local and remote attachment)
- 3278 mdls 2, 3, and 4
- 3279 mdls 2A and 3A
- 3279 mdls 2B and 3B in 4-color compatibility mode

The following keyboards are supported:

For 3275 or 3277 Display Stations

- 78-key Operator Console (feature #4632)
- 78-key EBCDIC Typewriter (feature #4633)
- 78-key EBCDIC Typewriter/APL (feature #4638), when operated with APL switch off

For 3276, 3278, or 3279 Display Stations

- 75-key EBCDIC Typewriter (feature #4621)
- 87-key EBCDIC Typewriter (feature #4627)
- 87-key EBCDIC Typewriter/APL (feature #4626), when operated with APL switch off
- 87-key EBCDIC Typewriter/TEXT (feature #4629), when operated with TEXT switch off

The standard character set (94 graphics plus blank and null) is supported on 3276 and 3278 Display Stations.

The following are supported, but not required:

- Audible alarm (feature #1090)
- 3277 dual-case character set (RPQ #8K0366)

- 2741 Communication Terminal
- 3101 Display Terminal (e.g., Teletype Mdl ASR 33/35)
- 328X Printers through RSCS
- 7436 Printer (Supported as a 3287)
- VM/SP System Printer (e.g., 1403, 3211, 3800)
- Communicating Mag Card Selectric Typewriter as a 2741
- An interface for adapting printer output for final printing on the 6670 Information Distributor and the 6640 Document Printer, connected through RSCS.

#### SOFTWARE REQUIREMENTS

PROFS is written in IBM S/370 Assembler language, EXEC2 and XEDIT Command Language. PROFS is designed to operate in a VM/CMS environment and is dependent on the following licensed programs which are available separately:

- VM/System Product (5664-167) Release 1.2 at Service Level 118 (PUT 8209/8210) or subsequent release.
- VM/High-Performance Option (5664-173) Release 2.5 or subsequent release.
- Remote Spooling Communications Subsystem/Networking (5748-XP1) Release 3 or later. (Required for either of the following: (1) exchange of 'mail' between PROFS systems or (2) support for remotely attached output devices such as the 6670 Information Distributor).
- Document Composition Facility (5748-XX9) Release 2 or later with the CMS Foreground Environment features (#6076, #6077, #6407, #6408).

#### SECURITY/INTEGRITY

PROFS runs in its own virtual machine and the library contents are owned by PROFS. Therefore, both PROFS and its libraries receive the normal protection of the virtual machine. Additional security measures exist within PROFS itself. General users, requesting access to members of the libraries are checked for specific authorization.

When a document is stored, the author can specify that it may be retrieved and viewed only by the author or the person(s) to whom it was sent. Calendars may be viewed and/or changed only by those individuals specifically authorized. User management is responsible for the selection, application, adequacy, and implementation of all security



PROGRAM PRODUCTS

**PROFS (cont'd)**

features and for appropriate application and administrative controls. Where natural-language text and/or data is to be transmitted via public communications facilities, management may wish to consider the use of encryption.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Introducing the Professional Office System (GH20-5601) ... Getting Started with the Professional Office System ... Using the Professional Office System ... Installing the Professional Office System ... Managing the Professional Office System ... Quick Reference to the Professional Office System ... Programmer's Guide to the Professional Office System*

**RPQs ACCEPTED: No**



**SCREEN DEFINITION FACILITY/CICS  
CMS RELEASE 1.0 (5664-178)  
OS/VS RELEASE 4.0 (5740-XYF)  
DOS/VSE RELEASE 4.0 (5746-XXT)**

**PURPOSE**

Screen Definition Facility/Custom Information Control System (SDF/CICS) is an online application development tool for the CICS/VS application programmer who wants to define or edit maps, map sets, and partition sets for the CICS/VS Basic Mapping Support (BMS). The online operation and the ease-of-use-oriented functions of the tool enhance productivity in development and maintenance. This tool is provided as three functionally equivalent program products which are designed for use in the following environments:

**SDF/CICS OS/VS:** Online functions can be used either under CICS/VS or, alternatively and new with Release 4.0, under TSO. Batch functions of SDF/CICS can be executed under any batch partition or region; under TSO they can also be invoked for foreground execution.

**SDF/CICS VSE:** Online functions can be used either under CICS/VS or, alternatively and new with Release 4.0, under ICCF. Batch functions of SDF/CICS can be executed under any batch partition or region; under ICCF they can also be invoked for foreground execution.

**SDF/CICS CMS:** Online functions of SDF/CICS and SDF/CICS utilities can be invoked under CMS. SDF/CICS libraries are implemented as VSAM clusters. VM/Interactive File Sharing (5748-XXC) is used for accessing these libraries, and is thus a prerequisite for using this product. The CMS batch facility cannot be used for SDF/CICS CMS because of a VM/IFS restriction.

The maps, map sets and partition sets generated by any of the above products can be used for CICS/VS applications executing in the OS/VS, VSE/Advanced Functions, and SSX/VSE environments. All maps and map sets can be generated for CICS/VS Version 1, Release 5 or Release 6. Partition sets generated by SDF/CICS can be used with applications using CICS/VS Version 1, Release 6.

Release 4.0 of SDF/CICS OS/VS, Release 4.0 of SDF/CICS VSE and Release 1.0 of SDF/CICS CMS support all functions of Release 3.0 of SDF/CICS OS/VS and SDF/CICS DOS/VSE. In addition, these products provide functional and usability enhancements, and support for features new in CICS/VS Version 1, Release 6.

**HIGHLIGHTS**

**Functions available in Release 3 (OS/VS and VSE):**

- Online definition and editing of maps and map sets.
- Support of device independence for maps and map sets.
- CICS/VS-BMS map generation.
- Multiple libraries support for online operation.
- Library directory support.
- Page simulation.
- Demo session support.
- User hierarchy and authorization.
- User profiles and environments.
- Online help and tutorial.
- Batch utilities.
- Conversion of CICS/VS-BMS defined maps and map sets.
- Conversion of data dictionary segment definitions to SDF/CICS maps.

**Highlights of New Functions:**

- CICS/VS Release 1.6 Specific Functions
  - Partition set definition and generation.
  - Empty graphic maps (for use by GDDM).
  - Trigger fields.
  - Aligned/unaligned maps.
  - Unsequenced input maps.
  - Large screen support.
- Usability Enhancements
  - Full command assignment to PF keys.
  - Full screen query and definition of PF keys.
  - Full screen query and definition of equate characters.
  - User concept for batch functions.
  - Multiple MSL support for batch functions.
  - Optional, integrated job logging.
  - Simplified product installation.
  - SDF/CICS automatically enabled during CICS/VS start-up via PLT.
- Other System Environments
  - Online functions of SDF/CICS OS/VS can alternatively be invoked under MVS/TSO.
  - Online functions of SDF/CICS VSE can alternatively be invoked under VSE/ICCF.
  - SDF/CICS CMS provides equivalent functional support under VM/SP CMS.

**INSTALLATION:** SDF/CICS is installed using the installation procedures of the respective operating system. SDF/CICS VSAM clusters can be installed and/or migrated using an SDF/CICS-provided installation program. The installation process is documented in the respective *SDF/CICS Operations Guide* and in the SDF/CICS Program Directory.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

SDF/CICS is designed to operate on the following IBM machines:

All IBM S/370, 303X and 308X processing units and IBM 4300 processors capable of supporting CICS/VS Version 1, Release 5 or 6, MVS/TSO, VSE/ICCF or VM/SP.

The online part of SDF/CICS, when running as a CICS/VS transaction, requires the same specified operating environment as announced for the respective CICS/VS version and release. Alternatively, the online part of SDF/CICS can be invoked under MVS/TSO, VSE/ICCF or CMS without additional requirements for the system configuration.

SDF/CICS utilities are run in a single partition in VSE/Advanced Functions or OS/VS1, or in a single address space in OS/VS2 (MVS). This does not generate additional requirements for the system configuration. Under CMS, The SDF/CICS utilities must be executed in the user's environment.

The configuration must provide sufficient direct access space to contain the VSAM files used by both SDF/CICS online functions and utilities.

The terminals supported by SDF/CICS as target devices are the same as those supported for the definition of maps by the Basic Mapping Support of CICS/VS Version 1, Release 5 or 6.

The IBM SDF/CICS terminals, that is, those devices on which the SDF/CICS user enters or receives information, are:

3275 Control Unit	mdl 2	BSC - remote
Display Station	mdl 12	SDLC - remote
3276 Control Unit	mdls 2,3,4	BSC - remote
Display Station	mdls 12,13,14	SDLC - remote
3277 Display Station	mdl 2	local and remote
3278 Display Station	mdls 2,3,4,5	local and remote
3279 Display Station	mdls 2A,2B,3A,3B	local and remote
3290 Display Station		local and remote
8775 Display Station	mdls 1,2	local and remote
	mdls 11,12	SDLC - remote

For the restrictions on specific devices and their local or remote support in a specific release of CICS/VS and/or interactive environment, the corresponding manuals for the release must be consulted.

Note that display devices with a width of 80 characters and a depth of 12 lines only are not supported since SDF/CICS Release 3.0. A minimum of 5 PF keys is required for operating SDF/CICS (12 PF keys are recommended for ease-of-use, 24 PF keys are supported).

**SOFTWARE REQUIREMENTS**

SDF/CICS runs as a CICS/VS application program on all IBM S/370, 303X and 308X processing units and IBM 4300 processors capable of supporting CICS/VS Version 1 Release 5 and 6.

CICS/VS is available as 5740-XX1 for OS/VS and 5746-XX3 for VSE/Advanced Functions.

SDF/CICS can, alternatively, also be run in the following interactive environments or in their compatible successors:

MVS/TSO (5752-VS2) Release 3.8.

MVS/XA (5740-XC6 or 5665-291) under TSO in MVS/370 compatibility mode only.

VSE/ICCF (5746-TS1) with VSE/Advanced Functions (5746-XE8) Release 3.0.

VSE/SP CMS (5664-167) Release 1.0.

SDF/CICS supports application programming in S/370 Assembler language, PL/I, COBOL and RPG II. For each language required, the appropriate compiler and library must be installed if application programs are compiled or assembled on the system.

SDF/CICS uses the Virtual Storage Access Method (VSAM). For VSE and CMS, the VSE/VSAM licensed program must be installed. For CMS, the VM/IFS licensed program (5748-XXC) must be installed (and the required segments must have been generated; see the *VM/SP Planning and System Generation Guide* (SC19-6201) for details). The VSAM functions used by SDF/CICS in OS/VS1 and OS/VS2 are basic and thus contained in the operating system. When running under MVS/TSO, the Data Facility Extended Functions program product (5740-XYQ) must be installed.

## PROGRAM PRODUCTS

**SDF/CICS OS/VS & VSE R4, CMS R1 (cont'd)**

SDF/CICS requires for its installation and/or operation the following support programs:

Assembler

System utilities

VSE: MAINT, Linkage Editor

OS/VS: IEBUPDTE, IEBCOPY, Linkage Editor

VSAM:

VSE: VSE/VSAM licensed program (5746-AM2)

MVS/TSO: Data Facility Extended Functions (5740-XYQ)

OS/VS: VSAM Access Method Services

CMS: VSE/VSAM (5746-AM2) and VM/IFS Virtual Machine/  
 Interactive File Sharing (5748-XXC)

SMP (System Modification Program) Release 4 in OS/VS

MSHP (Maintain System History Program) in VSE/Advanced Functions

VMSEVR in VM/SP CMS.

SDF/CICS can convert data dictionary segments, containing logically related data fields, from the following licensed programs into SDF/CICS maps:

DB/DC Data Dictionary licensed program

OS/VS (5740-XXF) from Release 3.0 on

VSE (5746-XXC) from Release 3.0 on.

SDF/CICS provides a skeleton map for the use of the ELIAS-I program products:

ELIAS-I (5746-XXV)

ELIAS-I/VM (5748-XXK)

SDF/CICS-defined maps can be exported to DPPX/Distributed Presentation Services of the IBM 8100 Information System.

DPPX/DPS (5760-XR1)

DPPX/DPS Version 2 (5660-264)

The distributed Basic Material consists of object modules, source for CICS/VS dependent modules, CICS/VS table entries, and input data to create the VSAM clusters necessary to run SDF/CICS. Furthermore, all SDF/CICS macros required to assemble the SDF/CICS source modules, SDF/CICS system generation table, and device characteristics table are part of the Basic Material.

**Virtual Storage Requirements:** The online part of SDF/CICS works either as a CICS/VS transaction or can, alternatively, be invoked in the supported interactive environments. Estimated virtual storage requirements are as follows:

CICS/VS 100K for the first user, 70K for each additional user. (CICS/VS and VSAM requirements must be added to that. A CICS/VS partition will accommodate at least three SDF/CICS users.)

VSE/ICCF 768K

MVS/TSO 512K

CMS 1024K

SDF/CICS utilities require a partition or region of 256K virtual storage. Under CMS, the 1024K of virtual storage required for running online SDF/CICS is sufficient for running SDF/CICS utilities.

**COMPATIBILITY/CONVERSION/MIGRATION**

SDF/CICS can be used to define and generate maps, map sets and partition sets for all the CICS/VS environments that are supported by SDF/CICS Release 4.0. The physical maps and partition sets generated by SDF/CICS are fully compatible with equivalent maps and partition sets generated by the map, map set, and partition set definition macros of the CICS/VS Basic Mapping Support.

The symbolic description maps generated by SDF/CICS are a compatible superset of maps that can be generated by the CICS/VS Basic Mapping Support. In particular, in extension to BMS macros, longer field names and arrays of structures can be defined and corresponding symbolic descriptions of maps can be generated.

CICS/VS maps and map sets in their BMS macro source format can be imported into SDF/CICS. Such maps and map sets can be converted by a batch utility of the program into SDF/CICS card formats, which can then be loaded into the SDF/CICS map specification libraries.

No import facility for BMS macro-defined partitions and partition sets is provided. The corresponding new parameters on the map and map set definition macros are ignored when converting to SDF/CICS format.

**Education:** The SDF/CICS online tutorial serves as built-in education material. SDF/CICS also contains two online demo sessions that demonstrate a simple map and the modification of an existing map to extended color field attributes.

**DOCUMENTATION**  
 (available from Mechanicsburg)

*Screen Definition Facility/Customer Information Control System General Information (GH19-6087) ... Screen Definition Facility/Customer Information Control System Program Reference (SH19-6077) ... Screen Definition Facility/Customer Information Control System Primer (SH19-6102) ... Screen Definition Facility/Customer Information Control System Operations Guide for OS/VS (SH19-6093) ... Screen Definition Facility/Customer Information Control System Operations Guide for VSE (SH19-6094) ... Screen Definition Facility/Customer Information Control System Operations Guide for CMS (SH19-6095) ... Screen Definition Facility/Customer Information Control System Messages and Codes: (SH19-6085) ... Screen Definition Facility/Customer Information Control System Reference Summary (SX11-6015) ... Screen Definition Facility/Customer Information Control System Program Logic (LY19-6060) ... Screen Definition Facility/Customer Information Control System Diagnosis Reference (SY19-6063) ... Screen Definition Facility/Customer Information Control System Program Listings Microfiche OS/VS (LJD3-6001) ... Screen Definition Facility/Customer Information Control System Program Listings Microfiche VSE (LJD3-6002).*

RPQs ACCEPTED: No

## 5664-179 - VMPPF VM PERFORMANCE PLANNING FACILITY

### PURPOSE

The VM Performance Planning Facility (VMPPF) is a performance and capacity management product for VM/SP and VM/SP High-Performance Option (VM/SP HPO) systems, operated as an application program under the VM system.

The VMPPF program product performs these major functions: Data reduction of VM/Monitor data ... model building to create a representation of the measured or projected system environments ... model execution to estimate: Average throughput, average transaction response time, hardware component utilization, e.g., CPU or channel. Model inputs representing workload and system configuration may be modified to estimate the performance of projected systems. These estimates can help the performance analyst or capacity planner evaluate alternative solutions to anticipated installation or user requirements.

### HIGHLIGHTS

#### Marketing Highlights

- VMPPF can be used for capacity planning and performance management in the VM environment.
- To effectively use the product, the user needs to understand the system installation, application requirements and business growth as well as VM and guest operating systems. Performance analysis expertise is also required.
- It can help an installation to optimize the performance of its current system by identifying system bottlenecks.
- VMPPF estimates can help answer 'what if' questions on performance of various projected system configurations and workloads.
- The modeling process can be iterated to evaluate a variety of alternative solutions to meet performance objectives.

#### Technical Highlights:

- VMPPF runs as a CMS application in the virtual machine environment.
- VMPPF contains a model to estimate the performance of VM systems under a variety of system configurations and user workloads.
- VMPPF operation is based on the VM/Monitor measurements of an existing system which may be automatically input to the model.
- VMPPF provides full-screen user interfaces for all VMPPF functions.
- VMPPF provides color/graphics display capabilities for enhanced usability.
- Calibration of the model against measured performance of an existing system is required.
- Guest operating systems and subsystems can be represented as special user classes.

### DESCRIPTION

VMPPF consists of five distinct parts:

1. The model estimates VM performance from user-specified system configurations and workload characteristics, of the following:
  - Average throughput
  - Average transaction response time
  - Hardware component utilizations, e.g., CPU or channel
2. The data reduction program extracts and analyzes the VM/Monitor data for performance of an existing installation and provides input to the model.
3. The user interfaces provide full-screen panels to control data input and model run iterations.
4. The compare program allows the user to compare the output of multiple data reduction and model runs.
5. The color/graphics display output provides graphical representation of output data in specified chart formats.

#### Hardware Modeled

- IBM CPUs, storage sizes, and DASD devices supported by current releases of VM/SP and VM/SP HPO:
  - UP, AP and MP CPU configurations
  - Up to 48 megabytes of storage
- Multiple VM systems.
- Tape I/O can be partially modeled if a channel is dedicated to tapes.
- The 3340 emulation on the 4331 Mdl Group 1 CPU.
- The 3880 Storage Control mdl 11.

**Software Modeled:** In the system environments of all currently supported releases of VM/SP Releases 1-3, and VM/SP HPO Releases 1-3, VMPPF provides modeling capability for:

- Single-threaded virtual machines such as CMS
- Multi-threaded virtual machines, such as the S/370 mode operating systems (these models employ simplifying assumptions)
- Dedicated resources, in which a portion of the VM system's hardware resources are assigned to a particular virtual machine, such as a Dedicated Batch facility

**Changes That Can Be Modeled:** The output data from VMPPF helps the analyst answer 'what if' questions, such as how is performance affected by a variety of system configuration and workload changes.

Analysts may represent these changes by modifying the input to the model. By running the model with the changes and generating the comparison reports, the analyst can evaluate the impact of changes on system performance.

Changes that can be modeled include:

- Growth of system workloads.
- Movement of workloads across processors.
- Changes in IBM processor type or processor model.
- Changes in processor storage size.

**Model Limitations:** VMPPF can only be used to model VM operations on those IBM CPUs specifically supported. The internal architecture of other CPUs may vary significantly, and attempts to model or extrapolate to other CPUs may result in unpredictable results.

The measured and modeled response times are represented as seen by the internal scheduler, and do not include transmission delays. For guest operating systems, the VMPPF data reduction program captures only aggregate throughput and response time data.

In order to model a guest operating system or subsystem at an end-user transaction level, a measure of the transaction rate is required from the guest operating system itself. Such data may be obtained from other available monitoring programs, such as RMF and SMF. The data can be entered through the full-screen interface provided with VMPPF.

The distribution of DASD read and write access over channel and control units reflect optimal access allocation rather than actual path utilization. In addition, delays for channel and control unit protocol are included in data transfer delays and are not modeled explicitly.

The queuing analytic model for the I/O subsystem employs some simplifying assumptions that may result in optimistic statements for DASD device response times. Response times for DASD devices and data sets reported by the model should be treated with caution, particularly at higher device utilizations. These outputs should be used primarily as relative indicators of the I/O configuration efficiency and performance.

**Model Accuracy:** VMPPF is a high-level analytic model which estimates 'average' values. Individual response times for particular transactions and short term utilizations of hardware components will vary from these average values.

Model results are sensitive to a variety of factors; these are described in the *VMPPF Guide and Reference* (SC34-2128). Examples of such factors include:

- Adequacy of base model calibration.
- Approximations employed by the I/O subsystem model.
- Consistency of workloads.
- Amount of change from base to projected environment.
- Degree to which measured system has been tuned.

Such factors must be applied to the interpretation of model results by a knowledgeable analyst. Attendance at one of the recommended IBM courses is key to the understanding, interpretation and application of model estimates. Further, the user should develop his own 'sensitivity awareness' of model results, based on continuing experience at his installation.

A key advantage of VMPPF is the ability to generate many projections quickly and easily from a given base. Hence, model results should primarily be used to identify trends and patterns based on a methodically developed body of accumulated information. Significant decisions should be confirmed by multiple runs across a varied range of base measurements.

### CUSTOMER RESPONSIBILITIES

Successful use of this product as a planning aid within a specific customer environment is dependent upon:

- A properly configured system with the prerequisite programs.
- A reasonably tuned base system for initial measurement.
- User-provided data that accurately describe the environment.
- Validity of the modeled hardware configuration (e.g., that it is installable).
- A realistic assessment of anticipated system growth.

**VMPPF (cont'd)**

The interpretation of the output results is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

VMPPF operates on any IBM central processing unit (CPU) that meets the minimum specifications of the operating system environment described under "Software Requirements".

It is necessary to have the APL/Data Analysis feature #1066 installed in 3271 or 3272 Terminal Control Units. The APL/Text Control Function feature (#1067) is required for 3274 or 3276 Control Units.

The ISPF and APL panels are designed for an IBM 327X-2 Display, but will run on any 3270-compatible terminal with at least 24 lines and 80 characters.

Use of the IBM 3279 mdl 3 Color Display is required for the graphics feature, and is recommended for emphasizing the input/output fields on the ISPF and APL panels. An IBM 3287-2 Printer is required if color hardcopy of graphical data is desired.

**SOFTWARE REQUIREMENTS**

The programs listed below are required to create the VMPPF operating environment:

- Any currently supported release of Virtual Machine/System Product (5664-167), or Virtual Machine/High Performance Option (5664-173), including VM/SP HPO 3.2 and 3.4 when available
- VS APL Release 4 (5748-AP1) which includes the APL full-screen auxiliary processor AP126 and GRAPHPAK
- VS FORTRAN Library Version 1 Release 1 or later, 5748-LM3
- Graphical Data Display Manager (GDDM) Version 1 Release 1 or later (5748-XXH)
- Interactive System Productivity Facility (ISPF) Version 1 Release 1 (5668-960)

**Storage Estimates:** VMPPF runs under VM/SP Releases 1 to 3, or VM/SP HPO Releases 1 to 3.4, in a CMS virtual machine with at least 2.0 megabytes of virtual storage.

VMPPF requires about 2.2 megabytes of disk storage, exclusive of data files. Graphics installation requires an additional 0.5 megabytes, which is included in the cylinder allocations below.

The following table shows the storage requirements for VMPPF, in cylinders. It is recommended that 3 to 5 additional cylinders initially be allowed for user listing output. This number of cylinders will vary, depending on VMPPF usage and the amount of output saved.

Device Type	Cylinders of Storage for VMPPF (2.2 Megabytes)
3310	13
3330	10
3350	6
3375	6
3340	22
3380	6
3370	7

**Note:** For additional descriptions, see *VMPPF General Information* (GC34-2126) for details.

**PLANNING INFORMATION**

Because VMPPF provides a queuing analytic modeling function for the representation of VM systems, hardware and software, the user should be familiar with:

- The installation, application workload requirements and the projected data processing growth for the installation.
- Performance characteristics of the measured VM system, including any guest operating systems or subsystems.
- Performance characteristics of measured workloads and classes of users.
- The use of VM/Monitor data collection, including selection of appropriate collection intervals.
- VMPPF should be used in the context of a structured, methodical approach to performance management and capacity planning. VMPPF methodology, and the simplifying assumptions made by the queuing model, will affect the estimates generated for any projected system configuration or workload.

**Customer Education:** The following education courses are recommended for understanding VMPPF:

- New York Advanced Education Center (call IBM DIRECT 800-631-5582)
  - VM/Performance: Course S3613
  - VMPPF Implementation: Course S3618

All analysts and capacity planners using VMPPF should complete the Independent Study Program:

- Capacity Planning - Basic Models: ISP IO100

All customer management and those responsible for implementing capacity and performance management projects should attend:

- Capacity Planning for Management: Course W9936

Other educational offerings of interest to the analyst and planner are:

- Information Systems Management Institute (ISMI)
  - Capacity Planning and Performance: Course W9911
  - Capacity Planning for Managers: Course E3353
- Capacity Planning Overview:
  - Video disk, Item GV20-1308
  - Video tape, Item GV20-1309

For further information on these IBM courses and education offerings, see your IBM service representative.

**Installation:** Installation procedures are described in the *VM Performance Planning Facility Guide And Reference Manual* (SC34-2128).

Planning information is provided in the *VMPPF General Information Manual* (GC34-2126).

**DATA SECURITY, AUDITABILITY and CONTROL**

VMPPF provides no security control in the function of this product. It depends on, and is controlled by the security controls of VM. The data handled by this program is obtained from the VM/Monitor and is restricted to data on CP and their timings. No data is processed which originates in another virtual machine (e.g., another user's data). Customer management is responsible for the selection, adequacy, and implementation of these controls for the protection of their data.

**DOCUMENTATION**  
(available from Mechanicsburg)

Available at FCS:

*VM Performance Planning Facility General Information Manual* (GC34-2126) ... *VM Performance Planning Facility Licensed Program Specifications* (GC34-2127) ... *VM Performance Planning Facility Guide And Reference* (SC34-2128) ... *VM Performance Planning Facility Template for 3270 Display Terminals* (GX23-0013) ... *VM Performance Planning Facility Program Summary* (GC34-2131) ... *VM Performance Planning Facility Supplemental Information* (SC34-2153).

**SYSTEM INTEGRITY**

IBM will accept APARs where installation of VMPPF introduces an exposure to the system integrity of the VM system. This program is intended to run unauthorized.

**LICENSED PROGRAM MATERIAL AVAILABILITY**

**Restricted:** No. This licensed program contains APL interpretive language materials and FORTRAN modules. Some APL materials are not accessible by the user. The FORTRAN modules will be available without source licensed program materials. These modules will be available in object code.

PROGRAM PRODUCTS

**HIGH-ACCURACY ARITHMETIC  
SUBROUTINE LIBRARY (ACRITH)  
5664-185**

**PURPOSE**

The ACRITH subroutine library provides a set of subroutines (VS FORTRAN and Assembler) for solving problems of numerical analysis with algorithmically verified accuracy for execution under VM/SP. It takes advantage of the High-Accuracy Arithmetic Facility which consists of new floating-point instructions for computations with maximum accuracy. An ISPF-based training component operating under VM/SP can be used for familiarization with the numerical properties of the algorithms in an interactive environment, and to solve smaller problems in conversational mode.

**SPECIAL SALES INFORMATION**

Today's commercial and engineering/scientific computing environments are often plagued by inaccurate solutions of difficult problems. The particular danger lies in the inability of the computer to give indication of an incorrect result.

The ACRITH subroutine library provides the user with a beneficial and unique feature: The ability to obtain the numerical results with algorithmically verified and maximum accuracy. This will be especially productive for the user who is not a sophisticated numerical analyst, and who cannot do the error analysis for her/his problem, and also for those users who do not want to spend the effort of going through such a person- and machine-time consuming error analysis.

A key element of the ACRITH concept is the use of the High-Accuracy Arithmetic Facility, which employs a long accumulator, thus solving hidden and known accuracy problems in numerical computations. These problems are generally expressed as exponent range or mantissa length limitations of a particular computer architecture.

**HIGHLIGHTS**

- Optimal floating-point arithmetic newly developed by:
  - Prof. U. Kulisch, Karlsruhe University (Germany) and
  - W. Miranker, IBM Research, Yorktown Heights (USA).
- Algorithms for linear algebra provide:
  - Numerical results with verified accuracy.
  - Solutions with verified existence, uniqueness and validity.
  - User notification, if a verified solution cannot be found.
- Based on High-Accuracy Arithmetic Facility:
  - New floating-point instructions with directed results.
  - For computational results with maximum accuracy.
- Online training component with capability to solve smaller problems in conversational mode.
- Application areas:
  - Professional personal computing.
  - Education in numerical mathematics.
  - Research in numerical methods.
  - Cross-industry mathematical problem solving (structural analysis, optimization, nuclear energy, power net distribution, forecasting, robotics, etc.).

**DESCRIPTION**

The ACRITH subroutine library provides a set of subroutines (VS FORTRAN and Assembler) for the solution of problems in most cases, and are automatically verified by the mathematical algorithms.

The subroutines are available for S/370 hexadecimal short and/or long floating-point formats for the following numerical problems:

- Evaluation of arithmetic expressions.
- Polynomial evaluations and zeros of polynomials.\*
- Linear equations.
- Matrix inversion.
- Linear optimization.\*
- Eigenvalues and eigenvectors.\*
- Vector operations.
- Scalar product.
- Matrix multiplication

\* Note: Long format only.

Also included are format conversion routines from decimal to hexadecimal, and from hexadecimal to decimal, both available with directed rounding.

The subroutines use the High-Accuracy Arithmetic Facility according to the Kulisch/Miranker theory (K.-M.: *Computer Arithmetic in Theory and Practice*, Academic Press 1981). These new instructions compute the basic arithmetic functions (+, -, x, /) and the scalar product (dot product) with maximum accuracy, and provide directed rounding (upwards, downwards, to the nearest number, towards zero) for the hexadecimal short and long floating-point formats. The scalar product instructions use a long accumulator with the internal size of 328

hexadecimal digits. Maximum accuracy is defined such that between the computed floating-point result and the exact result (infinite precision) there is no floating-point number.

The subroutines for linear equations and for eigenvalues/eigenvectors accept as input (coefficients, right-hand side) point or interval data. The output is usually provided in form of intervals, within which the results are verified to exist and to be unique. The vector operations also support point and interval data with the option of directed rounding.

It is a property of the algorithms that all subroutines deliver their results with verified bounds, and if the condition of the problem allows, also with maximum accuracy. The existence, uniqueness and validity of the solution are also verified within these bounds. If for an extremely ill-conditioned problem a verified solution cannot be achieved, an appropriate return code will be issued.

The Online Training Component can be used to familiarize the user with the functions of the ACRITH subroutines. It is based on ISPF, and offers similar panel layout and menu techniques. In the course of execution of an option, random input data can be generated or actual values from a mathematical problem can be entered, thus providing a very comfortable way to solve smaller problems in conversational mode. A tutorial is included that can give an introduction to the Online Training Component, to ISPF and to editing functions.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation of the ACRITH subroutine library.

**Installation:** The ACRITH subroutine library, including the Online Training Component, requires six megabytes of disk storage. The virtual storage required is application dependent. For a typical problem to solve, e.g., a system of linear equations for a 50 x 50 matrix, 125K bytes for the program and 225K bytes for the data including the workspace are required.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The ACRITH subroutine library has been designed to operate under VM/SP in all IBM S/370 mdl 135 and above, the IBM 303X and 308X Processors, and the IBM 4300 Processors. On IBM 4361 Processors, microcode support is provided for the new floating-point instructions.

**SOFTWARE REQUIREMENTS**

The ACRITH subroutine library is designed to operate with the following program products:

Program	Ver.	Rel.	Modif.	Program No.
VM/SP	1	2 or 3	0	5664-167
VS FORTRAN Comp. & Lib	1	2 or 3	0	5748-FO3 (1)
VS FORTRAN (Lib. only)	1	2 or 3	0	5748-LM3 (1)
ISPF Dialog Manager	1	1	0	5668-960 (2)

**Notes:**

- (1) For execution of the ACRITH subroutines, either VS FORTRAN library is required.
- (2) Required for the Online Training Component only.

**COMPATIBILITY**

The ACRITH subroutines adhere to two interface levels:

- The FORTRAN call interface: All ACRITH subroutines that can be called in user main programs obey the specifications of the CALL statement as described in the *VS FORTRAN Reference Manual*. Assembler routines called by the ACRITH subroutines follow the respective VS FORTRAN linkage conventions from the *VS FORTRAN Application Program Guide*.
- The High-Accuracy Arithmetic Facility: All ACRITH subroutines adhere to the specifications of the High-Accuracy Arithmetic Facility.

**CONVERSION**

VS FORTRAN programs which use the ACRITH subroutine library can be executed on all supported S/370 processors without the need for recompilation.

Programs using the new simulated instructions assembled for execution on processors without the ACRITH microcode support must be reassembled with the appropriate ACRITH macro library in order to gain from the performance benefits when executed on processors with the ACRITH microcode support.

Existing VS FORTRAN programs which want to utilize the power of the ACRITH program product must be rewritten for the arithmetic portions and the problem solving routines.



PROGRAM PRODUCTS

ACRITH (cont'd)

PERFORMANCE CONSIDERATIONS

The ACRITH subroutines are different from conventional subroutines both with respect to the algorithms used and to the results provided. Therefore, any simple comparison of run times can be misleading. In addition to the run time required, the algorithmically verified accuracy of the results must be considered. Because of the verified existence, uniqueness and validity of the solution, it is not required to conduct time consuming forward and/or backward error analysis.

For many problems that previously computed in long or extended hexadecimal floating-point format for accuracy reasons, the High-Accuracy Arithmetic subroutine library now delivers accurate results in short floating-point format.

On the 4361 Processors, microcode support is provided for the new ACRITH instructions for improved instruction execution times. Measurements show an average acceleration factor of approximately 2.0 (ranging from 1.1 to 4.5).

DOCUMENTATION  
(available from Mechanicsburg)

*ACRITH Subroutine Library: Program Summary (GC33-6161)\* ... Licensed Program Specifications (GC33-6162) ... General Information (GC33-6163) ... User's Guide and Operation Manual (SC33-6164) ... Reference Summary (GX33-9009) ... System/370 RPQ: High-Accuracy Arithmetic (SA27-7093) ... VS FORTRAN Application Programming: Language Reference (GC26-3986).*

\* Available at announcement. Others available at shipment.

RPQs ACCEPTED: No

**5664-187 - CVIEW V1  
THE COOPERATIVE VIEWING FACILITY  
VERSION 1****PURPOSE**

The Cooperative Viewing Facility (CVIEW), Version 1, is a program product that allows two users, at separate display stations, to share a single interactive terminal session. It provides the capability for centralization of DP support and services, thereby increasing productivity in the use of Data Processing Systems. It is useful for remote consultation, education, problem management, program maintenance and demonstrations.

**HIGHLIGHTS**

- Simple and expedient setup procedure
- Dual keyboard control
- Session security consideration
- Log file facility
- Multiple session capability

**DESCRIPTION**

**Setup Procedure:** All option selections are made via menus, rather than commands. At every point in the setup procedure, one of the options is the HELP panel. These design considerations have allowed the product to be usable to a wide range of users, including those without any knowledge of VM or CMS.

**Dual keyboard control:** Both terminal keyboards are active during a session. This allows either user to make entries with the resultant screen displayed on both terminals.

**Session security:** Each user is informed, periodically, through a security panel, that they are operating under the CVIEW system. The time period is set, at user option, during installation.

**Log file facility:** A log file is maintained and updated for each session with the following information:

- Name of consultant
- Start and stop date and time
- Device addresses

**Multiple sessions:** Up to 15 two-party sessions can be handled simultaneously.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

CVIEW operates on any IBM central processing unit (CPU) that meets the minimum hardware requirements for VM/SP.

At least two display terminals are required. Devices that may be used include the following IBM display stations:

- 3277 mdl 2
- 3278 mdls 2, 3 and 4
- 3279 all models when operated in 4-color compatibility mode.

**SOFTWARE REQUIREMENTS**

CVIEW operates under VM/SP Release 2 or 3 and CMS. It operates with or without the VM/High-Performance Option. It consists of 14 programs written in Assembler language and 14 execs written in EXEC2.

In the case of remote terminals from another system linking to CVIEW, VM/Pass-Through Facility (PVM) program product, Release 2, must be used. Once a remote session is taking place no other sessions can be started until the remote session is terminated.

CVIEW requires four cylinders of 3330 (or equivalent) and two megabytes of virtual storage.

**Installation:** CVIEW was designed for ease of installation.

Installation procedures are described in the *CVIEW Installation, Messages and Diagnosis Manual*.

**Education:** The time required for a person to become familiar with the process of establishing a session is relatively short since the system panels lead the user through the process.

**DATA SECURITY**

The security of a session is achieved by synchronizing on a password which can be communicated over the telephone. The password is not retained by CVIEW after session termination.

Additionally, each user receives, at a particular time interval, a warning that they are operating under CVIEW and are therefore sharing the session with another party.

**DOCUMENTATION**

(available from Mechanicsburg)

*CVIEW User's Guide (SC34-2144) ... CVIEW General Information Manual (GC34-2149) ... CVIEW Licensed Program Specification (GC34-2150) ... CVIEW Installation, Messages and Diagnosis Manual (SC34-2151).*

**SYSTEM INTEGRITY**

IBM will accept APARS when installation of CVIEW introduces an exposure to the system integrity of VM. This program is intended to run unauthorized when operating in VM/SP Release 3.



PROGRAM PRODUCTS

**3270-PC FILE TRANSFER PROGRAM  
5664-281**

**PURPOSE**

The 3270-PC File Transfer Program provides a 5150/5160 Personal Computer 3278/79 Emulation Adapter-featured computer, or a 3270 Personal Computer with the capability to transfer files to or from the host system to the workstation. This program product may be installed in VM/SP 2.1.

**HIGHLIGHTS**

The 3270-PC File Transfer Program allows files to be transferred from the host to the workstation for off-line data manipulation, updating, or correction or for the transfer and storage of local data in the host system.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for installing the proper program in the host system.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE/SOFTWARE REQUIREMENTS**

Either:

- IBM 3270 Personal Computer, 3270-PC Control Program, and IBM PC DOS 2.0 or,
- IBM Personal Computer 3278/79 Emulation Adapter in a 5150/5160 Personal Computer, Personal Computer 3278/79 Emulation Control Program, and IBM PC DOS 2.0.

**PACKAGING**

Each program product resides on a mini-reel.

**ORDERING INSTRUCTIONS:**

When ordering PP 5664-281 for VM/SP 2.1, #9001 must also be ordered for Asset Assignment. In addition, specify either #5242 for 9-track 1600 bpi Magnetic Tape or #5243 for 9-track 6250 bpi Magnetic Tape.

PROGRAM PRODUCTS

**5665-274 - RMF V3 R2.1**  
**RESOURCE MEASUREMENT FACILITY (RMF)**  
**VERSION 3 RELEASE 2 Modification Level 1**

**PURPOSE**

The Resource Measurement Facility (RMF) Version 3 Release 2 Modification Level 1 program incorporates all the functions of RMF Version 3 Release 1 and, in addition, offers a workload delay monitor and a virtual storage activity report.

**HIGHLIGHTS**

RMF Version 3 Release 2 Modification Level 1 provides support for the 438X Processors and incorporates the functions of RMF Version 3 Release 2 as follows:

- New and improved measurements are provided to help the installation manage the larger workloads and increased resources that the S/370 Extended Architecture can support.
- Measurement data from channel hardware can be used for more accurate measurement of I/O data.
- The Workload Delay Monitor (Monitor III) provides realtime exception capability and analysis to identify performance problems and resource contentions as they occur. Exceptions to predefined thresholds are highlighted for rapid identification.
- The backward reference capability will allow the analysis of recent performance problems. The development of a current performance problem can be tracked through the recent history data.
- Panels for online display allow contention analysis from both a job and resource perspective.
- A Virtual Storage Activity Report will provide information about the usage of virtual storage.
- Takes advantage of the S/370 Extended Architecture by relocating most RMF data areas and some RMF code to the extended area of virtual storage.

**DESCRIPTION**

**I/O ARCHITECTURE: SUPPORT AND USE:** The S/370-XA channel subsystem architecture and the MVS/SP Version 2 support for it, allow the channel subsystem to perform some of the I/O processing formerly done by programming. It presents a logical view of an I/O configuration to the software. All devices are accessible to each processor of the Processor Complex, and channel path selection and queuing of requests are performed by the hardware. The MVS/SP Version 2 I/O Supervisor (IOS) supports this new architecture by removing path selection and queuing for channel or control unit busy conditions. I/O requests are made to the channel such that there is one I/O request initiated per device. This is an enhancement over MVS/SP Version 1, in which the software remains sensitive to channel busy conditions and to control unit and device busy conditions of sufficient duration.

Since the queuing techniques are different in S/370/XA, the data that RMF reports is different. RMF preserves and reports data that the channel maintains about the I/O requests it handles. Several items of RMF data are measured by the channel instead of sampled by RMF, thus providing improved accuracy. Other items are presented in different terms to improve their usability.

One of the items of channel-measured data that RMF uses extensively is device connect time, the time the channel is transferring data to or from the device. This item is a measure of 'device busy' accumulated by channel hardware which reflects the amount of data actually transferred.

RMF and SMF both provide a common unit of measure for I/O activity; i.e., connect time. It is therefore not necessary to try to relate SIOs to EXCPs.

Among the significant changes made to reports in support of MVS Extended Architecture are:

- I/O Device Activity Report:
  - Version 3.2 presents the average I/O response time for each device and then breaks this down into its parts. The parts are:
    - Software queuing time.
    - The time the channel took to find a path to a device.
    - The time the device spent searching and transferring data.
    - The time the device spent positioning and reconnecting.

All except software queuing time are measured by the channel and passed to RMF for recording and reporting.

- Channel Activity Report:
  - This report provides utilization data about each physical channel.

- I/O Queuing Activity Report:

This report presents data that the hardware has collected about its management of path contention. The report also provides valuable I/O configuration information; it identifies channel paths and the control units they serviced during the measurement interval, along with a logical index into the I/O Device Activity report to allow easy association to the related set of devices.

**MONITOR for CONTENTION ANALYSIS:** Other enhancements will provide for improved performance and resource monitoring capabilities that will help the installation maintain performance criteria and manage large MVS system workloads with the increased resources that are supported by the S/370 Extended Architecture.

Previous performance monitoring techniques have relied upon resource utilization as an indicator of interactive response time. These methods are only valid in a system environment that has no resource constraints. The MVS operating system is designed to allow the installation to determine batch and interactive priorities in the distribution of various system resources. Because of this prioritization, some jobs or interactive users will have faster response time than others due to the delay caused by higher priority tasks.

By monitoring job or system delay time (in conjunction with 'busy' or active time) a better picture of overall system operation can be seen.

In a response time oriented interactive system, RMF Monitor III provides a contention- (or delay) oriented approach which identifies problems as they are occurring, via realtime exceptions. This puts a focus on the current performance problem.

Workload delay reasons are provided to help identify the area which is the probable cause of the performance problem. Additional delay information such as tasks being delayed, resources involved, tasks holding those resources and magnitude of delay time, provide the performance analyst with data on the impact of current system delays.

Through the use of the backward reference capability, the performance analyst may retrieve necessary measurement data to analyze performance problems of the recent past or trace the development of a current problem.

The workflow screen provides a pictorial representation of the speed at which work units are progressing and system resources are servicing requests. The use of workflow as a measure of performance allows instantaneous performance evaluation by workload (TSO, batch, started tasks, performance groups, domains or specific job), and system resources.

The RMF Workload Delay Monitor will improve system performance analyst effectiveness through an easier method of identifying and diagnosing system performance problems.

**ADDRESSING ARCHITECTURE: SUPPORT AND USE:** Most RMF data areas and some RMF code have been relocated to the extended areas (virtual storage above 16 megabytes). A substantial portion of the private area modules and data areas have been relocated to the extended area.

The Virtual Storage Activity Report provides information about the usage of virtual storage in the major system areas within the first 16 megabytes, as well as the extended area of virtual storage. Additional information may also be selected about the usage of virtual storage in the private areas of installation-selected jobs.

Using this new virtual storage information, an installation can plan for and monitor changes that will relieve virtual storage constraints below 16 megabytes.

Virtual storage utilization data can now be collected along with other long term measurement data that is used in capacity planning.

System programmers or capacity planners can easily assess their current situation with respect to a potential or actual virtual storage resource constraint problem. RMF data on paging activity and real storage utilization includes counts (or activity) from both above and below 16 megabytes. A count of fixed frames below 16 megabytes is provided.

**RESTRUCTURED SMF RECORDS:** RMF Version 3 provides a flexible structure for all SMF records produced by RMF. The Version 3 post processor converts records produced by RMF Version 2 (Release 2 MVS/System Extensions Support and later) to a format acceptable to the rest of Version 3.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The RMF Version 3 Release 2 Modification Level 1 licensed program is designed to operate on any IBM processor that is supported by MVS/SP 2.1.1 with the PTFs for 4381 support installed.



PROGRAM PRODUCTS

RMF V3R2.1 (cont'd)

SOFTWARE REQUIREMENTS

RMF Version 3 Release 2 Modification Level 1 licensed program requires that MVS/SP 2.1.1 be installed along with the PTFs for 4381 support and RMF Version 3 Release 2. If Monitor II or Monitor III local display sessions are used, the BTAM/SP must be installed.

**Storage Considerations:** Fixed storage requirements for RMF include temporarily fixed storage in the extended PLPA, temporarily fixed storage in the private area, and fixed storage in the extended SOA. The amount of storage RMF uses depends on the set of options the installation selects for RMF processing.

DOCUMENTATION  
(available from Mechanicsburg)

*MVS Resource Measurement Facility (RMF) Version 3 General Information Manual (GC28-1115-3).*

MVS SYSTEM INTEGRITY APPLIES: Yes

RPOs ACCEPTED: No

LICENSED PROGRAM MATERIALS AVAILABILITY

Restricted Materials: Yes. This licensed program will be available with some licensed program materials designated as "RESTRICTED MATERIALS OF IBM".

PROGRAM PRODUCTS

**5665-274 - RMF V3 R1  
RESOURCE MEASUREMENT FACILITY (RMF)  
VERSION 3 RELEASE 1**

**PURPOSE**

The Resource Measurement Facility (RMF) Version 3 program provides measurements that will help the installation to monitor the workload and use of resources in a 4381 Processor and 3081 Processor Complex running MVS/System Product Version 2.

**HIGHLIGHTS**

RMF Version 3 does the following:

- Provides new and improved measurements that will help the installation manage the larger workloads and increased resources the S/370 Extended Architecture can support.
- Changes measurements or the way in which they are accumulated, where necessary to support the S/370 Extended Architecture.
- Takes advantage of the S/370 Extended Architecture by relocating most RMF data areas and some RMF code to the extended area of virtual storage.
- Incorporates the functions of RMF Version 2 Release 4 Enhancement.

**DESCRIPTION**

**I/O ARCHITECTURE: SUPPORT AND USE:** The S/370-XA channel subsystem architecture and the MVS/SP V2 support for it, allow the channel subsystem to perform some of the I/O processing formerly done by programming. It presents a logical view of an I/O configuration to the software. All devices are accessible to the 4381 and each processor of the 3081 Processor Complex, and channel path selection and queuing of requests are performed by the 3081 or 4381 hardware. The MVS/SP V2 I/O Supervisor (IOS) supports this new architecture by removing path selection and queuing for channel or control unit busy conditions. I/O requests are made to the channel such that there is one I/O request initiated per device. This is an enhancement over MVS/SP Version 1, in which the software remains sensitive to channel busy conditions and to control unit and device busy conditions of sufficient duration.

Since the queuing techniques are different, the data RMF reports is different. RMF preserves and reports data the channel maintains about the I/O requests it handles. Several items of RMF data are now measured by the channel instead of sampled by RMF, thus providing improved accuracy. Other items are presented in different terms to improve their usability.

One of the new items of channel-measured data that RMF now uses extensively is device connect time, the time the channel is transferring data to or from the device.

- As a percentage of elapsed time, it is a measure of "device busy". Since it is measured rather than sampled, it is more accurate than the device busy reported by RMF Version 2.
- As a measure of load on a device, it is better than activity rate, because it reflects the amount of data transferred.
- SMF reports device connect time in the same way that it reports EXCP count; by DD statement and the total for job step. Now that SMF and RMF use the same unit to report I/O, it is not necessary to try to relate SIOs to EXCPs.

The new I/O architecture has led to changes in several RMF reports.

- I/O Device Activity Report:

RMF Version 2 presented data about path contention in terms of percents, times, and queue lengths. Version 3 presents most of its data in units of time. It gives an overall Average I/O response time for each device and then breaks this down into its parts. The parts are:

- Software queuing time.
- The time the channel took to find a path to the device.
- The time the device spent searching and transferring data.
- The time the device spent seeking and reconnecting.

All except software queuing time are measured by the channel and passed to RMF for recording and reporting.

% device busy is replaced by two values, % device connect and % device utilization. The % device connect, explained above, is measured by the channel. The % device utilization is both the time the device was in use and the time the device was reserved. It is a measure of the time the device was unavailable to service a request from another system.

- Channel Activity Report:

The physical channel portion of the Channel Activity report has been renamed Channel Path Activity. It provides utilization data about each channel path. The logical channel portion of the 370 Channel Activity report provided data on software management of

path contention. This is being dropped and a new, separately requested, report called I/O Queuing Activity presents data the hardware has collected about its management of path contention. The I/O Queuing Activity report also provides valuable I/O configuration information. It identifies channel paths and the control units they serviced during the measurement interval, along with a logical index into the I/O Device Activity report to allow easy association to the related set of devices.

- Address Space Resource Data Report:

The device connect time is provided for each job. It is analogous to the total EXCP count provided in 370, except it is hardware-measured and is a different unit.

**ADDRESSING ARCHITECTURE: SUPPORT AND USE:** Most RMF common area data areas and modules have been relocated to the extended areas (virtual storage above 16 megabytes). A substantial portion of the private area modules and data areas have been relocated to the extended area.

RMF data on paging activity and real storage utilization appears the same but includes counts (or activity) from both above and below 16 meg. A new count of fixed frames below 16 meg is provided.

**RESTRUCTURED SMF RECORDS:** The new and changed data RMF provides has resulted in a new structure for all SMF records produced by RMF. To allow the installation to process existing records with the new Version 3 post processor, the post processor converts records produced by RMF Version 2 (Release 2 MVS/System Extensions Support and later) to a format acceptable to the rest of Version 3.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The RMF Version 3 Licensed Program operates on any IBM processor supported by MVS/System Product Version 2.

**SOFTWARE REQUIREMENTS**

The RMF Version 3 Licensed Program requires that MVS/System Product Version 2 be installed. If Monitor II local display sessions are used, the BTAM/SP must be installed.

**Storage Considerations:** Fixed storage requirements for RMF include temporarily fixed storage in the extended PLPA, temporarily fixed storage in the private area, and fixed storage in the extended SQA. The amount of storage RMF uses depends on the set of options the installation selects for RMF processing.

**DOCUMENTATION**

(available from Mechanicsburg)

*MVS Resource Measurement Facility (RMF) Version 3 General Information Manual (GC28-1115).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No



PROGRAM PRODUCTS

**INFORMATION/LIBRARY  
RELEASE 1  
5665-277**

**PURPOSE**

Information/Library is a dialog-oriented program providing search and retrieval functions for a companion data base Library/MVS, Program Number 5665-294. The data base contains MVS system reference and program logic information. This information reflects the structure of the publications and consists of titles, abstracts, tables of contents, headings, indexes and full text for selected manuals (such as *OS/VS System Message Library: VS2 System Messages*).

Information/Library provides an online-accessible, complete and IBM-maintained master index of the OS/VS2 MVS documentation.

The fill-in-panels of the Information/Library dialog provide a convenient and easy way to 'formulate' search queries. Matching information is found accurately and displayed in a clearly arranged form. Moreover, the user can print the displayed information or parts thereof.

Information/Library operates under the Time Sharing Option (TSO) and/or under the licensed program Network Communications Control Facility (NCCF) of OS/VS2 MVS. The Virtual Storage Access Method (VSAM) is used for the Library/MVS data base organization.

**HIGHLIGHTS**

- Online master index for OS/VS2 documentation.
  - Quick and direct access to specific manuals or parts thereof.
  - Decrease in the OS/VS2 MVS library complexity.
  - Increase in the OS/VS2 MVS library usability.
- Context search based on manual-like structure.
  - Search on title (including order number).
  - Search on abstract.
  - Search on heading.
  - Search on index.
  - Search on heading and index.
  - Search on various combinations of the above.
- Structured index.
  - Search on complete master index.
  - Search on index terms to specific titles.
  - Search on index terms to specific headings.
- Dialog capabilities for finely-tuned, efficient inquiries.
  - Small number of comprehensive, yet easy-to-use functions.
  - User guidance by fill-in panels.
  - No need to learn command syntax.
  - Extended search terms: Phrases and word fragments.
  - Search operations based on previously obtained results.
- Structured result display.
  - Display titles (order number included).
  - Display abstracts (title included).
  - Display headings (title included).
  - Display index terms (title and headings included).
  - Display full text (title and headings included).
  - Display additional information for a specific result:
    - Heading hierarchy above a lower heading.
    - All index terms for a heading, not only the matching ones.
- Offline printing.
  - Parts to be printed are user-selectable.
  - User comments can be put on top of print information.
  - Print information can be directed to specific SYSOUT data sets.
- Online tutorial and help facilities.
  - Educational panels.
  - Help panels, available at any dialog step.
  - User never gets lost throughout the entire dialog.
- Increased productivity.
  - Easy information retrieval.
  - Greatly reduced search time.
  - Reduction of false starts and program runs due to missing information.
  - Better performance of OS/VS2 MVS-associated tasks.
  - More frequent and more efficient usage of the OS/VS2 MVS documentation.

**CUSTOMER RESPONSIBILITIES**

This section briefly discusses the activities the user has to perform to make Information/Library operational. It gives a rough guide for assessing the total installation effort. The assumption is that a system running under OS/VS2 MVS with TSO and/or NCCF has already been installed.

The major implementation steps are:

- Installation of the Information/Library dialog program according to the distribution tape and installation description. The System Modification Program (SMP) is used for installation.
- Definition of VSAM space and VSAM clusters for the Library/MVS data base and importing the Information/Library data base from the distribution tape.
- Execution of the sample dialog to verify the installation.

No modifications or adaptation of the Information/Library dialog program or the Library/MVS data base are required.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Information/Library is designed to operate on any IBM processor configured to run OS/VS2 MVS with TSO or NCCF.

For installation and operation of the program, the following minimum equipment is required:

- One 9-track IBM magnetic tape unit, 6250 bpi, or equivalent, for the installation of the distribution tapes.
- DASD space for the Library/MVS data base on any device supported by VSAM.
- One IBM 3270 Display Station with at least 24 lines by 80 characters, or equivalent, attached to the appropriate control unit.

**SOFTWARE REQUIREMENTS**

Information/Library requires the functions required by OS/VS2 MVS Release 3.8 and subsequent releases, unless otherwise identified, with the following:

MVS/SE Release 2  
MVS/SP Version 1  
MVS/SP Version 2

Information/Library operates under the Time Sharing Option (TSO) of the OS/VS2 MVS System Control Program Release 3.8, with the current releases of the Virtual Telecommunications Access Method (VTAM) or the Telecommunications Access Method (TCAM).

In addition, Information/Library operates under the licensed program Network Communications Control Facility (NCCF) Release 2 of OS/VS2 MVS Release 3.8 with the latest releases of Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM) or Advanced Communications Function/Telecommunications Access Method (ACF/TCAM). Subsequent releases of ACF/VTAM and ACF/TCAM are also supported unless otherwise stated by IBM. Information/Library can run under both TSO and NCCF concurrently.

The Virtual Storage Access Method (VSAM) is used for the Library/MVS data base organization.

Information/Library is a prerequisite for the use of Library/MVS.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Licensed Program Specifications (GH12-5254) ... General Information Manual (GH12-5136).*

**MVS SYSTEM INTEGRITY APPLIES: Yes**

**RPQs ACCEPTED: No**

PROGRAM PRODUCTS

**INFORMATION/LIBRARY**  
**RELEASE 2 Modification Level 0**  
**5665-277**

**PURPOSE**

Information/Library is a dialog-oriented program providing search and retrieval functions for the companion data base product Library/MVS. Installations can also use Information/Library with a data base consisting of user documentation, or with a concatenated data base containing both information from Library/MVS and user documentation.

Library/MVS contains MVS and MVS/XA system reference and program logic information. This information reflects the structure of the publications and consists of titles, abstracts, table of contents headings, indexes, and, for certain manuals (such as *Messages and Codes* manuals), full text. It provides an online, accessible master index to MVS documentation.

Information/Library and Library/MVS improve the productivity of MVS users by helping them to quickly locate the information they require for any given task from the MVS library. They can save not only search time in using the hardcopy library but also time spent as the result of errors from failing to find all the pertinent information for a given task. For full text documentation (such as *Messages and Codes*), users can access up-to-date information without referencing the hardcopy library.

**DESCRIPTION**

Information/Library operates under the Time Sharing Option (TSO), the licensed program TSO/Extensions (TSO/E), and/or the licensed program Network Communications Control Facility (NCCF) of MVS/370 or MVS/XA. The virtual storage access method (VSAM) is used for the Library/MVS data base organization.

Release 2 of Information/Library and Library/MVS contains all the search and retrieval functions of Release 1 plus the following enhancements:

- Selection of manuals from Library/MVS according to the user's specification.
- Support for user publications/documentation as a separate data base or concatenated with the selected manuals from Library/MVS.
- Support for multiple versions of the same publication or abstract.

**SELECTION OF INFORMATION IN THE DATA BASE:** Release 2 of Library/MVS allows the user to select the contents of the data base. As a result, the user can:

- Maintain product information at the level of the installed products.
- Reduce the size of the data base by eliminating inapplicable or unwanted product documentation, thereby requiring less DASD space for the data base and improving search time.
- Supplement information in the Library/MVS data base with user documentation.
- Maintain multiple versions of the same publication or abstract.

Release 2 includes the following programs to support the creation of an installation-tailored data base:

- A selection program that allows the installation to exclude individual publications or groups of publications (such as publications for a specific product or product level).
- A conversion program that converts user documentation input to Information/Library data base format.
- A load program that operates in batch mode and that builds the data base from the complete Library/MVS data base, from the output of the selection program, from the output of the conversion program, or from a combination of the preceding.

Updates to Library/MVS will be shipped as update tapes, containing only the updated documentation, documentation for additional products, or additional full text documentation. The user can use the selection and load programs to incorporate updates into the data base, replacing existing information in the current data base as applicable to the particular installation.

Periodically, update tapes will be incorporated into a new base tape.

**CONTENTS OF THE LIBRARY/MVS DATA BASE:** Release 2 of Library/MVS includes the information provided in Release 1.3, plus additional full text. The base tape for Release 2 supports MVS/370 systems: MVS/System Product Version 1 and related products (including data management products, ACF/VTAM, ACF/TCAM, IMS, CICS, and high-level languages). Updates to Release 2 will support:

- MVS/XA (MVS/System Product Version 2 (JES2 and JES3), Data Facility Product, and related products).
- Additional updates for MVS/370 (new releases of MVS/System Product Version 1 and related products).
- Additional products not yet included in the data base.
- Additional full text.

Updates will be distributed three to four times a year.

**SEARCH AND RETRIEVAL FUNCTIONS:** The search and retrieval functions and the structure of the data base are designed specifically for rapid and easy retrieval of applicable information from a large library of books such as the MVS library:

- Context search based on manual-like structure
  - Search on title (including order number)
  - Search on abstract
  - Search on headings (table of contents)
  - Search on index
  - Search on various combinations of the preceding
- Structured index
  - Search on complete master index
  - Search on index terms in a subset of titles
  - Search on index terms in specific headings
- Dialog capabilities for finely tuned, efficient inquiries
  - Small number of comprehensive yet easy-to-use functions
  - User guidance by fill-in panels
  - No need to learn any command syntax
  - Extended search terms: Phrases and word fragments
  - Search operations based on previously obtained results
- Structured display of results
  - Display titles (order number included)
  - Display abstracts (title included)
  - Display headings (title included)
  - Display index terms (title and headings included)
  - Display full text (title and headings included)
  - Display additional information for a specific result
    - Heading hierarchy above a lower-level heading
    - All index terms for a heading, not only the matching index terms
- Offline printing
  - All or parts of search results
  - Addition of user comments
  - Output directed to specific sysout data sets
- Online tutorial and help facilities
  - Educational panels
  - Help panels available at any dialog step

**CUSTOMER RESPONSIBILITIES**

This section outlines the activities the user does to make Information/Library operational. It gives a rough guide for assessing the total installation effort. The following steps assume that a system running MVS/370 or MVS/XA with TSO, TSO/E, and/or NCCF has already been installed.

The major implementation steps are:

1. Installation of the Information/Library dialog program according to the distribution tape and installation description. The system modification program (SMP) is used for installation.
2. Optional use of the selection program to exclude information on the Library/MVS tape from the data base. The selection program uses a selection table included on the Library/MVS tape to determine the contents of the data base. To load all information from the Library/MVS tape, omit the selection step.
3. Optional use of the conversion program to convert user documentation input into Information/Library data base format.
4. Use of the load program to build the VSAM-organized data base from one or more of the following sequential data sets:
  - The complete Library/MVS tape
  - Output from the selection program
  - Output from the conversion program
 The load program operates in batch mode.
5. Execution of the sample dialog to verify the installation.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on any IBM processor configured to run MVS/370 or MVS/XA with TSO, TSO/E, or NCCF.

For installation and operation of the program, the following minimum equipment is required:

- Three 9-track, 6250 bpi IBM magnetic tape units, or equivalent, for the installation of the distribution tapes.
- DASD space for the data base on any device supported by VSAM.

## PROGRAM PRODUCTS

**Information/Library R2 (cont'd)**

- One IBM 3270 Display Station with at least 24 lines by 80 characters, or equivalent, attached to the appropriate control unit.

**SOFTWARE REQUIREMENTS**

Information/Library operates under the Time Sharing Option (TSO) of the MVS/370 system control program (Release 3.8, MVS/System Extensions, or MVS/System Product Version 1) and the MVS/XA system control program (MVS/System Product Version 2), with the applicable releases of the Virtual Telecommunications Access Method (VTAM) or the Telecommunications Access Method (TCAM). Information/Library is also designed to operate under the licensed program TSO Extensions running under MVS/System Product Version 1 or MVS/System Product Version 2. Subsequent releases of MVS/370, MVS/XA, and TSO/E are also supported unless otherwise stated by IBM.

In addition, Information/Library operates under the licensed program Network Communications Control Facility (NCCF) Release 2 of the MVS/370 system control program (Release 3.8, MVS/System Extensions, or MVS/System Product Version 1) and the MVS/XA system control program (MVS/System Product Version 2), with the applicable releases of the Virtual Telecommunications Access Method (VTAM) or the Telecommunications Access Method (TCAM). Subsequent releases are also supported unless otherwise stated by IBM.

Information/Library can run under both TSO (or TSO/E) and NCCF concurrently.

Information/Library Release 2 is a prerequisite for the use of Library/MVS Release 2. Any combination of the Release 1 products with the Release 2 products is not supported. The licensed program Sort/Merge is a prerequisite for Information/Library.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual (GH12-5136-1) ... Information Retrieval Guide (SH12-5362-0) ... Installation and Data Base Administration Guide (SH12-5361-0) ... Licensed Program Specifications (GH12-5254-1) ... Program Logic Manual (LY12-5041-1).*

**MVS SYSTEM INTEGRITY APPLIES: Yes**

**RPQs ACCEPTED: No**



PROGRAM PRODUCTS

**BASIC TELECOMMUNICATIONS ACCESS METHOD/  
SYSTEM PRODUCT  
5665-279**

**PURPOSE**

The facilities of the Basic Telecommunications Access Method/System Product (BTAM/SP) provide the basic tools required to write a telecommunications program. These include facilities for creating terminal lists and for performing the following operations: Initiating and answering calls to and from terminals on switched networks ... Polling and addressing terminals on nonswitched multipoint lines ... Changing the status of terminal lists ... Transmitting and receiving messages ... Code translation ... Retransmitting messages which are received with detected errors ... Providing online terminal test facilities ... Keeping error statistics.

**HIGHLIGHTS**

BTAM/SP supports Binary Synchronous Communications and start/stop low, medium and high speed devices.

BTAM/SP supports Binary Synchronous Communication over nonswitched (leased or private direct communication) and switched (dial) networks in MVS/370 to MVS/Extended Architecture (MVS/XA), MVS/370 to terminal, and MVS/XA to terminal communications.

All terminals (except Binary Synchronous Communication) on a multipoint nonswitched line must be the same type. Terminals may be mixed within the same problem program.

Further information on terminal support is provided in the "BTAM/SP Terminal Support Chart".

Optional communication serviceability facilities are available in BTAM/SP including error recovery procedures, diagnostic error information, error counts and online terminal tests. It is strongly recommended that these facilities be included since they increase system availability.

BTAM/SP supports the same functions as OS/VS BTAM and, therefore, requires no additional programming training. The user is cautioned regarding any internal changes that he may have made to OS/VS BTAM.

**CUSTOMER RESPONSIBILITIES**

Prior to operation of IBM subsystems or user programs with BTAM/SP, any modules using the BTAM RESETPL macro must be reassembled against the changed RESETPL macro in BTAM/SP. After this reassembly, the using programs or subsystems will operate with BTAM/SP and MVS/370\* or MVS/XA. The reassembly programs and subsystems will no longer operate with OS/VS BTAM.

Note: MVS/370 is a generic term used to refer to MVS operating systems which operate with S/370 architecture, i.e.,

- OS/VS2 MVS 3.8
- OS/VS2 MVS 3.8 with the MVS SE program product
- OS/VS2 MVS 3.8 with the MVS SP V1 program product

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

BTAM/SP will operate on any hardware configuration supported by MVS/370 or MVS/XA.

**BTAM/SP TERMINALS SUPPORTED**

BTAM/SP supports the following terminals, programmable features, transmission control units, and communication controllers. Programmable features which change the control or transmission characteristics and which are not shown are not supported. Attempts to use BTAM/SP with unsupported features can cause unpredictable results. The user should be aware that many terminals and control unit special features are transparent to programming, and therefore readily usable even though not specifically identified. Note that the appropriate line adapters and hardware attachment features must be included in the system configuration. Terminals that are functionally equivalent to those specifically supported by BTAM/SP may also function satisfactorily with BTAM/SP; the customer is responsible for establishing equivalency. IBM assumes no responsibility for the impact that any changes to the IBM-supplied programs or products may have on such terminals.

**REMOTE ATTACHMENT**

**Terminals and Terminal Features**

**SS LINES:**

**IBM TERMINALS**

- 1030 Data Collection System on nonswitched lines:
  - 1031 Input Station (mdls A1, A2, A3, A4, A5, A6, A7):
    - Supported: Attachment of 1031, 1033, 1034, 1035
  - 1031 Input Station (mdls B1, B2, B3, B4, B5, B6, B7):
    - Supported: Attachment of 1035
  - 1035 Badge Reader
  - 1033 Printer
  - 1034 Card Punch
- 1050 Data Communication System on switched or nonswitched lines:
  - 1051 Control Unit (mdls 1,2):
    - Supported: Attachment of 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1092, 1093
      - #1313 - Automatic EOB
      - #4795 - Line Correction
      - #4796 - Line Correction Release
      - #5465 - Open Line Detection
      - #6100 - Receive Interrupt
      - #9698 - Text Time-Out Suppression
      - #9700 - Transmit Interrupt
  - 1052 Printer-Keyboard (mdls 1, 2):
    - Supported: #1313 - Automatic EOB
      - #9567, #9597 - PTTC/BCD Code
      - #9571, #9591 - PTTC/EBCD Code
  - 1053 Printer (mdl 1):
    - Supported: #9567, #9597 - PTTC/BCD Code
      - #9571, #9591 - PTTC/EBCD Code
  - 1054 Paper Tape Reader (mdl 1)
  - 1055 Paper Tape Punch (mdl 1)
  - 1056 Card Reader (mdls 1, 3)
  - 1057 Card Punch (mdl 1)
  - 1058 Printing Card Punch (mdls 1, 2)
- 1060 Data Communications System (MVS/370 only)
- 2848 Display Control (mdls 1, 2, 3) on nonswitched lines: (MVS/370 only)
  - Supported: Attachment of 2260, 1053
    - #3901 - Extended Cursor Control
    - #4787 - Line Addressing
    - #5340 - Non-Destructive Cursor
    - #5341 - Non-Destructive Cursor Adapter
  - Not Supported: Attachment of 1053
- 2260 Display Station (mdls 1, 2):
  - Supported: #3606 - Extended Cursor Control
    - Alphameric Keyboard
    - #4766 - Alphameric Keyboard Tab feature of 3606
  - Not Supported:
- 1053 Printer (mdl 4):
  - Supported: #9567, #9597 - PTTC/BCD Code
    - #9571, #9591 - PTTC/EBCD Code
- 2845 Display Control (mdl 1) on nonswitched lines (MVS/370 only):
  - Supported: Attachment of 2265, 1053
    - #3301 - Destructive Cursor
    - #4801 - Line Addressing
- 2265 Display Station (mdl 1):
  - Supported: #4766 - Alphameric Keyboard
- 1053 Printer (mdl 4):
  - Supported: #9567, #9597 - PTTC/BCD Code
    - #9571, #9591 - PTTC/EBCD Code
- 2740 Communication Terminal (mdl 1) on switched or nonswitched lines:
  - Supported: #3255 - Dial Up
    - #6114 - Record Checking
    - #7479 - Station Control
    - #8028 - Transmit Control
    - #8301 - 2760 Attachment
    - #9567, #9597 - PTTC/BCD Code
    - #9571, #9591 - PTTC/EBCD Code
    - Correspondence Code
- 2740 Communication Terminal (mdl 2) on nonswitched lines:
  - Supported: #1495, 1496 - Buffer Expansion
    - #1499 - Buffer Receive
    - #6114 - Record Checking
    - #9571, #9591 - PTTC/EBCD Code
- 2741 Communication Terminal (mdl 1) on switched or nonswitched lines:



PROGRAM PRODUCTS

BTAM/SP (cont'd)

Supported: #3255 - Dial Up  
 #4708 - Receive Interrupt  
 #9567, #9597 - PTTC/BCD Code  
 #9571, #9591 - PTTC/EBCD Code  
 Correspondence Code

2760 Optical Image Unit (mdl 1) on switched or nonswitched lines  
 Required: In the 2740-1: #6114 Record  
 Checking and 8301 - 2760 Attach-  
 ment

3100 Display Terminal (mdls 10, 12, 13, 20, 23) (supported as  
 CPT-TWX mdl 33/35 Line Control) on switched lines:

3767 Communication Terminal (mdls 1, 2) (supported as a 2740-1) on  
 switched or nonswitched lines:  
 Required: #7111 - 2740-1 Start/Stop  
 Supported: #9560 - Station Control

3767 Communication Terminal (mdls 1, 2, 3) (supported as a 2740-2)  
 on nonswitched lines:  
 Required: #7112 - 2740-2 Start/Stop

3767 Communication Terminal (mdls 1, 2) (supported as a 2741) on  
 switched or nonswitched lines:  
 Required: #7113 - 2741 Start/Stop

5100/5110 Computer Systems (supported as a 2741) on switched or  
 nonswitched lines:  
 Required: #1525 - Communications Adapter

6733 Typewriter Communication Module on switched lines supported  
 as CPT-TWX 33/35.

CMCST (Communicating Magnetic Card Selectric® Typewriter)  
 (supported as a 2741 with Correspondence Code) on switched lines:  
 Supported: The CMCST is functionally equivalent  
 to a 2741 with Dial UP, & Receive  
 Interrupt

IBM PROCESSORS AS TERMINALS

(For details of programming support provided within the Processor  
when acting as a terminal, see appropriate Programming pages)

S/7 (supported as a 2740-1 with checking) on switched or non-  
switched lines:  
Required: #1610 - Asynchronous Communica-  
tion Control

NON-IBM TERMINALS

AT&T 83B3 Line Control Type on nonswitched lines  
CPT-TWX (mdl 33/35) Line Control Type on switched lines  
World Trade Telegraph on nonswitched lines  
WU 115A Line Control Type on nonswitched lines

BSC LINES:

IBM TERMINALS

2770 Data Communication System on switched or nonswitched lines:  
 2772 Multipurpose Control Unit:  
 Required: #5010 - Multipoint Data Link Control  
 Supported: Attachment of 0050, 0545, 1017,  
 1018, 1053, 1255, 2203 2213,  
 2265, 2502, 5496  
 #1340 - Automatic Answering  
 #1490 - Buffer Expansion (256 bytes)  
 #1491 - Buffer Expansion Additional  
 (512 bytes)  
 #1910 - Conversational Mode  
 #3250 - Display Format Control  
 #3650 - EBCDIC Transparency  
 #3860 - 144 Character Print Line  
 #4610 - Identification  
 #4690 - Keyboard Correction  
 #5010 - Multipoint Data Link Control  
 #5890 - Horizontal Format Control  
 #6555 - Space Compression/  
 Expansion  
 #7705 - Synchronous Clock  
 #7950 - Transmit-Receive-Monitor  
 Print  
 #9140 - Extended Re-Entry  
 #9402 - Line Termination - 2-wire  
 #9761 - Transmission Code EBCDIC  
 #9762 - Transmission Code ASCII  
 #9936 - Immediate WACK

0050 Magnetic Data Inscrber  
0545 Output Punch (mdls 3, 4)  
1017 Paper Tape Reader (mdls 1, 2)  
1018 Paper Tape Punch (mdl 1)  
1053 Printer (mdl 1)

1255 Magnetic Character Reader  
 2203 Printer (mdls A1, A2):  
 Supported: #5558 - Print Positions, 24 Additional

2213 Printer (mdls 1, 2)  
 2265 Display Station (mdl 2)  
 2502 Card Reader (mdls A1, A2)  
 5496 Data Recorder

2780 Data Transmission Terminal on switched or nonswitched lines:  
 Supported: #1340 - Automatic Answering  
 #1350 - Automatic Turnaround  
 #3401 - Dual Communication  
 Interface  
 #5010 - Multiple Record Transmission  
 #5020 - Multipoint Line Control  
 #5820 - 120 Character Print Line  
 #5821 - 144 Character Print Line  
 #6400 - Selective Character Set  
 #7850 - Terminal Identification  
 #8030 - EBCDIC Transparency  
 #9150 - Extended Retry Transmission  
 #9761 - ASCII Transmission Code  
 #9762 - EBCDIC Transmission Code

2790 Data Communication System on switched or nonswitched lines:  
 2715 Transmission Control Unit (mdl 1 and 2):  
 Required: 2740  
 Supported: Attachment of 2798, 1035, 1053,  
 2740  
 #3801 - Expanded Capability  
 #4850 - Local 2740 Adapter  
 #9401 - Point-to-point Nonswitched  
 #9402 - Point-to-point Switched  
 #9403 - Multipoint Nonswitched

2740 Communication Terminal (mdl 1)  
 2798 Guidance Display Unit (mdl 1)  
 1035 Badge Reader (mdl 1)  
 1053 Printer (mdl 1)

2980 General Banking System on nonswitched lines:  
 2972 Station Control Unit (mdl 8 - RPO 858160, mdl 11 - RPO  
 858231)  
 Supported: Attachment of 2980, 2971  
 RPO 835503 - Buffer Expansion  
 RPO 858165, 858182 - 96-Character  
 Buffer

2980 Teller Station (mdl 1 - RPO 835504, mdl 4 - RPO 858147)  
 2980 Administrative Station (mdl 2 - RPO 835505)  
 2971 Remote Control Unit (mdl 3 - RPO 858144)

3270 Information Display System on nonswitched lines:  
 3271 Control Unit (mdls 1, 2):  
 Supported: Attachment of 3277, 3284, 3286,  
 3287, 3288  
 #1550 - Copy  
 #9761 - EBCDIC Code

3274 Control Unit (mdl 1C, 21C, 31C, 51C) (Supported as a 3271)  
 Supported: Attachment of 3277, 3278, 3284,  
 3286, 3287, 3288, 3289

3276 Control Unit Display Station (mdls 1, 2, 3, 4) (Supported as a  
 3271)  
 Supported: Attachment of 3278, 3287  
 #6350 - Selector Light-pen  
 #9082 - EBCDIC Character Set

3277 Display Station (mdls 1, 2):  
 Supported: #6350 - Selector Light-pen  
 #9089 - EBCDIC Character Set

3278 Display Station (mdls 1, 2, 3, 4, 5) (Supported as a 3277)  
 Supported: #6350 Selector Light-pen  
 #9082 - EBCDIC Character Set

3279 Display Station (mdl 1A, 1B, 2A, 2B)  
 3284 Printer (mdls 1, 2):  
 Supported: #9089 - EBCDIC Character Set

3286 Printer (mdls 1, 2):  
 Supported: #9089 - EBCDIC Character Set

3287 Printer (mdls 1, 2) (Supported as a 3284 or 3286 attached to a  
 3271-1 or -2)  
 Supported: #9082 - EBCDIC Character Set

3288 Printer (mdl 2) (supported as a 3286-2):  
 Supported: #9089 - EBCDIC Character Set

3289 Printer (mdls 1, 2) (Supported as 3286-2)

3270 Information Display System on switched lines  
 or nonswitched lines:  
 3275 Display Station (mdls 1, 2):  
 Supported: Attachment of 3284  
 #6350 - Selector Light-pen  
 #9089 - EBCDIC Character Set  
 #9761 - EBCDIC Code

3284 Printer (mdl 3):  
 Supported: #9089 - EBCDIC Character Set

PROGRAM PRODUCTS

BTAM/SP (cont'd)

3624 Consumer Transaction Facility (mdls 1, 2, 11, 12) (supported as a 2772)

Supported: Attached to a 3704/3705 via nonswitched lines only

3650 Programmable Store System (Supported as a S/3) on switched lines:

3651 Store Controller (mdls A25, B25, A75, B75, C75, D75)  
Supported: Attachment of 3275, 3653, 3657, 3659, 3663, 3669, 3683, 3784

3653 Point of Sale Terminal (mdl 1 and 1P)  
3683 Point of Sale Terminal (all models)  
3657 Ticker Unit (Not available on 3651 mdl A25 and B25)  
3663 Supermarket Terminal (mdls 1P, 2 and 3P)  
3275 Display Station (mdl 3)

Supported: Attachment of 3284

3284 Printer (mdl 3)

3659 Remote Communication Unit (mdl 1)

Required: 2400 BPS nonswitched line (Not available on 3651 mdls A25 and B25)

3784 Printer (mdl 1) Not Available on 3651 mdls A25 and B25

3660 Supermarket Scanning System (supported as a S/3) on switched lines:

3651 Store Controller (mdls A60, B60):  
Supported: Attachment of 3663, 3669

3663 Supermarket Terminal (mdls 1, 2):  
Supported: Attachment of 3666

3666 Checkout Scanner (mdl 1)  
3669 Store Communications Unit (mdl 1)

3660 Supermarket Key-Entry System (supported as a S/3) on switched lines:

3661 Store Controller:  
Supported: Attachment of 3663

3663 Supermarket Terminal (mdls 1, 2)

3680 Programmable Store System supported on switched and nonswitched lines:

3683 Point of Sale Terminal  
3684 Point of Sale - Control Unit (mdls 1, 2)  
Supported: 3684 mdl 2: Attachment of 3683 Point of Sale Terminal

3735 Programmable Buffered Terminal (mdl 1) on switched or nonswitched lines:

Supported: Attachment of 5496, 3286  
#5010 - Multipoint Data Link Control  
#9761 - EBCDIC Code  
#9762 - ASCII Code

5496 Data Recorder (mdl 1)  
3286 Printer (mdl 3)

3741 Data Station (mdl 2) on switched or nonswitched lines:

Supported: Attachment of 0129, 3713, 3715, 3717  
#1680 - Expanded Communications  
#1685 - Expanded Communications/  
Multipoint Data Link Control  
#5450 - Operator Identification Card Reader  
#7850 - Terminal Identification

0129 Card Data Recorder (mdl 2)  
3713 Printer (mdl 1)  
3715 Printer (mdls 1, 2)  
3717 Printer (mdl 1)

3741 Programmable Work Station (mdl 4) on switched or nonswitched lines:

Supported: Attachment of 0129, 3713, 3715  
#1680 - Expanded Communications  
#1685 - Expanded Communications/  
Multipoint Data Link Control  
#5450 - Operator Identification Card Reader  
#7850 - Terminal Identification

0129 Card Data Recorder (mdl 2)  
3713 Printer (mdl 1)  
3715 Printer (mdls 1, 2)

3747 Data Converter (mdl 1) on switched or nonswitched lines:

Supported: #1660 - Communications Adapter

3750 Switching System

3770 Data Communication System (supported as a 2770) on switched or nonswitched lines:

3771 Communication Terminal (mdls 1, 2, 3):  
Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3773 Communication Terminal (mdls 1, 2, 3, P1, P2, P3):

Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3774 Communication Terminal (mdls 1, 2, P1, P2):

Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3775 Communication Terminal (mdls 1, P1):

Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3776 Communication Terminal (mdls 1, 2) (supported as a 2772/3780):

Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3777 Communication Terminal (mdl 1) (supported as a 2772/3780):

Supported: #1201 - ASCII Code

3777 Communication Terminal (mdl 2) (supported as a S/360-20 MULTI-LEAVING Workstation):

Required: #3701 - EIA Interface

3780 Data Communications Terminal (mdl 1) (supported as a 2772 without component select) on switched or nonswitched lines:

Supported: #3601 - EBCDIC Transparency  
#5010 - Multipoint Data Link Control  
#5701 - Print-Positions, Additional  
#9761 - EBCDIC Code  
#9762 - ASCII Code

5110 Computer (supported as a 2772) on switched or nonswitched lines:

Required: 2074 BSCA  
Supported: Attachment of a 5103 Printer, 5106 Tape Cartridge and 5114 Diskette Unit.

The 5110 emulates the following 2772 features:

Auto Answer, Buffer expansion additional (512), EBCDIC transparency, 144 character print line, identification, Multipoint Data Link Control, Horizontal Format Control, Space Compression/ expansion, Synchronous clock, Transmission code EBCDIC.

5265 Retail Communicating mdl (supported as 3741) point-to-point operation.

Required: #5500 - 1200 BPS Integrated Non-switched Modem or #5501 - 1200 BPS Integrated Switched Modem or #3701 - EIA/CCITT Interface

5275 Direct Numerical Control Station (MVS/370 only) (supported as a 3275 with EBCDIC code and EBCDIC Character Set) on switched lines and as a 3277 on nonswitched lines

IBM PROCESSORS AS TERMINALS

(For details of programming support provided within the Processor when acting as a terminal, see appropriate Programming pages.)

1130 Computing System on switched or nonswitched lines:

1131 Central Processing Unit:  
Required: #7690 - Synchronous Communications Adapter

1800 Data Acquisition and Control System on switched or nonswitched lines: (TCAM, BTAM)

1826 Data Adapter Unit:  
Required: #7550 - Communication Adapter

5280 Distributed Data System (supported as a 3271-2) on a non-switched line:

5285 and 5288 controllers:  
Required: Refer to GSD sales manual for required features and related programming

5280 Distributed Data System (supported as a 3741 or S/3 MRJE) on switched or nonswitched line:

5285 and 5288 Processor Units:  
Required: #2500 Communications Adapter

Series/1 (Supported as a S/3 on switched or nonswitched lines:)

PROGRAM PRODUCTS

**BTAM/SP (cont'd)**

4953 or 4955 Processor  
Required: #2074, 2075 or 2094 Binary Synchronous Communications Adapter

S/3 on switched or nonswitched lines:  
5404, 5406, 5408, 5410, 5412 or 5415 Processing Unit:  
Required: #2074 - Binary Synchronous Communications Adapter

S/7 (supported as a S/3) on switched or nonswitched lines:  
5010 Processor Module:  
Required: #2074 - Binary Synchronous Communications Adapter

S/32 (supported as a S/3) on switched or nonswitched lines:  
5320 System Unit:  
Required: #2074 - Binary Synchronous Communications Adapter

S/34 (supported as a S/3) on switched or nonswitched lines:  
5340 System Unit:  
Required: #2500, 3500 or 4500 Communications Adapter Feature

S/34 (supported as a 3271 mdl 2) on a nonswitched line:  
5340 System Unit:  
Required: #2500, 3500, 4500 Communications Adapter Feature  
#4900 or 4901 Work Station Control Expansion A or B

S/36 (supported as a System/3) on switched or nonswitched lines:  
5360 System Unit:  
Required: #2500 or #4500 Communications Adapter feature

S/36 (supported as a S/360 mdls 25 & up) on switched or non-switched lines:  
5360 System Unit:  
Required: #2500 or #4500 Communications Adapter feature

S/36 (supported as a S/3271 on mdl 2) on nonswitched lines:  
5360 System Unit:  
Required: #2500 or #4500 Communications Adapter feature  
#4900 Workstation Control feature

S/360 mdl 20 on switched or nonswitched lines:  
2020 Processing Unit:  
Required: #2074 - Binary Synchronous Communications Adapter

S/38 (supported as a S/3 on switched and nonswitched line):  
5381 System Unit:  
Required: #1501 or #1502 Communications Attachment Feature  
#2001 or #2003 Communications Control Feature  
#3200 Line Base Feature

S/38 (supported as a 3271 mdl 2) on a nonswitched line (BTAM, TCAM VTAM):  
5381 System Unit  
Required: #1501, 1502 Communications Attachment  
#2001, 2003 Communications Control Feature

S/360 mdls 25, 30, 40, 50, 65, 65MP, 67(65 mode), 75, 85, 91, 195 on switched or nonswitched lines:  
Processing Unit:  
Required: #4580 - Integrated Communications Attachment, or  
2701 Data Adapter Unit, or  
2703 Transmission Control, (S/370 only), or  
3704 Communications Controller in emulation mode, or  
3705-I Communications Controller in emulation mode, or  
3705-II Communications Controller in emulation mode

All virtual storage S/370 Processors on switched or nonswitched lines:  
Processing Unit:  
Required: 2701 Data Adapter Unit, or  
2703 Transmission Control, (S/370 only) or  
3704 Communications Controller in network control or emulation mode, or  
3705-I Communications Controller in network control or emulation mode, or

3705-II Communications Controller in network control or emulation mode

8100 with DPPX on nonswitched lines:  
Required: Refer to 8100 pages for required features and for licensed programs supported.

8100 with DPPX/SP on nonswitched lines:  
Required: Refer to 8100 pages for required features and for licensed programs supported.

**LOCAL ATTACHMENT**

**Transmission Control Units and Communications Controllers**

2701 Data Adapter Unit on local channel:  
Supported: #1302, 1303, 1314 - Autocall  
#3455 - Dual Code  
#3463-3465 - Dual Communication Interface  
#8029 - Transparency  
#9060 - EBCDIC Code  
#9061 - ASCII Code  
#9062 - 6-bit Transcode

2702 Transmission Control Unit\* on local channel:  
Supported: #1290 - Autocall  
#1319 - Autopoll  
#8055 - 2741 Break

2703 Transmission Control Unit\* on local channel:  
Supported: #1340, 1341 - Autocall  
#7715 - EBCDIC Code  
#7716 - ASCII Code  
#7717 - 6-bit Transcode  
#8055 - 2741 Break  
#9100 - Transparency for ASCII

2715 Transmission Control Unit\* (mdl 1) on local channel:  
Supported: See "2790" under *Local Terminals*

3704/3705-I/3705-II/3705-80 Communications Controller on local channel:  
Supported: EBCDIC Code, ASCII Code, Autopoll and EBCDIC Transparency do not have special feature codes in the 3704/3705 EP/VS

\* These control units are supported on MVS/370 only

**LOCAL TERMINALS**

3270 Information Display System on local channel - Non-SNA:  
3272 Control Unit (mdls 1, 2):  
Supported: Attachment of 3277, 3284, 3286, 3287, 3288

3277 Display Station (mdls 1, 2):  
Supported: #6350 - Selector Light-pen  
#9089 - EBCDIC Character Set

3284 Printer (mdls 1, 2):  
Supported: #9089 - EBCDIC Character Set

3286 Printer (mdls 1, 2):  
Supported: #9089 - EBCDIC Character Set

3287 Printer (mdls 1, 2) (Supported as a 3284 or 3286 attached to 3272-1 or -2)  
Supported: #9082 - EBCDIC Character Set

3288 Printer (mdl 2) (supported as a 3286-2):  
Supported: #9089 - EBCDIC Character Set

3270 Information Display System on Local Channel: (Supported as a 3272)  
3274 Control Unit (mdl 1B, 1D, 21B, 21D, 31D)  
Supported: Attachment of 3277, 3278, 3284, 3286, 3287, 3288, 3289

3277 Display Station (mdls 1, 2)  
Supported: #6350 - Selector Light-pen  
#9089 - EBCDIC Character Set

3278 Display Station (mdls 1, 2, 3, 4, 5) (Supported as a 3277)  
Supported: #6350 - Selector Light-pen  
#9082 - EBCDIC Character Set

3279 (mdls 1A, 1B, 2A, 2B)  
3284 Printer (mdls 1, 2)  
Supported: #9089 - EBCDIC Character Set

3286 Printer (mdls 1, 2)  
Supported: #9089 - EBCDIC Character Set

3287 Printer (mdls 1, 2) (Supported as a 3284 or 3286)  
Supported: #9082 - EBCDIC Character Set

3288 Printer (mdl 2) (Supported as a 3286-2)  
Supported: #9089 - EBCDIC Character Set

3289 Printer (mdls 1, 2) (Supported as a 3286-2)

PROGRAM PRODUCTS

BTAM/SP (cont'd)

TERMINAL SUPPORT CHART 1

Remote Attach (a)	BTAM/SP	
	via EP/VS (c)	via 270X (d)
<b>SS Lines:</b>		
1030	X	1, 2, 3
1050	X	1, 2, 3
1060 (f)	X	1
2260	X	1
2265	X	1
2740-1,-2	X	1, 2, 3
2741	X	1, 2, 3
2760	X	1, 2, 3
3101 (TWX)	X	1
3767-1,-2 (2740-1)	X	
3767-1,-2,-3 (2740-2)	X	1
3767-1,-2 (2741)	X	
5100 (2741)	X	
5110 (2741)	X	
6733 (CPT-TWX 33/35)	X	1
CMCST (2741)	X	1, 2, 3
S/7 (2740-1)	X	1, 2, 3
AT&T 83B3 or WU 115A		
Line Control Type	X	1, 2, 3
CPT-TWX (M33/35)		
Line Control Type	X	1, 2, 3
WT Telegraph	X	1, 2, 3
<b>BSC Lines:</b>		
1130	X	1, 3
1800	X	1, 3
2770	X	1, 3
2780	X	1, 3
2790	X	1, 3
2972-8,-11	X	1, 3
3270	X	1, 3
3624-1,-2,-11,-12 (2772)	X	1, 3
3650	X	1, 3
3660	X	1, 3
3680	X	
3735	X	1, 3
3741-2,-4	X	1, 3
3747	X	1, 3
3770 (2772)	X	1
3777-2 S/360-20		
3780 (2772)	X	1, 3
5110 (2772)	X	
5265 (3741)	X	
5275 (3275-1,-2)	X	1
5275 (3277)	X	1, 3
5280 (3271)	X	1, 3
5280 (3741)	X	1, 3
5280 (S/3)		
Series 1 (S/3)	X	1 (b)
S/3	X	1, 3
S/7 (S/3)	X	1, 3
S/32 (S/3)	X	1, 3
S/34 (S/3)	X	1, 3
S/34 (3271)	X	1, 3
S/36 (S/3)	X	1, 3
S/36 (3271)	X	1, 3
S/36 (360 (b))	X	1, 3
S/38 (S/3)	X	1, 3
S/38 (3271)	X	1, 3
S/360-20	X	1, 3
S/360 (b)	X	1, 3
S/370 (b)	X	1, 3
8100/DPPX (e)	X	1, 3
8100/DPPX/SP (e)	X	1, 3
<b>TCU's Local Communications Controllers:</b>		
2701	X	
2702 (f)	X	
2703 (f)	X	
2715-1 (f, g)	X	
3704 (EP/VS)	X	
3704 (NCP/VS)		
3705-I (EP/VS)	X	
3705-I (NCP/VS)		
3705-II (EP/VS)	X	
3705-80 (NCP/VS)		
<b>Local Terminals:</b>		
3272-1,-2	X	
3274-1B (3272-2)	X	

LEGEND:

- SS = Start/Stop
- BSC = Binary Synchronous Communication
- X = Supported

Notes:

- (a) If shown, the terminal type in parenthesis designates the programming support provided, e.g., 'S/7 (2740-1)' means the S/7 is supported as a 2740-1'.
- (b) S/360 mdls 25, 30, 40, 50, 65, 65MP, 67 (65 mode), 75, 85, 91, 195 with either BOS, BPS, DOS or OS. All virtual storage S/370 Processors with either BOS, BPS, DOS, OS, DOS/VS, OS/VS1 or OS/VS2.
- (c) 3704/3705 EP/VS, or the Partitioned Emulator Program (PEP) extension to 3704/3705 NCP/VS, can be used to emulate the 270X.
- (d) 270X = 2701, 2702, 2703; column shows last digit of 270X support.
- (e) Supported as a 2780.
- (f) MVS/370 only.
- (g) Does not attach to IBM 3081 Processor Complex.

TERMINAL SUPPORT CHART 2

SS Lines:	Communications Code				Communication Network		
	EBCDIC		ASCII		sw nonsw		
	norm	trans	norm	tran	PTP	PTP	MP
1030	-	-	-	-	-	-	X
1050	-	-	-	-	X	-	X
1060	-	-	-	-	-	-	X
2260	-	-	-	-	-	-	X
2265	-	-	-	-	-	-	X
3101	-	-	X	-	X	-	-
2740-1	-	-	-	-	X	X	X
2740-2	-	-	-	-	-	-	X
2741	-	-	-	-	X	X	-
2760	-	-	-	-	X	X	-
3767-1,-2 (2740-1)	-	-	-	-	X	X	X
3767-1,-2,-3(2740-2)	-	-	-	-	-	-	X
3767-1,-2 (2741)	-	-	-	-	X	X	-
5100 (2741)	-	-	-	-	X	X	-
5110 (2741)	-	-	-	-	X	X	-
6733 (CPT-TWX 33/35)	-	-	X	-	X	X	-
CMCST (2741)	-	-	-	-	X	-	-
S/7 (2740-1)	-	-	-	-	X	X	X
AT&T 83B3, WU 115A	-	-	-	-	-	-	X
CPT-TWX (M33/35)	-	-	-	-	X	-	-
WT Telegraph	-	-	-	-	-	X	-
<b>BSC Lines:</b>							
2770	X	X	X	-	S	X	M
2780	X	X	X	-	S	X	M
2980	X	-	-	-	-	-	M
3270	X	-	X	-	S	-	M
3624-1,-2,-11,-12 (2772)	-	X	-	-	-	-	M
3650 (S/3)	-	X	-	-	X	-	-
3660 (S/3)	-	X	-	-	X	-	-
3680	-	X	-	-	X	-	-
3735	X	-	X	-	S	-	M
3741-2,-4	X	X	X	-	S(f)	X	-
3747	X	X	-	-	S(c)	X	-
3770 (2772)	X	X	X	-	S	X	M
3777-2 (S/360-20)	X	X	X	X	S	X	M
3780 (2772)	X	X	X	-	S	X	M
5110 (2772)	X	X	-	-	S	X	M
<b>5265 Communicating</b>							
mdl (3741)	X	-	X	X	X	X	-
1130	X	X	-	-	S	X	M
1800	X	X	X	-	S	X	M
5275 (3277)	X	-	X	-	-	-	M
5275 (3275-1,-2)	X	-	X	-	S	-	M
5280 (3271-2)	X	-	-	-	-	-	M
5280 (3741)	X	X	X	-	S	X	M
5280 (S/3)	X	X	X	-	S	X	-
S/3	X	X	X	-	S	X	M
S/7 (S/3)	X	X	X	-	X	X(d)	M
S/32 (S/3)	X	X	X	-	S	X	M
S/34 (S/3)	X	X	X	-	S	X	M
S/34 (3271)	X	-	-	-	-	-	M
S/36 (S/3)	X	X	X	-	S	X	M
S/36 (S/360 (b))	X	X	X	-	S	X	M
S/36 (3271)	X	-	-	-	-	-	M
S/38 (3271)	X	-	-	-	-	-	M
S/360-20	X	X	X	X	S	X	M
S/360 (b)	X	X	X	X	S	X	M



PROGRAM PRODUCTS

BTAM/SP (cont'd)

S/370 (b)	X	X	X	X	S	X	-
8100/DPPX							
DPPX/DSC	X					X	X
DPPX/RJE	X	X				X	
8100/DPPX/SP							
DPPX/SP/DSC	X					X	X
DPPX/SP/RJE	X	X				X	
Local Channel Attach:							
3272-1,-2	X	-	-	-			
3274-1B (3272-1)	X	-	-	-			
S/38 (S/3)	X	X	X	-	S	X	-

Legend:

- SS = Start/Stop
- BSC = Binary Synchronous Communication
- X = Supported
- = Not supported
- M = Group of terminals which can operate on same BSC MP and same line speed.
- S = Group of terminals which can share the same phone number(s).

Notes:

- (a) If shown, the terminal type in parenthesis designates the programming support provided, e.g., "S/7 (2740-1)" means "the S/7 is supported as a 2740-1".
- (b) S/360 mdls 25, 30, 40, 50, 65, 65MP, 67 (65 mode), 75, 85, 91, 195 with either BOS, BPS, DOS or OS. All virtual storage S/370 Processors with either BOS, BPS, DOS, OS, DOS/VS, OS/VS1 or OS/VS2.
- (c) The 3741/3747 can use the same switched network hardware at the 3704/3705 as other BSC terminals.
- (d) IPL of S/7 is not supported in this network configuration.

SOFTWARE REQUIREMENTS

Applications or subsystems using BTAM/SP must be recompiled against BTAM/SP (because of changes to the RESETPL macro). After recompilation, the subsystems/applications, with BTAM/SP will run on either MVS/370 or MVS/XA. PTF UZ29156 (MVS 3.8) must have been applied prior to installation of BTAM/SP.

COMPATIBILITY and MIGRATION

User applications or subsystems require recompilation with BTAM/SP because of changes to the RESETPL macro. After recompilation, BTAM/SP, with the recompiled applications or subsystems, runs with MVS/370 or MVS/XA.

BTAM/SP consists of interface modifications that allow BTAM/SP to operate with MVS/XA. No other enhancements were made to the product. Application environments that operate successfully on MVS/370 will continue to operate successfully on MVS/XA. Extensions of BTAM/SP into new networking environments require evaluation. The innate design limitations of BTAM, i.e., internally defined time delays, retry limits and recovery procedures that were appropriate in the 1960s and early 1970s have not been changed.

DOCUMENTATION  
(available from Mechanicsburg)

BTAM/SP Licensed Program Specifications: (GC27-0602) ...  
BTAM/SP Program Summary (GC27-0599) ... Supplement to OS/VS  
BTAM for BTAM/SP (SC27-0604) ... Supplement to OS/VS BTAM  
Logic for BTAM/SP.

MVS SYSTEM INTEGRITY APPLIES

IBM will accept APARS where the installation of BTAM/SP introduces an exposure to the system integrity of MVS/370 or MVS/XA. Refer to Programming Announcement Letter. This program is intended to run authorized.

RPQs ACCEPTED: No.

**5665-280 - ACF/VTAM V2.2 (OS/VS2 MVS)  
ADVANCED TELECOMMUNICATIONS FUNCTION  
for VTAM VERSION 2 RELEASE 2**

**PURPOSE**

Advanced Communications Function for VTAM Version 2 Release 2 (ACF/VTAM V2R2) is a Systems Network Architecture (SNA) access method program product for users of OS/VS2 (MVS) Release 3.8, optionally including MVS/SP Version 1 for S/370 and MVS/SP Version 2 for extended architecture (XA) processors operating in S/370 compatibility mode. It continues to support the functions provided in previous releases of ACF/VTAM (except as indicated in the "Compatibility"), and has been enhanced in the areas of data communications, device support, problem determination, ease of use, and network configuration, management and control.

**OVERVIEW**

ACF/VTAM V2R2 provides telecommunications support for channel-attached and SDLC link-attached communication controllers\* in NCP mode and for locally-attached devices. In addition, ACF/VTAM V2R2 controls the sharing of telecommunication resources between application programs, and supports the concurrent execution of multiple teleprocessing applications.

\* The term 'communication controller' is used in these pages to refer to both the 3705 and 3725 Communication Controllers.

ACF/VTAM controls communication between application programs and terminals by establishing and managing SNA sessions. Sessions can be established between resources in single or multiple host networks, or between resources in independent, interconnected networks. Application programs need only be responsible for device control characters in data streams.

The types of devices supported are:

- SNA-SDLC devices.
- BSC 3270 devices.
- SNA channel-attached devices.
- Non-SNA channel-attached devices.
- Certain asynchronous (Start/Stop) and BSC devices through the Network Terminal Option (NTO) program product with ACF/NCP.

The interface for application programs allows the user to control connections between application programs and other application programs or terminals, as well as to request data transfer. A single request for connection or input can be directed simultaneously to more than one terminal. The ACF/VTAM V2R2 application program interface is designed to provide long-term stability and to aid user teleprocessing growth.

The program operator facility of the ACF/VTAM V2R2 application program interface allows an authorized application program to enter ACF/VTAM operator commands and receive ACF/VTAM operator messages.

Network operator control facilities are provided, enable users to monitor and reconfigure their networks to meet fluctuating requirements.

ACF/VTAM V2R2 provides interactive time sharing support through its integrated time sharing option (TSO/VTAM). TSO/VTAM extends the line and terminal sharing benefits of ACF/VTAM to TSO users. TSO is a standard feature in OS/VS2 (MVS) that provides conversational time sharing facilities.

ACF/VTAM V2R2 enables the user to have cross-system and cross-network communication, thus providing resource sharing, distributed processing and increased resource availability.

Configuration restart facilities allow an ACF/VTAM network to be reinstated after a failure or a normal deactivation. Manual or programmed operator switching to a backup processor or communication controller is also supported.

**Encrypt/Decrypt Feature:** The ACF/VTAM Encrypt/Decrypt optional feature, in combination with the Cryptographic Facility program product (5740-XY5) or the Cryptographic Unit Support program product (5740-XY6), allows users to encrypt and decrypt messages during sessions between logical units.

ACF/VTAM V2R2 operates with ACF/NCP Version 1 Release 3, Version 2 or Version 3. Some of the capabilities provided by ACF/VTAM V2R2 are supported only in conjunction with specific releases of ACF/NCP. A summary of this support appears later in these pages.

**SPECIAL SALES INFORMATION**

ACF/VTAM V2R2 will be attractive to current users of ACF and to new users installing SNA for the first time because of its improved subsystem support, additional capabilities and device support, and its enhancements in the area of software problem determination, documentation, and ease of use.

Specifically, the following ACF/VTAM V2R2 capabilities exceed those of ACF/VTAM Version 2 Release 1:

- SNA network interconnection.

- Gateway System Services Control Point (SSCP).
- Adjacent SSCP routing.
- Multiple gateways.

- Default SSCP selection.
- Integrated support for Network Logical Data Manager Release 1.
- Support for Network Logical Data Manager Release 2.
- Data host communication with a channel-attached NCP without having to activate the NCP.
- Support for subsystem use of ASCII-8.
- Session management exit routine for authorization and accounting.
- TSO/VTAM enhancements:
  - 3290 Information Panel support.
  - ASCII-8 support.
  - Screen-size support for type-1 logical units.
- Usability enhancements:
  - Improved methods of specifying virtual route pacing parameters.
  - Default Communication Network Management (CNM) routing information for IBM CNM applications.
- Serviceability enhancements:
  - Forced deactivation of an NCP link.
  - Trace enhancements.
- Removal of TOLTEP.

**HIGHLIGHTS**

ACF/VTAM V2R2 is a data communication access method based on Systems Network Architecture (SNA). It controls communication between elements within one or more SNA networks. It also uses the facilities of the operating system and of virtual storage to support:

- Devices:
  - SNA SDLC devices.
  - BSC 3270 devices.
  - SNA channel-attached devices.
  - Non-SNA channel-attached 3270 devices.
  - Certain asynchronous (Start/Stop) and BSC devices through the Network Terminal Option (NTO) program product with ACF/NCP.
- Channel-attached and SDLC-link-attached communication controllers with ACF/NCP, including multiple channel attachment and extended NCP ownership and connectivity.
- Multisystem networking.
- Interconnection of two or more independent SNA networks through gateway ACF/NCP nodes, including:
  - Gateway System Service Control Point (SSCP) for cross-network name and address translation.
  - Adjacent SSCP routing table to determine the next SSCP on a session path.
  - Multiple gateways for SSCP-SSCP and LU-LU sessions.
- Default selection of the SSCP that owns an undefined network resource or provides a path to the owning SSCP.
- Channel-to-channel adapters for multisystem communication.
- ACF/VTAM V2R2 hosts as intermediate routing nodes in the network, for example, when connected to each other through channel-to-channel adapters.
- Downstream loading of devices through the Downstream Load Utility program product.
- Switched network backup support for SNA-SDLC devices for extended availability.
- CICS/VS, IMS/VS, TSO, JES, NCCF, and many other related IBM subsystems and program products.
- Subsystem or application program usage of the ASCII-8 code set defined in ANSI X3.41-1974, as well as ASCII-7.
- The Communications Network Management (CNM) program products:
  - Network Communications Control Facility (NCCF)
  - Network Problem Determination Application (NPDA)
  - Information/System
  - Network Logical Data Manager (NLDM)
- Default routing of CNM RUs to the appropriate IBM CNM application program.

## ACF/VTAM V2 R2 (cont'd)

- Single-tape installation (including multisystem networking and interconnected network capabilities).
- Ability to easily modify, replace or suppress ACF/VTAM messages to suit installation needs or preferences.
- Processing to improve network performance and reliability of large SNA messages sent from ACF/VTAM application programs.
- An interface for application programs to control connections between application programs and other application programs or terminals, as well as to request data transfer.
- An application program interface (API) compatible with previous releases of ACF/VTAM to facilitate migration.
- Ability for application programs to determine, at assembly and at execution time, what particular functions are supported with the given level of ACF/VTAM being used.
- Session management exit routine for authorization, accounting and gateway node path selection.
- Communication between two IBM subsystems or user-written ACF/VTAM application programs, through single or parallel sessions.
- Flexibility in initiating sessions by allowing the two ends of a session to negotiate the session initialization parameters.
- Parallel links and transmission groups for increased bandwidth, multiple routes for communication route backup, and multiple priority levels for improved traffic control.
- Time Sharing Option (TSO) for SNA/SDLC interactive terminals, non-SNA 3270 systems and, through the Network Terminal Option program product, selected Start/Stop terminals.
- TSO/VTAM Device Support Enhancements:
  - Support for the 3290 Information Panel large-screen, plasma Display Station.
  - Screen-size support for type-1 logical units.
  - Support for the use of the ASCII-8 code set.
- Extensive reliability, availability and serviceability facilities for ACF/VTAM networks.
- Transfer control of one host processor's communication controller(s) to another host processor. It also permits control of the terminals of a communication controller to be divided among multiple host processors.
- Data host communication with a locally-attached ACF/NCP without the need to establish an SNA session (contact without ACTPU).
- ACF/NCP Version 3 capability to unconditionally force the deactivation of an ACF/NCP link and all its attached submodes.
- Dynamic buffer pool allocation to optimize the use of main storage.
- Session pacing to help avoid buffer overruns.
- Specifying on the PATH macro or an exit routine, the maximum and minimum pacing window size to be used on a route.
- Dynamic display and dump of ACF/NCP storage.
- SDLC data link test, terminal connectivity test, route test, transmission group trace, and intensive mode recording of SDLC data link errors in single-system networks, multiple-system networks, and interconnected-system networks to assist in network problem determination.
- Dynamic collection of tuning statistics.
- Network operation and control facilities that allow users to monitor, control and reconfigure the network to meet fluctuating requirements. The network configuration may be changed while the network is being used.
- Concurrent tracing of up to eight ACF/NCP lines.
- Ability to trace events that are occurring internally between ACF/VTAM modules.
- Session outage notification to both ends of a session if the supporting route becomes inoperative.
- Flow control to manage networks during periods of peak demand.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices.
- CCITT X.21 switched protocols when the communication controller is natively attached to an X.21 network.
- Task-oriented reference library, including a master index.

ACF/VTAM Version 2 Release 2 is a complete replacement for previous releases of ACF/VTAM, including those that use the Multisystem Networking Facility.

**Note:** Refer to "Special Sales Information" for a list of the ACF/VTAM V2R2 capabilities not included in previous releases of ACF/VTAM.

**SPECIAL FEATURES:** The ACF/VTAM Version 2 Release 2 Encrypt/Decrypt optional feature, in combination with the Programmed Cryptographic Facility program product, provides the following functions:

- Permits encryption and decryption of messages between logical units in single, multiple-domain and interconnected networks.
  - Multiple-domain networks require the Encrypt/Decrypt feature to be installed in each domain that uses cryptography.
  - Interconnected networks require the Encrypt/Decrypt feature to be installed in each ACF/VTAM (SSCP) in the session route in order to support cryptographic sessions.
- Permits ACF/VTAM application programs generally to run unaltered with the Encrypt/Decrypt feature and allows them to select encryption for particular sessions or for particular messages within sessions.

### DESCRIPTION

#### SUMMARY and ADVANTAGES

ACF/VTAM V2R2 is an SNA (Systems Network Architecture) access method with which users can build and interconnect data communication networks. Using SNA within or between networks:

- Provides a consistent and comprehensive structure for communication system growth.
- Minimizes the effects of system changes.
- Distributes network functions away from host processors.
- Allows sharing of network resources.
- Supports many different kinds of communication devices.
- Extends system functions conveniently and effectively to users.
- Minimizes users' involvement in details of system operation.

ACF/VTAM V2R2 supports several related IBM programs, as well as user-written application programs, all of which can share the network resources. This provides for a more efficient use of lines, terminals, communication controllers, channel-to-channel adapters, and other network resources, because they are not dedicated to a single application program.

#### Interface for Application Programs

- Provides an application program interface (API) compatible with previous releases of ACF/VTAM on OS/VS2 (MVS).
- Provides for the direct transmission of messages between application programs and terminals, making the network communication elements, such as the communication links and the communication controllers, transparent to the application program. It permits the use of resources without specifying knowledge of their location.
- The program operator facility of the application program interface allows an authorized user-written application program to enter ACF/VTAM operator commands and receive ACF/VTAM operator messages.

#### Single and Multiple Host Support

- Can be used in a single-system, multiple-system, or interconnected-system environment (with its integrated multisystem networking and SNA network interconnection capabilities).
- In a multiple-system environment or interconnected-system environment, ACF/VTAM V2R2 can be connected\* to other processors that have installed one of the following IBM program products:
  - ACF/VTAM Version 2 Release 1 or 2.
  - ACF/VTAM Version 1 Release 3 with the Multisystem Networking Facility feature.
  - ACF/VTAME.
  - ACF/TCAM V2R4 with the Multisystem Networking Facility feature.

\* A cross-domain connection can be through an SDLC cross-domain link or through a channel-to-channel adapter (not applicable to VSE) including MVS guest operating systems on VM/370, or through a communication controller with the multiple channel attachment capability supported by ACF/NCP (not applicable to ACF/VTAME), depending on the cross-domain connections supported by the other SNA hosts in the multisystem network. A cross-network connection must be through an SDLC link-attached or channel-attached communication controller operating with ACF/NCP Version 3.

Multi-system and interconnected-system connection capability allows application programs and terminals that are controlled by ACF/VTAM

## ACF/VTAM V2 R2 (cont'd)

V2R2 to communicate with application programs in another domain or network. It also allows application programs and terminals controlled by another domain or network to communicate with ACF/VTAM V2R2 application programs.

Through adequate planning and network design, multisystem networking and SNA networking interconnection may provide:

- Significant extension of the services available to the end-users of the various connected SNA hosts, regardless of the domain or network in which the resources reside.
- Backup services to the end-users, when a failure occurs in certain elements of the network.
- Balancing of the processing load in the various hosts.

**Interconnected SNA Network Support:** Allows two or more distinct SNA networks to be interconnected. Connections occur without redefining subarea addresses, logical unit (LU) names, class or service names, or logon mode table names. End-user-initiated sessions can be established between LUs in any two interconnected networks using the same session initiation procedures currently used in those networks. Thus, the operation of interconnected networks is transparent to the end-users. The major SNA network interconnection facilities provided in ACF/VTAM Version 2 Release 2 include:

- Gateway Systems Services Control Point (SSCP) - Using the gateway node facilities provided by ACF/NCP Version 3, sets up the name translations and network address translations needed to support cross-network sessions in interconnected SNA networks.
- Multiple Gateways - Allow the gateway SSCP to select a gateway node for cross-network LU-LU sessions independently of the gateway node used to set up the session with the adjacent SSCP.
- Adjacent SSCP Routing - Allows the gateway SSCP to use a list of adjacent SSCPs to determine the next SSCP on the session-initiation path to a destination network or destination SSCP for an LU-LU session. One or more multiple adjacent SSCP definitions can be filed and activated individually.

**Default SSCP Selection:** Allows one or more default SSCPs to be defined to each ACF/VTAM host. A session setup request for a logical unit is sent to each of the default SSCPs in turn until the setup succeeds, or until all the SSCPs have been tried without finding the SSCP that owns the logical unit. In a single network, this list of default SSCPs is used when the owner of the destination logical unit is not defined to ACF/VTAM, and thus the owning cross-domain resource manager (CDRM) is not identified. In an interconnected environment, this list is used when neither the destination network nor the destination SSCP is known to ACF/VTAM or when ACF/VTAM is not in session with the destination SSCP. It is also used when there is no list of adjacent SSCPs for the destination network.

**Extended NCP Interconnection:** Capabilities for interconnecting communication controllers in single and multiple-system networks. A communication controller may be link-attached through transmission groups to one or more channel-attached and/or link-attached communication controllers.

These capabilities can significantly expand the installation's configurability options. They can also improve the overall efficiency of the network, and improve the ability of a host system to take over a communication controller whose current owner (or a link to that owner) has failed or has been deactivated.

**Extended NCP Ownership:** In single system and multisystem networking networks, as many as eight host systems can share the ownership of an NCP in a communication controller that is channel-attached\* and/or link-attached to another communication controller(s). If one of the host systems fails or gives up control of the communication controller, each of the remaining host systems is notified. This notification serves as a signal for using the take-over capability described below. Extended NCP ownership does not apply across network boundaries. Host systems that share ownership of an NCP in a communication controller can also share ownership of SDLC links that connect the communication controller to other communication controllers. When the force deactivate facility of ACF/VTAM V2R2 is used to deactivate a shared NCP link, the link is unconditionally deactivated, and each of the sharing owners is notified. Each of the host systems is also notified if a link that it owns fails, or if the adjacent communication controller becomes inoperative.

\* The channel and SDLC link attachments cannot exceed the number of channels and SDLC links supported by the communication controllers.

**Channel-Attached NCP Communication without NCP Activation:** Allows an ACF/VTAM Version 2 Release 2 data host to establish contact with a channel-attached ACF/NCP that has been activated by another ACF/VTAM. Data can then be transferred between the data host and the communication controller without the need for an NCP definition in the data host. The makeup of the network is transparent to the data host. This facility also prevents the data host from issuing requests on the SSCP session that could affect the configuration of the communication controller or of other nodes.

**Forced Deactivation of an NCP Link:** Supports the ACF/NCP Version 3 capability to unconditionally reset a 'hung' NCP link without requiring the user to re-IPL the NCP. Previously, the FORCE operand of the VARY INACT command deactivated the link's subnodes, then it deactivated the link. This processing required ACF/VTAM to send I/O for each PU on the link, then send I/O for the link itself. The new support requires only one I/O to reset the link and all attached subnodes.

**Downstream Load Utility Program Product Support:** Via an SDLC link-attached communication controller operating with ACF/NCP, ACF/VTAM V2R2 supports the Downstream Load Utility licensed program's ability to load data into the 8775 Display Terminal or equivalent devices such as the 7426 Terminal Interface Unit.

**Switched Network Backup:** Switched network backup support for SNA-SDLC devices allows (a) control unit(s) associated with a failed or deactivated nonswitched line to be reactivated through an alternate, switched line, or (b) terminals associated with a failed or deactivated control unit (switched or nonswitched) to continue to receive communication support through reconfiguration to a backup, switched control unit.

**Network Communications Control Facility (NCCF) Program Product Support:** ACF/VTAM V2R2 provides an interface to support the problem determination and network operation facilities offered by NCCF.

**Network Terminal Option (NTO) Program Product Support:** Provides support to users who environment while continuing to access the following non-SNA terminal devices:

- 2740 Communications Terminal mdl 1.
- 2741 Communications Terminal.
- 3101 Display Terminal (TWX mdl 33/35).
- 3780 Data Communications Terminal (BSC).
- 6733 Typewriter Communication Module (TWX mdl 33/35).
- Western Union Teletypewriter Exchange Services (TWX mdl 33/35).
- World Trade Teletypewriter Terminal (WTTY) (nonswitched only).

**NLDM Program Product Support:** ACF/VTAM V2R2 supports the Network Logical Data Manager (NLDM) program product that runs as an application program on NCCF.

- Integrated support for the Network Logical Data Manager (NLDM) Release 1 program product. (This support was available for MVS systems in ACF/VTAM Version 1 Release 3 and Version 2 Release 1 through PTFs.) ACF/VTAM supplies path information unit (PIU) trace data and session notification data to NLDM. ACF/VTAM accepts requests from NLDM to:
  - Activate or deactivate the PIU data capture function within ACF/VTAM.
  - Initiate or terminate tracing of PIUs that flow within ACF/VTAM to or from a specified network resource or resource type.
  - Initiate or terminate session notification processing.
- Support for the Network Logical Data Manager (NLDM) Release 2 program product. ACF/VTAM supplies NLDM Release 2 with the information it needs to perform route tests and enhanced problem determination in single and interconnected networks.
  - Information about cross-network sessions as they appear to the ACF/VTAM network, and as they appear to an adjacent network through which the session path flows. ACF/VTAM also supplies information about which networks contain the session endpoints, and each resource's network name in the network where it resides.
  - Information about the route being used by a session that has a session endpoint within the domain of the SSCP.
  - Information about the route used by a cross-network session within the network where an SSCP resides, and within adjacent networks, when the SSCP is acting as a gateway SSCP for the session.
  - The ability to test the connectivity of a route within its network or an adjacent network.
  - Time-stamped session start and session end notification data, thus allowing session awareness processing to begin after sessions have been established.

**Application-to-Application Communication:** Communication between two ACF/VTAM application programs offers users greater flexibility to design and implement more efficient application program processing in a network. For example, a single application may provide centralized processing for other application programs as well as terminal users. This may eliminate duplicate processing support, and optimize the use of system resources among multiple application programs. This facility also adds the flexibility for multiple sessions to operate concurrently

## ACF/VTAM V2 R2 (cont'd)

between two application programs that reside within a single host system or across different host systems.

**Negotiable Session Initialization Parameters:** Permits increased application program control of sessions between user-written application programs that reside within a single host system or across different host systems or networks. During session initialization, two application programs (through the ACF/VTAM application program interface) can dynamically exchange certain session parameters to establish and/or modify transmission control and integrity of session data. With this capability, it may be possible for a user to simplify the predefined installation of intercommunicating application programs.

**Parallel Links:** Multiple active SDLC links between adjacent communication controller links allow data traffic to flow simultaneously over two or more SDLC links between adjacent communication controllers. All such links can be operational and in use at the same time, and each can be activated or deactivated independently of the others. This capability can provide increased message flow and improve the availability and reliability of transmissions between communication controllers.

**Transmission Groups:** Logical groupings of transmission links between adjacent network nodes allow a user to define up to eight transmission groups, each with one or more SDLC links between adjacent communication controllers. A transmission group permits multiple SDLC links to be defined as a single logical link. Only a single transmission group containing a single link is supported between adjacent subareas connected through a communications adapter. A single channel between a host and its channel-attached communication controller is also defined as a transmission group. If a link or links in a transmission group fails, session traffic will automatically be placed on remaining active links without loss of data. This ensures the reliability and availability of service between communication controllers. Multiple transmission groups and appropriate route selection permit a user to specify message traffic for different application programs to flow through a network over pre-assigned transmission groups. For example, interactive processing may be assigned one group and batch processing may be assigned a different group, each with its own physical link support.

**Multiple Routes:** A user may define up to eight routes for SNA or non-SNA message transmission between two host systems or between a host system and a communication controller. When a session is initiated between two application programs or between a terminal and an application program, one of the routes is automatically selected to transmit the session traffic. The user may limit the selection to a particular route or to one of an ordered sequence of routes. Thus, it is possible to distribute the traffic for different sessions to different routes, dividing the load among several routes. Parallel sessions between two application programs can take advantage of multiple routes so that failure of route does not disrupt all sessions.

The ordered sequence of routes, determined by the installation, defines the set of alternate routes available for session traffic. In the event a route becomes inoperative during a session, the application program or terminal may request that the session be re-initiated. This causes automatic selection of one of the alternate routes. The user can then resynchronize the session data traffic and continue data communication and application program processing over the network routes that remain in operation.

**Multiple Priority Levels:** A user can specify one of three message traffic priorities for a session between two application programs or between a terminal and an application program. For example, this permits message traffic for a time-dependent session to be transmitted through a network ahead of other message traffic. That is, interactive processing may be given top priority by users while other network traffic, such as batch processing, is assigned to a lower priority by users.

**TSO/VTAM Support:** ACF/VTAM provides time sharing support through its integrated time sharing option (TSO/VTAM). TSO/VTAM extends the line and terminal sharing benefits of ACF/VTAM V2R2 to TSO users. TSO is a standard feature in OS/VS2 (MVS) that provides conversational time sharing facilities.

- TSO/VTAM allows installations to specify whether data is to be treated as 'confidential text' or not. Data not to be treated as confidential text remains unaltered in the ACF/VTAM buffers and may aid in problem determination.
- Provides the capability to initiate and terminate a generalized trace facility (GTF) trace for individual TSO/VTAM user sessions.
- ACF/VTAM allows the ACF/VTAM operator to specify a TSO user identification on a Display command. The output of the display will contain:
  - An indication that this is a TSO userid display.
  - The application program name (for example, TSO0005).
  - The terminal name (for example, SNA3270B) associated with the specified userid.
  - The status as known by ACF/VTAM of both the application program and the terminal.

– An indication as to whether the TSO/VTAM GTF trace is in effect for this TSO userid.

- Screen-size support for type-1 logical units. TSO/VTAM now supports the TSO TERMINAL SCRSIZE command for type-1 logical unit devices, as well as for type-0 and type-2 logical unit devices supported already. The TERMINAL SCRSIZE command sets the number of characters per line and the number of lines on a screen. The TERMINAL SCRSIZE command will now be valid for any type-1 logical unit display or printer. (This support was available, through PTFs, in ACF/VTAM V1R3 and V2R1.)
- ASCII-8 support for users. TSO/VTAM users can now use the ASCII-8 code set defined in ANSI X3.41. TSO/VTAM translates I/O to and from ASCII-8 devices that are defined as such in the logon mode table. The appropriate ASCII-7 or ASCII-8 alternate code indicator is set in the attributes area specified by the GETTERM ATTRIB operand.
- Support for the 3290 Information Panel. The 3270-compatible functions of the 3290 are supported in SNA and non-SNA networks, and the enhanced functions of the 3290 are supported in SNA networks. This support, which was also provided in ACF/VTAM Version 2 Release 1 through PTFs, includes:
  - A logon mode table entry for the 3290.
  - Ability to use any bit string in the address bytes of data streams destined for the 3290, thus allowing access to device buffer positions beyond 4,096.
  - Using only one SEND for request/response units (RUs) destined to type-2 logical unit devices, regardless of the outbound RU size, thus improving performance. (ACF/VTAM builds chains as required.)

**Multiple Host System Restart:** In recovering from a failure situation, two host systems can restart their SSCP-SSCP session without disrupting existing cross-domain or cross-network LU-LU sessions. This permits user application programs that are not affected by such a failure to continue operations during and after recovery of the host systems' SSCP-SSCP session.

**Communication Controller Session Takeover:** In the event a host system fails or otherwise gives up control of a communication controller, any host system that is sharing ownership of the same communication controller will have its network operator notified about the lost host. Any of the notified host systems can take over control of the devices mentioned above without disrupting their existing cross-domain sessions with application programs. It is unnecessary to deactivate corresponding cross-domain resource definitions before acquiring resources attached to the communication controller that were controlled by the lost host system.

**Host-Terminal Control Session Restart:** In recovering from a host failure or a route failure on the host-to-terminal control session, a host system can recover its control session for most IBM devices that are SDLC link-attached to PU type 2 control units without disrupting the existing sessions between the devices and application programs. This permits user application programs that are not affected by such a failure to continue processing during and after recovery of the control session. For other terminals, restart of the control session results in session outage notification.

**Note:** Some devices or control units may require a specific EC level of hardware or microcode to support this function. The appropriate documentation for the various SNA terminal products should be reviewed.

**Dynamic Buffer Allocation:** ACF/VTAM can dynamically allocate main storage for buffer pools according to message traffic loads and availability of main storage resources. This gives users considerable flexibility to optimize the use of main storage for buffer pools and determine buffer pool space requirements that are consistent with throughput and response time.

**Inbound Pacing Support for 3270, 3730, 3790 and 8100:** This facility is supported as a user-selectable session establishment function under ACF/VTAM V2. Pacing of inbound message traffic for a user application program can help avoid buffer overrun.

**VTAM as a User Task:** Permits the operator to unconditionally terminate ACF/VTAM V2, without waiting for resources to be released. Upon termination, all system resources acquired by ACF/VTAM are released, and the address space may be used for other purposes.

**Session Management Exit Routine:** Provides a single exit through which an installation can combine the session-related functions of authorization, accounting and gateway node path selection.

Although designed with special considerations for cross-network sessions, this exit may also be used for single-network sessions. In this case, at the option of the installation, the session management exit routine can replace the existing authorization and accounting routines.

When used with cross-network sessions for gateway path selection, the exit is passed a list of alternate gateway paths and LU names of the

## ACF/VTAM V2 R2 (cont'd)

session partners. The routine can modify the order of the list or shorten it, thus changing the way in which the gateway paths are considered for use in setting up a particular session. This gives the installation an opportunity to distribute LU-LU sessions across gateway NCPs according to an installation's particular requirements.

**Dynamic Display of ACF/NCP Storage:** Allows a network operator to display any contiguous 256 bytes of ACF/NCP storage without disrupting normal ACF/NCP operation. This display capability, provided in hexadecimal representation on a network operator console, can be useful in dynamically evaluating network problem situations.

**Dynamic Dump of ACF/NCP Storage:** A network operator can invoke a dump of ACF/NCP storage from a channel-attached or SDLC-attached communication controller. Since ACF/NCP continues to operate during the dump process, the dump will represent ACF/NCP status over a period of time. The dump contents are recorded and printed via the facilities of the appropriate System Support Program (SSP) for ACF/NCP and can be useful in dynamically evaluating network problem situations.

**Dump for the 3725:** The 3725 operator can dump the microcode for the communication scanner processor (CSP) and maintenance and operator subsystem (MOSS). ACF/VTAM writes the dumps on specified files.

**SDLC Data Link Test:** Offers the capability to dedicate one station on an SDLC link to testing while allowing the remaining stations on that link to remain active. When a station comprises a cluster control unit and its attached devices, the control unit is dedicated to the test and its attached devices are deactivated.

**Terminal Connectivity Test:** Provides the capability of initiating an echo test from the terminal end of a session to determine that a terminal and its connection to ACF/VTAM V2 are functioning properly. The test does not interfere with other stations on the link or with other devices on the same control unit.

**Route Verification and Error Notification Facilities:** A network operator can determine if a cross-domain or cross-network message route originating in that, or an adjacent host, is operative or inoperative. This permits the operator to verify the availability of routes and to take corrective action for routes that may have become inoperative. It also permits the operator to verify that a route has been returned to service following a failure or deactivation. During the verification, appropriate resource owners are notified when an inactive or failed resource is encountered on a route.

In addition, if during network operation a route fails, an awareness message is issued at the host system end point(s), identifying the inoperative route to the operators. This enables an operator to take appropriate action to minimize the effects of an unusable message on application programs.

**Transmission Group Trace:** The SNA headers of message traffic over a transmission group between two communication controllers can be traced as if it were a single SDLC line. This allows for the collection of transmission control information without tracing the entire message.

**Intensive Mode Recording of SDLC Data Link Errors:** A network operator can dynamically invoke and terminate recording of information about temporary errors that may be occurring on an SDLC data link. This capability supplements support that records permanent error information and permits a user to collect additional information on SDLC data link errors. This detailed information may preclude the need for more specific testing to re-create an error.

**Tuning Statistics:** A tuning statistics function permits dynamic accumulation of data about the I/O interface to a channel-attached communication controller, a channel-attached 3790 or channel-attached host processor. Such data may aid a user in determining and selecting optimum values for start parameters and network definition.

**Operator DISPLAY Command:** ACF/VTAM DISPLAY commands permit a network operator (or programmed operator application) to obtain information about the status of network resources; that is, nodes, lines, terminals, logical units, physical units, application programs and buffers. Such information may be useful for status purposes, for performance analysis or to determine if an action is required for a failing element in the network.

This information provides both detailed status to the network operator and serves also as an aid for problem determination. When appropriate, the resource's status will have an identifier appended to it indicating that it is either a virtual resource (i.e., a Network Terminal Option resource) or, has been reconfigured by the Dynamic Reconfiguration facility or, in the case of network backup, has been acquired from another host system's domain. Session and resource status information is included in the display output to aid the network operator in resource management.

**Multiple Line Trace:** Provides the capability to trace concurrently a maximum of eight lines with ACF/NCP. The trace data is recorded on a file and may be printed using the ACF/TAP (Trace Analysis Program) System Support Program (SSP) of ACF/NCP.

**VTAM Internal Trace:** ACF/VTAM provides:

- The ability to trace events that occur between ACF/VTAM modules.
- The ability to terminate or initiate the VTAM Internal Trace Facility at ACF/VTAM initialization time.
- The ability to have the VTAM Internal Trace records recorded on an external file.
- The ability to trace session setup, session takedown, and BIND failures.
- The ability to trace ACF/VTAM I/O activity.

**3725 Scanner Interface Trace:** ACF/NCP for a 3725 Communication Controller forwards data collected by the CSP line scanner to ACF/VTAM, which writes it on a specified file.

**Session Outage Notification:** If the route supporting a session becomes inoperative, then, via SNA protocols, the session ends are made aware of the outage. Session re-initiation may be requested as described under "Multiple Routes".

**Flow Control Management of Network Traffic Demands:** SNA protocols dynamically regulate the message traffic flow between a host system and a communication controller and between two host systems. Continuous feedback is exchanged between network resources in order to regulate network traffic and reduce the possibility of network congestion. When necessary, the feedback triggers local flow control mechanisms in ACF/VTAM. Application programs and local terminals may be temporarily prevented from introducing more data into a congested network.

**Dynamic Reconfiguration of Nonswitched SNA-SDLC Devices:** Allows the network operator to selectively add or delete supported nonswitched SNA-SDLC devices, without disrupting other network functions. This capability supplements the ACF/NCP generation process, and supports temporary configurations in a non-disruptive fashion until a permanent network control program generation can be done.

**Limited Usage of Application Program Private Area:** ACF/VTAM allows an installation, when defining an application program, to limit the amount of private area storage ACF/VTAM may request to queue data arriving for the application program.

### Reliability and Availability

- Capability to have the application program span multiple address spaces:

ACF/VTAM V2R2 permits application program interface (API) requests from a single application program to originate from different address spaces and to reference a single application program access method control block (ACB). This multiple address space facility provides application programs with capabilities for error isolation and session protection. This capability will also allow application program design flexibility by permitting individual sessions to be assigned to their own address space while being allowed to reference a single ACB. Improved operation may also be achieved by grouping sessions with similar characteristics or functions to be performed in one address space.

- Levels of error isolation:

To minimize the disruption caused by an error detected while ACF/VTAM is processing, ACF/VTAM attempts to isolate the error to:

- The failing API request.
- The session issuing the API request.
- The task containing the session.
- The application program.

Also, if a task or address space is terminated while processing for other than ACF/VTAM, ACF/VTAM attempts to isolate the disruption to the task structure or address space involved.

- OS/VS2 (MVS) authorized path mode of operation for ACF/VTAM application program interface (API) macro instructions and exit routines:

– An ACF/VTAM V2R2 authorized application program may use the ACF/VTAM API macro instructions and exit routines in the OS/VS2 (MVS) authorized path mode of operation (using the system request block (SRB) mode of operation). All API macro instructions (except for the OPEN, CLOSE, MODCB, TESTCB, GENCB and SHOWCB macro instructions) can be used in this mode of operation. Selection of authorized path mode is under control of the application program through API macro instruction operands.

– All exit routines associated with an ACF/VTAM V2R2 application program can make use of this authorized path mode of operation. The selection of authorized path mode is specified when the application program is defined.

PROGRAM PRODUCTS

ACF/VTAM V2 R2 (cont'd)

- Application programs selecting the authorized path mode of operation may realize improved ACF/VTAM performance.

**CCITT X.21 Support:** ACF/VTAM V2R2 supports the following CCITT X.21 switched functions when attached to an X.21 network through a communication controller:

- Address calling.
- Auto answer.
- Call progress signal.
- Direct call.
- Closed User Groups.
- Abbreviated Address Calling.

RELATED IBM PROGRAMS

The following related IBM programs and program products are supported by ACF/VTAM V2 R1:

TYPE	PROGRAMS
Data Base/ Data Communication	CICS/VS
	IMS/VS
Job Entry	FTP
	JES2/RJE
	JES2/NJE
	JES3/RJP
Interactive	IIPS/IIAS
	IIS
Device Support	TSO (2)
	TSO/E (2)
	VSPC
	VS APL (1, 2, 3)
	BTP Version 4
	DSLU
	DSX Release 2
	GDDM (1,2,3,5)
	Host Command Facility
	Host Prep (8100/DPCX Support)
	MVS/IDWS
	Network Routing Facility
	NTO Release 2
	Programmable Store System Host Support
SSS Release 5	
Systems and Communications Network Management	3600/4700 Finance Com'ctn. System Host Support
	Information/System Version 1 (2,4)
	Information/System Version 2 (2)
	NCCF Version 1 Release 2
	NCCF Version 2
	NLDM Releases 1 (4), 2 (4)
Distributed Data Processing	NPDA Versions 2, 3
	DISOSS/370 (1, 5)
	MVS/OCCF (4)

Notes:

- (1) Supported through CICS/VS.
- (2) Supported through TSO/VTAM.
- (3) Supported through VSPC.
- (4) Supported through NCCF.
- (5) Supported through IMS/VS

ACF/VTAM Version 2 Release 2 will support subsequent releases of the above programs and products unless otherwise stated in the announcement documentation for the future releases or modifications for ACF/VTAM.

Refer to the appropriate product documentation or to your IBM marketing representative for information on programming support for specific devices supported and other related IBM program capabilities.

ACF/VTAM V2R2 also will support user programs written to use the ACF/VTAM record application program interface (Record API).

CUSTOMER RESPONSIBILITIES

To install and use ACF/VTAM Version 2 Release 2, the customer must:

- Design the single system network.
- Order and install all required communication equipment.
- Install ACF/VTAM V2R2.
- Define the network to ACF/VTAM.
- Install a compatible release of ACF/NCP (unless all terminals are channel-attached to the host).
- Define the network to ACF/NCP (if applicable).

To use the ACF/VTAM V2R2 multisystem networking functions, the customer must:

- Design the multiple-system network.
- Order and install any additional communication equipment (e.g., intersystem links between communication controllers) or channel-to-channel adapters that may be required.
- Install ACF/VTAM V2R2.
- Install a compatible release of ACF/NCP (if required).
- Define the multisystem network to ACF/VTAM and ACF/NCP (if required) in each system.

To use the ACF/VTAM V2R2 functions for interconnected SNA networks, the customer must:

- Design the interconnected network.
- Install, or upgrade to, a compatible release of ACF/NCP.
- Order and install any additional communication equipment (e.g., inter-network links between communication controllers).
- Define to each ACF/VTAM V2R2 all networks that will interconnect.
- Define to each ACF/NCP Version 3 (V3) all networks that will be interconnected, including COS entries and VR lists.
- Install ACF/VTAM V2R2 in the gateway hosts.
- Install ACF/NCP V3 in the gateway nodes.
- Install NCCF Version 2 (if required for resource name translation).\*
- Specify the alias/real name equivalencies if the NCCF name translation facility is used.
- Install NLDM Release 2 (optional).\*

\* For an SNA network interconnection environment, IBM recommends that NLDM Release 2 and NCCF Version 2 be present at every VTAM host that serves as a gateway node to support the problem determination effort for cross-network sessions. With these products installed, the network operator will have access to data used for network problem determination and problem source identification.

Certain tasks, such as installing links, updating path tables in non-gateway NCPs and hosts, and updating CDRM and CDRSC statements in back-level hosts can be done before ACF/VTAM V2R2 is installed.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

ACF/VTAM Version 2 Release 2 is designed to run in a virtual storage environment in any IBM system configuration that supports OS/VS2 (MVS) as specified in "Software Requirements".

The host processor instruction set must include the Compare and Swap, the Compare Double and Swap and the Set PSW Key from Address (SPKA) instructions.

For remote or cross-domain communication, ACF/VTAM V2R2 requires an IBM 3705 or 3725 Communication Controller, with the

**ACF/VTAM V2 R2 (cont'd)**

appropriate level of ACF/NCP or a channel-to-channel adapter connecting it to another ACF/VTAM Version 2 host.

For cross-network communication, ACF/VTAM V2R2 requires an IBM 3705 or 3725 Communication Controller with the appropriate level of ACF/NCP.

**Storage Considerations:** Preliminary requirements for host processor storage and for disk storage for ACF/VTAM data sets can be calculated by using the *Network Program Products Planning* manual (SC27-0658). Requirements for disk storage for ACF/NCP data sets and for communication controllers can be calculated by using information in the same manual.

**SOFTWARE REQUIREMENTS**

ACF/VTAM Version 2 Release 2 is designed to run with the following operating system releases:

- OS/VS2 (MVS) Release 3.8, optionally with:
  - MVS/SP Version 1 for S/370.
  - MVS/SP Version 2 for Extended Architecture (XA) processors (ACF/VTAM with MVS/XA operates in 24-bit mode).

ACF/VTAM Version 2 Release 2 will also run on subsequent releases or modifications of OS/VS2 (MVS), unless otherwise stated in the announcement documentation of the future releases or modifications for it or for ACF/VTAM.

ACF/VTAM V2R2 will run in a VM/370 environment in a guest virtual machine.

The optional ACF/VTAM Encrypt/Decrypt feature requires the Programmed Cryptographic Facility program product (5740-XY5) or the Cryptographic Unit Support program product (5740-XY6).

For remote communication, ACF/VTAM V2R2 requires ACF/NCP Version 1 Release 3, Version 2 or Version 3 running in an IBM 3705 or 3725 Communication Controller.

For cross-network communication, ACF/VTAM V2R2 requires ACF/NCP Version 3 running in a communication controller.

For cross-network communication with networks that have identically named resources, an alias name translation facility is required to provide name translations between the interconnected networks. NCCF Version 2 provides this function.

To provide NLDM Release 2 with complete session route data, ACF/NCP Version 3 is required at all the subarea nodes along the session route.

**COMPATIBILITY**

The ACF/VTAM V2R2 application program interface (API) is upward compatible with the ACF/VTAM Version 1, ACF/VTAM V2R1 and VTAM level 2 API. Where related IBM programs (for example, CICS/VS, IMS/VS, JES2/RJE, JES2/NJE, JES3/RJP, TSO, VSPC, NCCF, etc.) operate with ACF/VTAM Version 1 or VTAM level 2, compatibility is retained for the level(s) of those programs that are current at the availability of ACF/VTAM V2R2 on OS/VS2 (MVS), except for the cases where support for specific release level(s) of these products has been indicated elsewhere in these pages. Recompilation of the related IBM programs is not required.

Application programs that use the macro language and control block record mode interface of ACF/VTAM Version 1 or VTAM level 2, should continue to operate without recompilation on the same operating system with ACF/VTAM V2R2, provided that these programs do not depend on the internal processing characteristics of these access methods.

Beginning with ACF/VTAM Version 2 Release 1, the length of the access method control block (ACB) was increased. Application programs that have been properly coded using the *ACF/VTAM Programming* manual to run on ACF/VTAM Version 1 and ACF/Version 2 Release 1 will run without reassembly on ACF/VTAM V2R2.

Program operator application programs that have been properly coded using the *ACF/VTAM Programming* manual to run on ACF/VTAM Version 1 or ACF/VTAM Version 2 Release 1 will also run on ACF/VTAM V2R2.

ACF/VTAM Versions 1 and 2 for OS/VS1, ACF/VTAM Version 1 for VSE, and ACF/VTAME have the following restrictions in the use of the automatic logon function (VARY LOGON or LOGAPPL):

- Controlling PLU relationships cannot be established between the above VTAMs and ACF/VTAM V2R2.
- Cross-network controlling PLU relationships cannot be established to or from the above VTAMs in an SNA network interconnection environment.

The restrictions above also exist for ACF/VTAM V2R1 and V1R3 for MVS, and for ACF/VTAM V2R1 for VSE. For these levels of

ACF/VTAM only, however, the restrictions may be removed by applying a compatibility PTF that will be available.

The possibility that a user could logon cross-domain to an application program using the application program's ACB name has been eliminated in ACF/VTAM V2R2. While this use of the ACB name is not documented or recommended, it was possible in previous releases of ACF/VTAM. With ACF/VTAM V2R2, a user can logon to a cross-domain application program only by using the application program's network name, as documented in the ACF/VTAM publications.

Application programs written for previous releases of ACF/VTAM or VTAM Level 2 may require changes to take advantage of the additional functions offered by ACF/VTAM V2R2.

**MIGRATION and PLANNING CONSIDERATIONS**

The recommended bases for migration to ACF/VTAM Version 2 Release 2 are ACF/VTAM Version 1 Release 3 and ACF/VTAM Version 2 Release 1.

A checklist of conversion/migration planning considerations for current users of BTAM, BTAM/SP and previous releases of ACF/VTAM is included in the *Network Program Products Planning* manual (SC27-0658).

When migrating to ACF/VTAM Version 2 Release 2 from a prior release of ACF/VTAM, the following should be considered:

- ACF/VTAM support of associated IBM program products.
- Choosing the migration path.
- Upgrading to ACF/VTAM V2 R2.
- Upgrading NCPs.
- Functional compatibility with networks having various supported levels of ACF/VTAM and ACF/NCP.

An ACF/VTAM V2R2 host does not support an ACF/NCP V1 R2.1 in its domain. A V1 R2.1 NCP cannot be channel attached to, or controlled by a V2R2 VTAM host. However, an ACF/VTAM V2R2 does support LU-LU sessions with ACF/NCP V1 R2.1 for cross-domain and cross-network communications.

**ACF/NCP CONSIDERATIONS**

The following ACF/VTAM V2R2 enhancements are supported only in conjunction with ACF/NCP V3:

- SNA Network Interconnection.
- Forced deactivation of an NCP link.
- NLDM Release 2 Route Test Data.

The VTAM-NCP support table that follows lists the releases of each product through which SSCP-PU, SSCP-LU, and LU-LU sessions are supported. It can be used to plan migration from previous releases of VTAM to ACF/VTAM V2R2.

NCPs	NCP5	V1 R1	V1 R2	V1 R2.1 (7)	V1R3 (7)	V2	V2	V3	V3
VTAMs						3705	3725	3705	3725
VTAM2	yes	yes (1)	yes (2)	yes (2)	no	no	no	no	no
V1R1	yes	yes	yes (3,4)	yes (3,4)	yes (6)	no	no	no	no
V1R2	no	yes	yes	yes	yes	no	no	no	no
V1R3 (12)	no	no	yes (5)	yes (5)	yes	yes	yes (8)	yes (9)	yes (8,9)
V2R1 (13)	no	no	no	yes (5)	yes	yes	yes (10)	yes (11)	yes (10,11)
V2R2	no	no	no	no	yes (14)	yes	yes	yes	yes

**Notes:**

- (1) With applicable VTAM Level 2 PTFs.
- (2) OS/VS only, with applicable VTAM level 2 PTFs:
  - OS/VS1: UX14242.
  - OS/VS2 (MVS): UZ28810.
- (3) Not supported on VSE.
- (4) With applicable ACF/VTAM V1R1 PTFs:
  - DOS/VS Release 34: UD17664.
  - OS/VS1: UX14243.
  - OS/VS2 (MVS): UZ28811.

**ACF/VTAM V2 R2 (cont'd)**

- (5) With applicable ACF/NCP/VS V1R2 or V1R2.1 PTFs when connected to ACF/NCP/VS V1R3 or later.
- (6) OS/VS only, with applicable ACF/VTAM V1R1 PTFs:
  - OS/VS1: UX14243.
  - OS/VS2 (MVS): UZ28811.
- (7) With EREP PTFs for Link Problem Determination Aid (LPDA) level maintenance data records.
- (8) OS/VS2 (MVS) only, with ACF/VTAM V1R3 PTFs UZ90205, UZ90206, UZ90207 and UZ90208. (ACF/VTAM V1R3 for OS/VS1 and DOS/VS does not support sessions with ACF/NCP for the 3725.)
- (9) With applicable ACF/VTAM V1R3 PTFs:
  - OS/VS2 (MVS): UZ62633.
  - OS/VS1: UX18990.
  - DOS/VS: UD26545.
- (10) With ACF/VTAM V2R1 OS/VS2 (MVS) PTF UZ59682. (PTFs not required for OS/VS1 and DOS/VS systems.)
- (11) With ACF/VTAM V2R1 OS/VS2 (MVS) PTF UZ90186. (PTFs not required for OS/VS1 and DOS/VS systems.)
- (12) With applicable ACF/VTAM V1R3 PTF when the network contains any ACF/VTAM V2R2 or ACF/NCP V3 node(s):
  - OS/VS2 (MVS): UZ56422.
  - OS/VS1: UX17328.
  - DOS/VS: UD23966.
- (13) With ACF/VTAM V2R1 OS/VS2 (MVS) PTF UZ56421 when the network contains any ACF/VTAM V2R2 or ACF/NCP V3 node(s). (PTFs not required for OS/VS1 or DOS/VS systems.)
- (14) Supported for LU-LU sessions only. The 1.2.1 NCP cannot be channel attached to, or controlled by the V2R2 VTAM.

PTFs may be required in addition to those stated above. Contact your IBM support center for updated install information and recommended service before installing these products.

**OTHER CONSIDERATIONS**

As a result of some of the new capabilities in ACF/VTAM V2R2, minor network operational differences may exist with prior releases of ACF/VTAM.

A controlling PLU session set request (CDINIT) is always deferred (queued) when the PLU or SLU is owned by an adjacent SSCP and the single required SSCP-SSCP session is not active. Session setup in a single network involves only two SSCPs, therefore the session setup request is always deferred when the SSCP-SSCP session is not active. When networks are interconnected, the path between the controlling PLU and its associated SLU can be through several SSCPs. In this case, the setup request is not deferred if one or more of the required SSCP-SSCP sessions is not active, unless the PLU and SLU are owned by adjacent SSCPs. All deferred session setup requests are established automatically when the required SSCP-SSCP session becomes active. Cross-network session requests that are not deferred can be established by the operator issuing the VARY LOGON after all the required SSCP-SSCP sessions become active.

ACF/VTAM application programs generally will not need to be changed to operate with the Encrypt/Decrypt feature. However, there exist several SNA sense codes that deal only with unrecoverable errors associated with the Encrypt/Decrypt feature, and existing application programs that are not now using the Encrypt/Decrypt feature may need to be changed to handle these sense codes properly. Application programs that already operate properly with the Encrypt/Decrypt feature require no further modification to work properly with the ACF/VTAM Version 2 Release 2 Encrypt/Decrypt feature.

In a mixed ACF/VTAM-ACF/TCAM multisystem environment, the ability of ACF/VTAM to access device characteristics of terminals controlled by ACF/TCAM is limited to those indicators defined and maintained by ACF/TCAM. In particular, the ability to determine the physical device address of a 3271-11, 12 used in the copy function is not supported.

When using the ACF/VTAM capability to modify, replace, or suppress ACF/VTAM messages, it should be noted that user modification of information required for problem diagnosis, such as IBM-supplied command syntax and defaults, might impair the standard serviceability characteristics of the product and may increase the documentation requirements for reporting a problem to IBM. The IBM-supplied command CSECT should be retained for problem re-creation.

**CONVERSION**

Converting from BTAM or BTAM/SP to ACF/VTAM V2R2: Conversion to ACF/VTAM from application programs that use BTAM through CICS/VS, IMS/VS, or other IBM subsystems or programs that also support ACF/VTAM, will, in most cases, involve little or no reprogramming. The use of ACF/NCP in the Partitioned Emulation Programming (PEP) mode will ease the transition from BTAM to ACF/VTAM V2R2 since it allows concurrent use of BTAM and ACF/VTAM by the IBM subsystem or program and permits gradual conversion of communication links and terminals from BTAM to ACF/VTAM with ACF/NCP. This will help to avoid or minimize disruption of the services provided by the application program to its users.

Conversion to ACF/VTAM from application programs that use the BTAM macros directly involves reprogramming those application programs. The recommended approach is to redesign those application programs to use the IBM subsystems (such as CICS/VS or IMS/VS) and obtain multiple benefits, besides ACF/VTAM support, including:

- The intrinsic advantages of using the various data management, multi-tasking, device support, and other functions in the IBM subsystems that exploit and expand the capabilities offered by the operating system.
- Support for a wide variety of existing IBM terminals and other devices.
- Continued updating of support for new IBM terminals and other devices.
- Intersystem communication capabilities (on CICS/VS and IMS/VS).
- Little or no effect on the application programs as new releases of the operating system and access methods become available.
- High-level interface for application programmers that masks many of the complexities of communications programming.
- Relief to the application programmers from many of the tedious tasks involved in writing communication programs, thus providing more time for the development of the actual application programs and capabilities requested by the end-users.
- Availability of many programming tools and techniques that extend the capabilities of the IBM subsystems and increase the productivity of the application programmers through IBM program products that operate on the IBM subsystems (such as DL/I, DMS, GDDM, etc.).

As an alternative, the existing BTAM or BTAM/SP applications could be recoded to use the ACF/VTAM macros directly.

**DATA SECURITY, AUDITABILITY and CONTROL**

ACF/VTAM gives customer management the ability to:

- Establish and maintain the integrity of the data communication network.
- Control the connection of applications to terminals and other applications in the network.
- Elect a confidential text capability. Sessions may be defined as confidential text. This ensures that the data is not included in buffer traces, and buffers are cleared prior to being returned to the buffer pool.
- Encrypt communications. The ACF/VTAM Encrypt/Decrypt feature can be used to protect data transmitted within a network or across networks.
- Configure networks for security. Nodes sharing similar security requirements may be placed in an isolated (e.g., secure) network. SNA Network Interconnection allows communication between these nodes and less secure nodes in other networks. However, Network Management Operations originating from nodes in other (less secure) networks can not affect the isolated network.

In particular, auditors will find the following functions to be of interest:

- Control
  - Application-to-application communication
  - Negotiable session initialization parameters
  - Transmission group
  - Multiple priority levels
  - Application program interface
  - Optional user exits for authorization and accounting
- Integrity/Recovery
  - NCCF/NPDA
  - Error isolation
  - Multiple routes
  - Parallel links
  - Switched network backup
  - Route verification
  - Trace facilities

Customer management is responsible for the selection, application, adequacy, and implementation of these features in the protection of their data.

**PERFORMANCE and STORAGE CONSIDERATIONS**

ACF/VTAM V2R2 mainline path storage and common storage requirements are approximately the same as for equivalent functions using ACF/VTAM V2R1. ACF/VTAM V2R2 private virtual storage requirements have increased. Information on this increase will be available during First Quarter, 1984 via the HONE aids STORMVS and STORVTAM. Preliminary estimates of host processor storage and disk

**ACF/VTAM V2 R2 (cont'd)**

storage requirements are in the *Network Program Products Planning* manual (SC27-0658).

Response time in a single system environment depends on a variety of processor and data communication load factors, such as:

- Line speeds.
- Number, type and organization of terminals.
- Number and type of ACF/VTAM commands and exits used.
- Amount of processing done by the application program.

Response times in a multiple-system and interconnected-system environments depend on the factors above and on various network load factors, including the number of nodes traversed.

Hardware requirements are included in the "Specified Operating Environment" above.

Specific user storage requirements will be dependent on the specific configuration and upon the following user-specified areas and functions:

- I/O buffer areas.
- Number and organization of terminals.
- Number and type of macro instructions used.
- Number and size of NLDM program product trace buffers selected (optional).

The actual performance impact (if any) to a customer will vary depending upon his particular hardware and network configuration. IBM aids such as SNAP/SHOT should be used to assess individual customer performance capability and storage requirements.

**DOCUMENTATION:**

(available from Mechanicsburg)

*Network Program Products General Information* (GC27-0657) ...  
*Network Program Products Planning* (SC27-0658) ... *ACF/VTAM*  
*Licensed Program Specifications* (GC27-0609) ... *ACF/VTAM*  
*Installation and Resource Definition* (SC27-0610) ... *ACF/VTAM*  
*Programming* (SC27-0611) ... *ACF/VTAM Operation* (SC27-0612) ...  
*ACF/VTAM Customization* (SC27-0613) ... *ACF/VTAM Messages and*  
*Codes* (SC27-0614) ... *ACF/VTAM Diagnosis Guide* (SC27-0615) ...  
*ACF/VTAM Diagnosis Reference* (SC27-0621) ... *ACF/VTAM*  
*Reference Summary* (SX27-0027) ... *Network Program Products*  
*Bibliography and Master Index* (GX27-0216) ... *ACF/VTAM Logic*  
*(LY27-8034)\** ... *ACF/VTAM Data Areas* (LY38-3054)\* ... *ACF/VTAM*  
*Logic: Encrypt/Decrypt* (LY38-3055)\*.

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PP 5665-280.10

Nov 83

Major Revision

PROGRAM PRODUCTS

ACF/VTAM V2 R2 (cont'd)

ACF/VTAM VERSION 2 RELEASE 2 TERMINAL SUPPORT CHART

The following devices and subsystems are supported by ACF/VTAM Version 2 Release 2 for single system, multisystem, and interconnected system communications with host application programs.

Device or SubsystemName	Controlling Device-Model	PU <sup>1</sup>	S <sup>2</sup>	NS <sup>3</sup>
Channel-Attached SNA				
3270 Information Display System	3274-1A,-21A,-31A,-41A	2		
3790 Communication System	3791	2		
3730 Distributed Office Communication Syst				



PROGRAM PRODUCTS

ACF/VTAM V2 R2 (cont'd)

TSO/VTAM (ACF/VTAM V2R2) TERMINAL SUPPORT CHART

TSO/VTAM, through ACF/VTAM Version 2 Release 2, communicates with the following devices and subsystems:

Device or Subsystem Name	Controlling Device-Model	Terminal-Model	LU Type
Channel-Attached SNA 3270 Information Display System	3274-1A,-21A,-31A,-41A	3178	2
		3277-1,-2	2
		3278-1,-2,-3,-4,-5	2
3790 Communication System	3791-1A,-1B,-1C,-2A,-2B 3276-12	3279-2A,-2B,-3A,-3B,-2X,-3X,-S2A,-S2B,-S3G	2
		3290	2
		3277-1,-2	2
		3178	2
		3278-2	2
Link-Attached SNA (SDLC) 3101 Display Station 3232 Keyboard Printer Terminal 3270 Information Display System	7426-2 3232-1 3271-11,-12 3274-1C,-21C,-31C,-41C,-51C,-61C  3275-11,-12 3276-11,-12,-13,-14	3101-10,-13,-20,-23	2
		3277-1,-2	0
		3178	2
		3277-1,-2	2
		3278-1,-2,-3,-4,-5	2
		3279-1A,-1B,-2A,-2B,-2X,-3X,-S2A,-S2B,-S3G	2
		3290	2
		3178	0
		3279-2A,-2B,-3A,-3B,-2X,-3X,-S2A,-S2B,-S3G	2
		3178	2
3767 Communication Terminal 3770 Data Communication System	3767-1,-2,-3 3771-1,-2,-3 3773-1,-2,-3 3774-1,-2 3775-1	3277-1,-2	1
		3178	1
		3277-1,-2	1
		3178	1
		3277-1,-2	1
3790 Communication System 6580 Displaywriter 8775 Display Terminal IBM Personal Computer IBM Personal Computer XT System/34 <sup>1</sup>	3791-1A,-1B,-1C,-2A,-2B 6580-A08,-B08 8775-11,-12 5150-14,-64,-74 5160-87 5340-CXX,-DXX,-EXX,-FXX	3277-1,-2	2
		5251-11,-12	2
		5291-1	2
		5292-1	2
		5251-11,-12	2
		5291-1	2
		5292-1	2
		3277-1,-2	2
		8775-1,-2	2
		3277-1,-2	2
System/36 <sup>2</sup>	5360 - all models	5251-11,-12	2
		5291-1	2
8100/DPPX <sup>3</sup> ,DPPX/SP, <sup>3</sup> DPCX <sup>4</sup> 8130 Processor	8130-A21,-A22,-A23,-A24 3276-11,-12,-13,-14	3277-1,-2	2
		8775-1,-2	2
		3178	2
-S2A,-S2B,-S3G 2 8140 Processor	8140-A31,-A32,-A33,-A34,-A41,-A42,-A43,-A44,-A51,-A52,-A53,-A54 3276-11,-12,-13,-14	3278-1,-2,-3,-4	2
		3279-2A,-2B,-3A,-3B,-2X,-3X,-S2A,-S2B,-S3G	2
		3277-1,-2	2
		8775-1,-2	2
		3178	2
Channel-Attached Non-SNA 3270 Information Display System	3272-1,-2 3274-1B,-1D,-21B,-21D,-31D,-41D	3278-1,-2,-3,-4	2
		3279-2A,-2B,-3A,-3B,-2X,-3X,-S2A,-S2B,-S3G	2
		3277-1,-2	0
		3178	0
		3277-1,-2	0
		3278-1,-2,-3,-4,-5	0
		3279-2A,-2B,-3A,-3B,-2X,-3X,-S2A,-S2B,-S3G	0
		3290	0
		3277-1,-2	0
		3178	0
Link-Attached Non-SNA (BSC) 3270 Information Display System	3272-1,-2 3274-1C,-21C,-31C,-41C,-51C,-61C  3275-1,-2 3276-1,-2,-3,-4	3277-1,-2	0
		3178	0
		3277-1,-2	0
		3278-1,-2,-3,-4,-5	0
		3279-2A,-2B,-3A,-3B,-2X,-3X,-S2A,-S2B,-S3G	0
		3290	0
		3278-1,-2,-3,-4	0
		3279-2A,-2B,-3A,-3B,-2X,-3X,-S2A,-S2B,-S3G	0
		3277-1,-2	0
		8775-1,-2	0
8100/DPPX <sup>3</sup> ,DPPX/SP <sup>3</sup> 8130 Processor	8130-A21,-A22,-A23,-A24 3276-11,-12,-13,-14	3277-1,-2	0
		8775-1,-2	0
		3178	0
8140 Processor	8140-A31,-A32,-A33,-A41,-A42,-A43,-A44,-A51,-A52,-A53,-A54 3276-11,-12,-13,-14	3278-1,-2,-3,-4,-5	0
		3279-2A,-2B,-3A,-3B,-2X,-3X,-S2A,-S2B,-S3G	0
		3277-1,-2	0
		8775-1,-2	0
		3178	0
IBM Personal Computer IBM Personal Computer XT System/34 <sup>1</sup>	5150-14,-64,-74 5160-87 5340-CXX,-DXX,-EXX,-FXX	3278-1,-2,-3,-4,-5	0
		3279-2A,-2B,-3A,-3B,-2X,-3X,-S2A,-S2B,-S3G	0
		5251-11,-12	0
		3178	0



PROGRAM PRODUCTS

ACF/VTAM V2 R2 (cont'd)

Device or Subsystem Name	Controlling Device-Model	Terminal-Model	LU Type
System/36 <sup>2</sup>	5360 - all models	5291-1 5292-1 5251-11,12 5291-1 5292-1	0 0 0 0 0
System/38 (as a 3271-2)			
<b>Link-Attached Non-SNA (Start/Stop)</b>			
2741 Communications Terminal	2741 <sup>5</sup>	2741	0
3101 Display Terminal	3101 <sup>5</sup>	3101	0
3767 Communications Terminal	3767 <sup>5</sup>	3767-1,-2	0
World Trade Teletypewriter Terminal	WTTY <sup>5</sup>	WTTY	0
Western Union Teletypewriter			
Exchange Services Terminal	TWX <sup>5</sup>	Model 33/35	0
IBM Personal Computer 5,6			0

Notes:

- 1 Supported with the System/34 3270 Device Emulation licensed program.
- 2 Supported with the System/36 System Support licensed program, the Communications feature (#6001) and the 3270 Device Emulation feature (#6003).
- 3 Supported with the DPPX 3270 Data Stream Compatibility program product and the DPPX/SP Data Stream Compatibility licensed program.
- 4 Supported in Data Stream Compatibility mode only.
- 5 Supported through the Network Terminal Option (NTO) licensed program.
- 6 Supported as a 3101.

RPQs ACCEPTED: No

MVS SYSTEM INTEGRITY APPLIES: Yes

LICENSED PROGRAM MATERIALS AVAILABILITY

Restricted Materials: Yes

This licensed program will be available with some licensed program materials designated as "RESTRICTED MATERIALS OF IBM".

In addition, some modules will be available without source licensed program materials. These modules will be available in object code.

## PROGRAM PRODUCTS

**VIRTUAL STORAGE PERSONAL COMPUTING (VSPC)  
OS/VS2 VSPC (MVS) V2 R1 (5665-283)**

Programs 5740-XR5, 5740-XR6 and 5746-XR3 are no longer available.

**PURPOSE**

IBM Virtual Storage Personal Computing (VSPC) is a set of program products that provides DOS/VS, OS/VS1 and OS/VS2 (MVS) users at terminals a choice of responsive tools, in an interactive environment, to help support their personal computing and problem solving activities.

VSPC was designed to offer a comprehensive set of functions for data and source program manipulation that are tailored for end users without extensive data processing knowledge. VSPC also offers the ability to submit jobs for batch processing and to retrieve job output at the user's terminal.

**HIGHLIGHTS**

General purpose personal computing and problem solving capabilities are provided that can operate concurrently with DOS/VS, OS/VS1 or OS/VS2 (MVS) background operation.

VSAM is used exclusively as the device-independent access method for VSPC library support.

VTAM is used exclusively as the terminal access method. Use of VTAM and its associated network independence allows the same terminals to be used for VSPC and other VTAM applications such as CICS or IMS, etc.

For VSPC job submission, cancellation, status and output functions VSPC under DOS/VS uses POWER/VS ... under OS/VS1 the Job Entry Subsystem (JES) ... under OS/VS2 (MVS) the Job Entry Subsystem (JES2 or JES3).

VSPC functions are complemented by a set of other program products that operate in the environment created by the VSPC foreground processor interface. These complementary program products provide the VSPC user with a selection of programming languages, such as APL, BASIC and FORTRAN, for problem solving. Further information on these complementary program products can be found in the appropriate sections of these pages.

Commands are provided by VSPC for the customer's operations staff for interactive control of system resources, user enrollment and user profile maintenance. VSPC AID, a prompting facility, assists the user in constructing commands.

The personal computing users of VSPC will have at their disposal a set of simple-to-use commands to help support their problem solving needs; they are provided with a workspace, editing and data management commands, as well as library support.

A set of conversational remote job entry commands is also provided which will allow the VSPC user to submit jobs to the batch for execution; output can be retrieved at the terminal or routed elsewhere.

VSPC provides a responsive, interactive editor for program and data manipulation.

The foreground processor interface provides facilities for VSPC foreground processors (VS APL, VS BASIC and installation written) to access sequential and direct files in the VSPC library, as well as VSAM key sequenced, entry sequenced and relative record data sets external to the VSPC library.

The VSPC Library provides a set of facilities both to share data files and to keep them secure, as required.

The Full Screen Management facility allows installation written foreground processors to format, read, write and erase two-dimensional fields of data on a 3270 display device. These processors can also read program function and attention keys and light-pen operations.

A function, called Shared Storage Management, is also available with VSPC. By means of the shared variable concept, Shared Storage Management provides a means of communication between programs, both in the VSPC foreground and in the batch background.

**DESCRIPTION****VERSION 1 RELEASE 2 CAPABILITIES**

In addition to the functions provided by Version 1 Release 1, Version 1 Release 2 provides numerous enhancements to VSPC in the OS/VS1 and OS/VS2 (MVS) operating environments.

Full screen editing for display terminals; the user can edit multiple data lines through the terminal facilities (INS MODE, DEL key, etc.).

Program Function (PF) key setting lets the display terminal user specify the interpretation of PF keys.

New and improved editing commands give added capabilities for editing and line entry. Data lines can now be copied, joined together or split apart. Global changes to data must now be

explicitly requested. A current line pointer is provided as a convenient reference point for the terminal user.

General usability improvements are also included. Command entry is simplified. Empty editable files of any content attribute can be defined. The screen display on a terminal can be held as long as the user wishes.

Job entry improvements allow omission of the JECODE from jobnames in job entry commands and the ability to query status of all submitted jobs.

**Improved application capabilities include:**

VSAM alternate index support for record processing of external VSAM files.

Shared file updating by transfer of ownership of shared files from one user to another.

Foreground interface enhancements: Foreground processors can now issue immediately executed commands, make use of in-storage command lists and control password prompting to the terminal user.

**Subsystem management improvements include:**

Additional display terminal support. Advanced 3270 terminals with added function can be used. The 3791 Controller is also supported.

Additional resource control through enhancements to the VSPC operator SET command.

Composite accounting units: The separate VSPC counts may be combined and weighted by the installation. This gives a more direct relationship between VSPC accounting counts and the installation accounting/billing methods. The composite units are included in all SMF records and in messages to terminal users.

Service program enhancements: Incremental backups are now provided; for an incremental backup only, files updated since the last full backup are copied. Files designated as shared by their owners can be exported and copied by authorized other users. Alphabetic characters in the line-number field of an imported file are allowed. With appropriate authority, files and users can be deleted from the VSPC output library.

General usability improvements: Terminal and system problem messages are much improved. A sample logon interpreter is provided; an installation can use it unchanged or can modify it as needed. AID messages are no longer resident in virtual storage and can be easily modified. Extensions to SMF records are provided for more complete recording of VSPC activity.

**VERSION 2 RELEASE 1 CAPABILITIES**

In addition to the functions provided by the previous releases, Version 2 Release 1 provides the following enhancements to VSPC in the OS/VS2 (MVS) environment:

Large screen models of the IBM 3270 display terminal family are supported in large screen mode. This includes the VIEW mode full screen editor as well as the VSPC command mode screen format. The new screen sizes are: 32 rows by 80 columns (mdl 3 terminals), 43 rows by 80 columns (mdl 4 terminals), and 27 rows by 132 columns (mdl 5 terminals).

Improved support for IBM 328X printers, including forms control and printing up to 132 characters per line. In addition, VSPC Version 2 Release 1 supports cross-domain access to printers in an ACF/VTAM multi-system network, as well as sharing of these hardcopy devices between VSPC and other cooperating VTAM applications.

Terminal output can be directed to a file, while output to the terminal itself can be suppressed.

Scheduled execution of a VSPC session without a terminal (also known as disconnected operation), including the ability to query the status of the scheduled sessions.

MSS support for external VSAM files is improved to provide better resource balancing when external VSAM files have been defined to be staged in "cylinder fault" mode.

The ability to reuse an existing VSPC library when doing a reorganization or recovery operation (without the overhead of reformatting every track that occurs when a new VSPC Library is created), and the ability to EXPORT directly from a VSPC backup tape.

A full-function CLIST processor, including support for symbolic parameter substitution, conditional execution (with run-time logic for error processing), and non-command data embedded in the CLIST stack.

A time limit for program execution, which may be specified by the VSPC user in the RUN command.

PROGRAM PRODUCTS

VSPC (cont'd)

Foreground interface extensions allow installation-written foreground processors to read detailed directory records from the VSPC library, to obtain information about the current user load, and to perform a confidential read from the terminal.

Shared Storage Manager (SSM) extensions allow installation-written processors to find out whether or not a potential partner has signed on the the SSM and allow installation-written auxiliary processors to be posted when a partner has become interlocked.

Improved installation control options including the ability to restrict the use of the SEND command and the ability to restrict certain users to be able to run only specified applications without being able to directly utilize the general programming facilities of VSPC.

Support for GDDM and PGF running under the VSPC supervisor. A new foreground interface service request is provided to allow processor and application access to all GDDM and PGF functions and utilities. This support requires GDDM and PGF Release 2 or later.

CUSTOMER RESPONSIBILITIES

Each customer installing, operating or supporting VSPC must have a working knowledge of DOS/VS, OS/VS1 or OS/VS2 (MVS). No customer should attempt to install VSPC until the installation has achieved proficiency in the use of the operating system.

With VSPC, as with other products, considerable attention should be given to pre-installation systems design and analysis, and to communications requirements.

The customer is responsible for providing adequate protection against accidental loss or misuse of his data. This includes an adequate review of the system's security provisions by the user.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

**DOS/VS:**  
VSPC Release 1 operates under DOS/VS on IBM S/370 mdls \*115 (3115-2 only) \*125, 135, 138, 145, 148, 155 II and 158, with at least 256K bytes of real storage to support three terminals. VSPC requires the following features in addition to those features required by DOS/VS:

- CPU timer and clock comparator (#2001).
- Floating point (#3900 or #3910).
- Conditional swapping (#1051) or advanced control program support (#1001).

\* VSPC operation on the mdls 115 (3115-2 only) and 125 is suitable for test operation only. In most cases, performance is not expected to be suitable for a production environment.

**OS/VS1:**  
VSPC Version 1 Release 2 operates on all IBM processors supported by OS/VS1, with at least 384K bytes of real storage to support three terminals. VSPC requires the following features, in addition to those features required by OS/VS1:

- CPU timer and clock comparator (#2001).
- Floating point (#3900 or #3910).
- Conditional swapping (#1051) or advanced control program support (#1001).

**OS/VS2 (MVS):**  
VSPC Version 1 Release 2 and VSPC Version 2 Release 1 operate on all IBM processors supported by OS/VS2 (MVS), with at least 2,048K bytes of real storage to support three terminals. VSPC requires the following feature, in addition to those features required by OS/VS2 (MVS):

- Floating point (#3900 or #3910).

VIRTUAL STORAGE REQUIREMENTS

**DOS/VS, OS/VS1:**  
The size of the VSPC interactive partition is dependent on the number and type of active terminals, the sum of the active users' workspaces, the VSAM external file requirements and the initialization options selected. Additional virtual storage is required for any user-installed foreground processors.

**OS/VS2:**  
The VSPC interactive environment virtual storage requirement is dependent on the number and type of active terminals, the sum of the active users' workspaces, VSAM external file requirements and the initialization options selected. Additional virtual storage is required for any user-installed foreground processors. Note: VSPC under OS/VS2 (MVS) utilizes multiple address spaces to extend the total amount of virtual storage available to interactive VSPC.

**Real Storage Requirements:** The real storage requirement for VSPC is dependent on the number and type of terminals, the functions selected, the installation's other processing (if any), expected traffic and the desired response time characteristics.

**Direct Access Storage Requirements:** Additional DASD space is required, beyond the minimal operating system requirements, for system libraries, system paging data sets, VSPC library data sets and VSPC accounting data sets.

TERMINALS SUPPORTED

VSPC uses VTAM for all terminal operations. VTAM requires NCP/VS for remote terminals.

Operating with ACF/VTAM Version 1 Release 2 or later or ACF/VTAM Version 2 (which does not support the Basic Applications Program Interface) on OS/VS1 or OS/VS2 (MVS), VSPC continues to provide access to the IBM 2741 and TWX-33/35 protocols via the ACF/VTAM V1 R2 or ACF/VTAM Version 2 Record Application Program Interface and the Network Terminal Option program product (5735-XX7) installed with ACF/NCP/VS Release 2 or later.

The user should be aware that many terminal and communications controller features are transparent to programming, and therefore readily usable even though not specifically identified. Note that the appropriate line adapters and hardware features must be included in the system configuration. Note that VSPC also requires an attention interrupt capability on all terminals with the exception of the 3270. See the appropriate pages for specific terminal configurations.

Existing keyboards can be modified for use with APL by utilizing APL overlays on the keys (order APL Characters, GX20-1783).

The terminals and communications controllers supported are listed below.

Terminals that are functionally equivalent to those specifically supported by VSPC may also function satisfactorily with VSPC; the customer is responsible for establishing equivalency. IBM assumes no responsibility for the impact that any changes to the IBM-supplied programs or products may have on such terminals.

The following terminals and communications controllers are supported:

COMMUNICATIONS CONTROLLERS

3704/3705 Communications Controller on local channel:

Note: EBCDIC Code, ASCII Code, Autopoll and EBCDIC Transparency do not have special feature codes in the 3704/3705, but the equivalent functions are program supported as capabilities of the 3704/3705 NCP/VS.

Supported: NCP/VS  
PEP (NCP/VS only)

START/STOP TERMINALS

The following start/stop terminals are supported via the VTAM Basic Application Program Interface (API).

1050 Data Communication System on switched or leased lines:

- 1051 Control Unit (mdls 1,2)
  - Required: Attachment of 1052
  - #6100 - Receive Interrupt
  - #1313 - Automatic EOB (or RPQ E28235)
  - #9698 - Text Time-Out Suppression
- 1052 Printer-Keyboard (mdls 1,2)
  - Recommended: #1006 - Accelerated Carrier Return
  - Supported:
  - Print. Elements: #9567 - PTTC/BCD (P/N 1167938)
  - #9571 - PTTC/EBCD (P/N 1167963)
  - RPQ F24235 - APL (P/N 1167988)

2741 Communication Terminal on switched or leased lines:

- Required: #4708 - Receive Interrupt
- Supported:
- Print. Elements: #9567 - PTTC/BCD (P/N 1167938)
- #9571 - PTTC/EBCD (P/N 1167963)
- #9812 - Correspondence (P/N 1167043)
- RPQ F24235 - APL, Base Machine is PTTC/BCD or PTTC/EBCD (P/N 1167988)
- RPQ E62267 - APL, Base machine is Standard Selectric (P/N 1167987)
- Keyboards: RPQ M40174 - APL, Base machine is PTTC/BCD or PTTC/EBCD (P/N 5195500)
- RPQ M40174 - APL, Base machine is Standard Selectric (P/N 5156576)
- Recommended: #8341 - Typamatic Keys

Note: With ACF/VTAM V1 R2 or ACT/VTAM Version 2, supported via the Record Applications Program Interface and with the Network Terminal Option program product installed with ACF/NCP/VS R2. OS/VS1 and OS/VS2 MVS only.

3232 (Mdl 51) on switched or leased lines:

PROGRAM PRODUCTS

VSPC (cont'd)

Note: With ACF/VTAM R2, supported via the Record Application Program Interface and with the Network Terminal Option program product installed with ACF/NCP/VS R2. (OS/VS1 and OS/VS2 MVS only).

3767 Communication Terminal (mdls 1,2) on switched or leased lines supported as a 2741. The NCP MTA facility, a feature for switched line devices, supports the start/stop mode of this device on ACF/NCP only. The 3767 has an optional feature which permits one keyboard and an alternate character set.

Required: #7113 - 2741 start/stop (which provides PTTC/EBCD and Correspondence Codes)  
#5505, 5506 or 3719 - Interrupt Capability for the modem

Supported: Keyboards: #9381 - Correspondence and #9382 - Alternate EBCDIC Character Set or, #9383 - Alternate APL Character Set #9391 - EBCDIC and #9392 - Alternate Correspondence Character Set or #9393 - Alternate APL Character Set #2950, #2955 - EBCDIC #1291 - APL Character Set

Note: Alternate Character Set requires feature #1291 as a prerequisite.

Note: With ACF/VTAM V1 R2 or ACF/VTAM Version 2, supported via the Record Applications Program Interface and with the Network Terminal Option program product installed with ACF/NCP/VS R2. (OS/VS1 and OS/VS2 MVS only.)

6733 Typewriter Communication Module on switched or nonswitched lines as a CPT-TWX 33/35:

Note: With ACF/VTAM (R2), supported as a CPT-TWX 33/35 via the Record Application Program Interface and with the Network Terminal Option program product installed with ACF/NCP/VS (R2). (OS/VS1 and OS/VS2 (MVS) only.

CPT-TWX (mdl 33/35) Line Control Type on switched lines or leased lines:

Supported: KSR and ASR.

Note: Use of paper tape reader requires the Reader Control arrangement (XON and XOFF).

Note: With ACF/VTAM V1 R2 or ACF/VTAM Version 2, supported via the Record Applications Program Interface and with the Network Terminal Option program product installed with ACF/NCP/VS R2. (OS/VS1 and OS/VS2 MVS only.)

3101 Display Terminal (mdls 10, 11, 12, 20, 21, 22) 110-1200 bps on switched or leased lines. The MTA facility, a feature for switched line devices, supports only 110 bps on NCP and 110 and 300 bps on ACF/NCP.

Note: With ACF/VTAM V1 R2 or ACF/VTAM Version 2, supported via the Record Applications Program Interface and with the Network Terminal Operation program product installed with ACF/NCP/VS R2. (OS/VS1 and OS/VS2 MVS only.)

TERMINALS SUPPORTED VIA VTAM RECORD API

Also refer to the START/STOP TERMINALS section, above, for selected Start/Stop terminals supported via the ACF/VTAM V1 R2 or ACF/VTAM Version 2 Record API. (OS/VS1 and OS/VS2 MVS only.)

3232 Keyboard Printer Terminal (mdl 1) on switched or leased lines for SDLC.

Support of a 3232 Keyboard Printer Terminal (mdl 11 attached via an 8100 Information System is provided by DPPX/Base using DPPX/DSC (Data Stream Compatibility).

3270 Information Display System. LOCAL, BSC and SDLC are supported through the Record API of VTAM. The 3270 Data Analysis - APL Feature (#1066) or the APL/Text feature (#1120) is required if APL or text characters are to be entered/displayed. This

feature is not available for all 3270 devices. See the appropriate pages for applicability.

Support of 3270 devices attached via a 3791 controller or 8100 Information System is provided by Version 1 Release 2 or later using DSC (Data Stream Compatibility).

Supported: Control Units:

3271 mdl 2 - Remote Cluster on leased line only.  
3271 mdl 12 - Remote Cluster on leased line only. (Not supported: ASCII)  
3272 mdl 2 - Local Cluster (Not supported: ASCII)  
3274 mdl 1A, 21A, 31A (Version 1 Release 2 or later only)  
3274 mdls 1B, 1C, 1D, 21B, 21C, 21D, 31C, 31D, 51C  
3791 mdls 1C, 2A, 2B (Version 1 Release 2 or later only)  
8100 Information System (Version 1 Release 2 or later only)

Displays:

3275 mdl 2 - Standalone Display Station on leased line only.  
3275 mdl 12 - Standalone Display Station on leased line only (Not supported: ASCII)  
3276 mdls 2, 3 or 4  
3276 mdls 12, 13, 14 (Version 1 Release 2 or later only)  
3277 mdl 2 - Display Station  
3278 mdls 2, 3, 4, 5  
3279 mdls 2A, 2B, 3A, 3B  
8775 (Version 1 Release 2 or later only)  
Notes: Extended Data Stream not supported. Prior to Version 2 Release 1, the above displays are supported in 1920 character mode only. In addition to supporting all of the models supported by the previous releases, Version 2 Release 1 supports the large screen models in large screen mode.

Printers:

3262 mdls 3, 13 (supported as a 3289 mdls 1, 2)  
3268 mdl 2 printer 3284 mdls 2, 3  
3286 mdl 2  
3287 mdls 1, 1C, 2, 2C (Features #9660 and #3610 not supported; #9550 not supported prior to Version 2 Release 1)

Trans. Codes:

3288 mdl 2  
3289 mdls 1 and 2  
Note: Printers require a 1920 character or larger buffer

Char. Sets:

#9761 - EBCDIC  
#9762 - ASCII  
#9089 - EBCDIC  
#9082 - EBCDIC  
#9084 - ASCII Character Set (B) (3287 mdls 1 and 2)

Keyboards:

#9091 - ASCII Character Set (A)  
#9092 - ASCII Character Set (B)  
#4621 - 75-Key EBCDIC Typewriter  
#4622 - 75-Key EBCDIC Data Entry  
#4623 - 75-Key EBCDIC Data Entry  
#4624 - 75-Key ASCII Typewriter  
#4627 - 87-Key EBCDIC Typewriter  
#4628 - 87-Key ASCII Typewriter  
#4630 - 66-Key EBCDIC Typewriter  
#4631 - 66-Key EBCDIC Data Entry  
#4632 - 78-Key Operator Console  
#4633 - 78-Key EBCDIC Typewriter  
#4634 - 66-Key ASCII Typewriter  
#4635 - 78-Key ASCII Typewriter  
#4637 - 66-Key APL Typewriter  
#4638 - 78-Key APL Typewriter  
#4639 - 78-Key Text

3767 Communication Terminal (mdls 1,2,3) on switched or leased line for SDLC:

Supported: Keyboards:

#9381 - Correspondence and #9382 - Alternate EBCDIC Character Set or, #9383 - Alternate APL Character Set #9391 - EBCDIC and #9392 - Alternate Correspondence Character Set or, #9393 - Alternate APL Character Set #2950, #2955 - EBCDIC #1291 - APL Character Set



PROGRAM PRODUCTS

VSPC (cont'd)

Note: Alternate Character Sets require feature #1291 as a prerequisite.

3770 Data Communication System on switched or leased line:

Supported: Interactive mode only  
 Models: 3771 mdls 1, 2, 3 - Communication Terminal  
 3774 mdls P1, P2 - Communication Terminal (Required: #9141 Emulator)  
 3775 mdl P1 - Communication Terminal (Required: #9141 Emulator)  
 Trans. Codes: #1460 - SDLC/BSC  
 #1470 - SDLC

5280 Distributed Data System on switched or leased lines. These devices are supported as selected 3270 control units and devices.

Supported as:  
 Control Unit: 3274 mdl 1C - switched or leased line (SNA/SDLC)  
 Display: 3277 mdl 2 - selected features only  
 Printer: 3287 mdl 1 and 2 (SNA/SDLC)

System/34 on switched or nonswitched lines. These devices are supported as selected 3270 control units and devices.

Supported as:  
 Control Unit: 3274-mdl 1C - SNA/SDLC  
 Display: 3277 mdl 2 - selected features only  
 Printer: 3288 mdl 2  
 3287 mdl 2 (in 3288 mode)

System/36 on switched or nonswitched lines. These devices are supported as selected 3270 control units and devices.

Supported as:  
 Control Unit: 3274-mdl 1C - SNA/SDLC  
 Display: 3277 mdl 2 - selected features only  
 Printer: 3288 mdl 2  
 3287 mdl 2 (in 3288 mode)

SOFTWARE REQUIREMENTS

VSPC which is distributed in Assembler language, operates under OS/VS1 and OS/VS2 (MVS). OS/VS1 Release 5 or later, or OS/VS2 (MVS) Release 3.7 or later is required for VSPC Version 1 Release 2. OS/VS2 (MVS) Release 3.8 or later is required for VSPC Version 2 Release 1.

Under DOS/VS, VSPC requires VTAM, VSAM and SAM. POWER/VS is required for VSPC conversational remote job entry. NCP Release 4.1 or later is required for remote terminals.

Under OS/VS1 VSPC requires VTAM and VSAM. NCP is required for remote terminals.

Under OS/VS2 (MVS), VSPC requires VTAM Release 2.0, or ACF/VTAM Version 1 or ACF/VTAM Version 2. For remote terminals, NCP Release 5.0 or ACF/NCP/VS is required with either of the above levels of VTAM. The latest current level of VSAM Release 2 must be installed. VSPC under OS/VS2 (MVS) also requires JES2 or JES3, Supervisor 1 and Supervisor 2 selectable units. VSPC also operates with the MVS/System Extensions and MVS/System Product program products.

DOCUMENTATION  
(available from Mechanicsburg)

Title	Order Number
VS APL General Information	GH20-9064
VS BASIC General Information	GC28-8302
VSPC FORTRAN General Information	GH20-9061
VSPC General Information	GH20-9070
Program Product Specifications for DOS/VS VSPC	GH20-9109
for OS/VS1 VSPC	GH20-9089
for OS/VS2 (MVS) VSPC	GH20-9108

MVS SYSTEM INTEGRITY APPLIES: Yes

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**MVS/XA DATA FACILITY PRODUCT  
RELEASE 1  
MVS/XA DFP (5665-284)**

**PURPOSE**

The MVS/XA Data Facility Product (MVS/XA DFP) program provides the MVS/Extended Architecture (MVS/XA) operating system environment with data management, device support, program library management, and utility functions for IBM processors operating in Extended Architecture mode. Previous to MVS/XA these functions were provided in OS/VS2 MVS Release 3.8 for S/370 users.

**SPECIAL SALES INFORMATION**

This support includes re-packaging the above functions together with the functional extensions that are available to OS/VS2 MVS Release 3.8 users via the following licensed programs:

- Data Facility Device Support Release 1 Modification Level 4 (DFDS) (5740-AM7).
- Sequential Access Method - Extended Release 1 (SAM-E) (5740-AM3).
- Data Facility Extended Function Release 1 (DFEF) (5740-XYQ).
- Offline IBM 3800 Utility program product (5748-UT2).
- Access Method Services Cryptographic Option (5740-AM8).

MVS/XA DFP Release 1.0 includes prerequisite maintenance and 3800 Enhancements.

**RELEASE 1.0 HIGHLIGHTS**

The Data Facility Product licensed program support provided for IBM 4381 Processors and 3081 Processors operating in Extended Architecture mode consists of the following:

- Support for 31-bit real storage addressing. Examples include:
  - Access methods, when acquiring buffer(s), indicate to storage management that the pages will not require real locations below 16 megabytes (when the pages are fixed in preparation for I/O operations).
  - Device error recovery procedures support the full range of real addresses.
- Support for 31-bit virtual storage addressing. Examples include:
  - Program fetch.
  - Loader.
  - Linkage editor.
  - IEBCOPY.
  - AMBLIST.
  - Checkpoint/restart.
  - TSO LINK/LOADGO prompter.
  - Virtual I/O.
  - Device error recovery procedures.
- Support of the new maximum number of Unit Control Blocks (UCBs) providing for up to 4,096 unique device addresses. The actual number of devices is dependent on the particular processor model and I/O configuration.
- Support of up to 256 channel paths with up to 8 paths per device, with the actual number of paths and paths per device dependent upon the particular configuration.

DFP Release 1.0, does not require any pre-requisite maintenance.

**RELEASE 1.1 HIGHLIGHTS**

MVS/XA DFP Release 1.1 provides support for the 3880 Storage Control mdl 11 and the 3880 Storage Control mdl 13, virtual storage constraint relief and the following functions.

- VSAM global resource serialization.
- Virtual I/O 31-bit virtual indirect addressing words.
- System generation has been modified to increase the number of 2840 Display Control mdl 2s which can be identified (4,095).
- Additional VSAM local shared resource (LSR) pools per address space.

**DESCRIPTION**

**ADDRESSING and RESIDENCE MODE (AMODE/RMODE):** The architecture for 31-bit virtual addressing introduces a new control bit in the program status word (PSW) to define the addressing mode of the executing instruction as 24- or 31-bit mode. When in 31-bit mode both instruction and data addresses are treated as 31-bit addresses. In 24-bit mode they are treated as 24-bit addresses and most operations are performed with 370 addressing architecture applied.

MVS/XA provides support for execution in either addressing mode and allows programs to switch from one mode to another during execution. The majority of MVS/370 programs can execute in 24-bit mode without change. New or modified programs can be written to take advantage of 31-bit addressing. The default mode of execution is 24-bit. MVS/370 is a generic term used in reference to the supported releases of OS/VS2 MVS operating with S/370 architecture.

To manage this dual environment, addressing mode (AMODE) and residence mode (RMODE) attributes are supported. AMODE is the attribute of the entry points into a load module that specifies the addressing mode that is expected by the entry point. RMODE is the attribute of a load module that specifies the residence mode when loaded into virtual storage for execution.

The Assembler H Version 2 licensed program marks output object modules with AMODE/RMODE attributes which the linkage editor available with DFP uses to mark load modules in the directory entry. See the Assembler H Version 2 pages (5668-962) for further information regarding the Assembler. The control program then ensures that the program is loaded in the correct addressing range, and is invoked in the appropriate addressing mode. The original AMODE/RMODE attributes are retained in the composite external symbol dictionary and will be utilized in the event the module is again link edited. The AMODE/RMODE attributes can be overridden at link edit time with new control statements or linkage editor input parameters.

**PROGRAM DEVELOPMENT CONSIDERATIONS**

**24-bit Program Development Considerations:** As stated earlier, the majority of MVS/370 programs continue to execute correctly utilizing upward compatible MVS/XA DFP interfaces. (See the "Compatibility" section below.) As long as AMODE-24 is selected or defaulted to (i.e., AMODE not specified), this level of compatibility applies to new and changed programs.

**31-bit Program Development Considerations:** New programs or changed programs expecting to execute in 31-bit addressing mode need to be aware of the following situations when calling MVS/XA DFP services:

- In all cases identified below, the user must ensure that only 24-bit virtual addresses are passed. Parameter lists, control blocks, buffers, and user exit routines must reside within the 24-bit addressing range.
- VSAM services have been modified to accept calls from 31-bit users. Users must be executing in 24-bit mode when directly calling the services of MVS/XA DFP access methods other than VSAM.
- When calling the MVS/XA DFP services via SVC, the system performs the necessary mode switching.

For Release 1.1, VSAM allows programs running in 31-bit mode to create and access buffers in virtual storage above 16 megabytes. VSAM user exits are also supported above 16 megabytes.

**OPEN, CLOSE, BLDVRP, DLVRP,** and the control block manipulation macros (CBMM) must have their parameter lists in virtual storage below 16 megabytes. Other VSAM macros (GET, PUT, etc.) can have their parameter list above 16 megabytes. The user needs to specify the intent to use 31-bit buffers in the access method control block (ACB) at OPEN time. The ACB is to be kept below 16 megabytes while the request parameter list (RPL) may be placed above 16 megabytes. The RPL and EXLST must be below 16 megabytes if referenced by the MODCB, GENCB, TESTCB or SHOWCB macros.

**Note:** MVS/XA DFP R1.1 uses the entire 4-byte address field. Programs that use an address field for other than addressing purposes (for example, flags in high order bits) may produce unexpected results.

**PERFORMANCE and VIRTUAL STORAGE USAGE OBJECTIVE**

It is IBM's objective that Data Facility Product will not show a significant change in performance or virtual storage usage when compared to an OS/VS2 MVS Release 3.8 environment with DFDS Release 1 Modification Level 4, DFEF Release 1, SAM-E, Offline IBM 3800 Utility and Access Method Services Cryptographic Option installed, providing load libraries have been prepared by the user to include optimum block size and relocation dictionary (RLD) record and relocation dictionary/control (RLD/CTL) record block counts in the program library members.

For information concerning overall MVS/XA performance, see MVS/System Product Version 2 (5665-291).

**DATA MANAGEMENT**

Data management controls operations associated with input/output devices, such as allocation of space on volumes, storing, naming, and cataloging data sets, and movement of data between real and auxiliary storage.

**IMPROVED VTOC ACCESS** via an INDEX to the VTOC: Indexed VTOCs are supported by DFP. The support is functionally equivalent to the support introduced to S/370 users with the Data Facility Device Support (DFDS) licensed program, and is available in MVS/370 Data Facility Product licensed program (5665-295).

The VTOC is composed of unblocked records with DASD keys and is accessed primarily in two ways: Via DADSM routines to perform global DASD space management functions such as allocating and scratching

## MVS/XA Data Facility Product (cont'd)

data sets, and via EXCP and the sequential access method (SAM) for reading and writing DSCBs, or portions of the VTOC.

VTOC access is improved by using an index structure for the VTOC, and by providing a common VTOC access facility (CVAF) to support the index structure. This structure includes space maps which replace the Format 5 DSCBs of the OS/VS2 MVS VTOC and are used to manage VTOC and VTOC index space. Following are some key characteristics of volumes with a VTOC index:

- The VTOC index is optional on any DASD that is supported by MVS/XA. For additional information, see "Migration".
- Volumes with and without the VTOC index can coexist on the same system and are supported by the DADSM routines in a manner transparent to the user.
- The VTOC can still be accessed via EXCP and SAM, except that data identifying a volume's available space has been moved from the Format 5 DSCB to space maps in the index. Users are encouraged to use CVAF for all access to the VTOC on volumes both with and without the VTOC index. See "Indexed VTOC Compatibility".
- If CVAF detects an error in the index structure, CVAF marks the index as invalid, and existing DADSM routines restore the VTOC to non-indexed format so that the volume can be used while the index error is being analyzed. The user's programs will not be aware of the error, the volume continues to be available for use, and the operator is notified.
- The Device Support Facility, a Class 2 System Control Program, may be used:
  - To create a VTOC with or without an index when a volume is initialized.
  - To build an index over an existing volume's VTOC.
  - To rebuild the index as desired.
- To convert the VTOC to non-indexed for running on certain systems, see "Migration".

The VTOC index can be either RACF- or password-protected, in which case a user must be RACF-authorized or must supply a password if the index is to be scratched, renamed, or opened for output. The VTOC can be RACF-protected, in which case the user must be RACF-authorized to open the VTOC for output.

**DADSM INSTALLATION EXITS:** Optional pre- and post-processing installation exits are provided for the allocate, extend, scratch, partial release, and rename functions of DADSM. These exits allow an installation to reject, limit, audit, or simply monitor DADSM requests involving DASD space utilization.

**INTEGRATED CATALOG FACILITY:** The integrated catalog facility program included in MVS/XA DFP is a functional replacement for VSAM master catalogs, VSAM user catalogs, and OS control volumes. It was introduced to the OS/VS2 MVS Release 3.8 users with the Data Facility Extended Function licensed program, and is available in MVS/370 Data Facility licensed program (5665-295).

The integrated catalog facility defines two catalog data sets: The basic catalog structure data set and the VSAM volume data set. These data sets replace the VSAM or CVOL catalog data sets.

The basic catalog structure contains volume information for both VSAM and non-VSAM data sets. The basic catalog structure may be located on any volume and multiple basic catalog structure data sets may be defined on a single volume. A VSAM volume data set contains the data set characteristics for VSAM format data that resides on a given volume. There is one VSAM volume data set on each volume that contains VSAM format data controlled by the integrated catalog facility.

The integrated catalog facility program is designed to reduce the potential of damaging the catalog and limits the scope of damage in the event of system failure during catalog processing.

The integrated catalog facility program also validity checks critical data during catalog processing.

VSAM catalog ownership of volumes is eliminated for data sets cataloged by the integrated catalog facility. Data sets on any volume may be cataloged in any basic catalog structure and multiple basic catalog structure data sets may be defined on a single volume.

Users of the Resource Access Control Facility (RACF) are restricted from protecting identically-named VSAM data sets which are cataloged in separate basic catalog structures residing on the same volume.

**Backup and Recovery Facilities:** The catalog backup and recovery facilities allow the user to define simple and consistent recovery procedures. The integrated catalog facility supports catalog recovery without the RECOVERABLE attribute of VSAM catalogs. The attributes of a VSAM data set, including its physical location on direct access storage, are maintained in a VSAM volume data set on the same volume as the VSAM data set. This allows periodic EXPORTs of the basic catalog structure, and a subsequent IMPORT in the event of

failure of a basic catalog structure without concern for catalog and VSAM data set synchronization.

**VSAM Space Management:** All direct access storage space management for VSAM data sets cataloged by the integrated catalog facility is performed by the system direct access device space management (DADSM) function. Integrated catalog facility does not perform sub-allocation; hence, no data spaces are associated with an integrated catalog facility catalog and all VSAM data sets under its domain will appear as UNIQUE-like VSAM data sets. Functional equivalency to the VSAM catalog is maintained by removing the restrictions associated with the current UNIQUE data sets.

All integrated catalog facility catalog records are VSAM logical records. This allows a considerable savings in the amount of direct access storage space required. For most non-VSAM data sets, only 20 percent of the space required by the current VSAM catalog will be used by the integrated catalog facility.

**System Catalog:** Either the integrated catalog facility master catalog or the VSAM master catalog may be the system catalog. In addition to optionally containing pointers to integrated catalog facility and/or VSAM user catalogs, it may also contain pointers to OS control volume catalogs. JCL may be used to designate specific catalogs to be used for a job or job step.

A message at IPL time prompts the system operator for the name of an alternate system catalog, enabling the system to be IPLed in the event that the regular, or default, system catalog is unavailable.

### ACCESS METHODS

**LARGE REAL SUPPORT:** MVS/XA DFP Release 1.0 support of large real storage allows the data buffers to be allocated at any location in the real storage installed on the processor (including locations whose real addresses are above the 24-bit addressing range). This support is designed to reduce contention for real storage locations in the 24-bit addressing range and will benefit those programs which require real storage in that range.

Any available real storage in the 31-bit addressing range is used to back virtual storage in either the 24-bit or 31-bit addressing ranges. When areas of virtual storage in the 24-bit addressing range are page fixed, they are normally page fixed in 24-bit addressable real storage. The new "LOC" parameter of GETMAIN may be used to indicate that an area in 24-bit addressable virtual storage may be backed by 31-bit addressable real storage when page fixed. For example,

```
GETMAIN...LOC=(BELOW,ANY)...
```

would result in virtual storage being obtained within the 24-bit virtual addressing range. The real storage backing the virtual storage may be anywhere within the 31-bit real addressing range (up to the capacity of the particular processor model), even when page fixed.

The following access methods, included in MVS/XA DFP Release 1.0, have implemented this support.

BDAM, BISAM, BPAM, QSAM, BSAM, VSAM, QISAM

**VIRTUAL STORAGE ACCESS METHOD - VSAM:** DFP VSAM is an access method designed to operate with direct access storage devices and to support both direct and sequential processing by means of either an index key (keyed accessing) or relative byte address (addressed accessing). (Relative byte address refers to the displacement of a stored record or control interval, from the beginning of the storage space allocated to the data set to which it belongs.)

Three types of data sets are provided:

1. Key-sequenced data sets, which are ordered by a key field in the data record.
2. Entry-sequenced data sets, which are ordered by the sequence in which the records were loaded.
3. Relative record data sets, which are ordered by record number.

Keyed accessing is used to access key-sequenced or relative record data sets, and addressed accessing is used to access both key-sequenced and entry-sequenced data sets. Key-sequenced and entry-sequenced data sets may be either fixed- or variable-length records; relative record data sets contain fixed-length records only.

VSAM is composed of two major elements: A data organization which minimizes data movement and which is suitable for data base applications; and routines for creating data sets in the VSAM organization, adding and deleting records, and performing other data management functions.

The data management functions supplied by VSAM include:

- Opening data sets.
- Processing records by index key.
- Processing records by address.
- Closing data sets.
- End of volume processing.
- Cataloging VSAM data sets.
- Data set password protection.

## MVS/XA Data Facility Product (cont'd)

- Data set encryption/decryption.
- Allocating space.
- Checkpoint/restart processing.

In OS/VS2 MVS the channel command word (CCW) contains a 24-bit address. MVS/XA supports this CCW and calls it a format 0 channel command word (CCW or CCW0). MVS/XA introduces a new format 1 CCW (CCW1) that contains a 31-bit address. VSAM will utilize the Format 1 CCWs in its support of real main storage above the 16 megabyte line, and will provide new MVS/System Product Version 2 system management facilities (SMF) statistics.

### Encryption/Decryption Support:

The access method services REPRO function gives the user the ability to encrypt and decrypt data using a software version of the National Bureau of Standards Data Encryption Standard (DES). This function was introduced to the OS/VS2 MVS user with the Access Method Services Cryptographic Option licensed program (5740-AM8).

All data sets supported for copying by REPRO (any VSAM or ISAM data set, or any other data set that can be accessed sequentially except VSAM and integrated catalog facility catalogs) are supported as input for enciphering via REPRO ENCPHER. The user can decrypt the sequential cipher text data set using REPRO DECIPHER.

This function of the REPRO command may use the services of the Programmed Cryptographic Facility (5740-XY5) licensed program to encipher/decipher the data by a program and provide facilities for controlling the cryptographic key.

Alternatively, this function of the REPRO command may use the services of the Cryptographic Unit Support (5740-XY6) licensed program to provide facilities for controlling the cryptographic key and provide an interface to the 3848 Cryptographic Unit to encipher/decipher the data.

### Implicit VERIFY:

When VSAM OPEN detects a condition requiring a VERIFY, it will automatically initiate VERIFY processing, unless the user specifies otherwise. A warning message will be issued.

### Activity Indicators:

The last-accessed date field and change data set indicators in the VTOC Format 1 data set control block (DSCB) are now maintained under control of a user exit for VSAM data sets cataloged by the integrated catalog facility.

### VSAM Data Sharing Facilities:

The following VSAM data sharing facilities introduced by DFEF and available in MVS/370 DFP are supported to provide the VSAM application more control of shared data:

- Exclusive control feedback. When an exclusive control conflict occurs, the address of the RPL which owns the resource, and the RBA of the control interval will be returned to the user.
- A control block update facility is available to allow an application to perform cross-system and cross-region VSAM data sharing under share option 3.
- The OS/VS2 MVS restriction which prohibits control area splits under cross-region share option 4 has been eliminated. The restriction still applies to cross-system share option 4 data sets.
- VSAM supports facilities which allow the user to invalidate VSAM data and index buffers (MRKBFR) or to cause VSAM to write a modified buffer to DASD storage (WRTBFR).
- Extensions to the JRNAD exit allow the application to maintain control over data and index control intervals.

### VSAM SRB/Cross-Memory Mode Processing:

In order to minimize the need for a VSAM application to switch execution modes, VSAM record management allows SRB and limited cross-memory mode processing. This support includes:

- An additional user processing exit (UPAD) for request resumption (POST) when the user is operating in SRB/cross-memory mode.
- The elimination of SVC calls where possible, and RPL codes to indicate to the VSAM application that the request must be reissued in TCB mode.

### RELEASE 1.1 VSAM HIGHLIGHTS

The relocation of VSAM record management code to the extended pageable link pack area (EPLPA) provides virtual storage savings below 16 megabytes of approximately 158K bytes in the pageable link pack area (PLPA). VSAM I/O buffers may optionally reside in virtual storage above 16 megabytes. Programs running in 31-bit addressing mode may create and access these VSAM buffers. VSAM user exits are supported above 16 megabytes.

Up to 16 VSAM local shared resource (LSR) pools per address space may be specified, and the LSR pools may optionally reside in virtual storage above or below 16 megabytes.

**VSAM Global Resource Serialization:** VSAM has been enhanced for users of global resource serialization. Provisions are available which allow

cross-system sharing of VSAM data sets using a subset of the cross-region share option. This cross-system support provides:

1. Consistent RNAME for the enqueues issued by open, close, and end-of-volume, and
2. Enqueues to cross-system enqueues where appropriate.

**SEQUENTIAL ACCESS METHODS:** Data Facility Product uses the buffer scheduling introduced to OS/VS2 MVS with SAM-E for queued sequential access method (QSAM) processing. MVS/XA DFP, SAM-E and MVS/370 DFP use EXCPVR instead of EXCP for all basic sequential access method (BSAM) and QSAM direct access and virtual I/O operations, except basic direct access method (BDAM) WRITE/LOAD. In the exception case, the S/370 implementation is used. The buffer handling program modules made obsolete by this new implementation are not in DFP. For the OS/VS2 Release 3.8 user with SAM-E or MVS/370 DFP installed, these changes enable improved DASD data access performance by:

- Reducing channel program interpretation and translation.
- Reducing the frequency of fixing and freeing of pages.
- Reducing the path length for the SAM I/O operations per block.
- Decreasing DASD contention.
- Increasing the number of QSAM buffers transferred per I/O operation.

Under BSAM, data is sequentially organized and physical blocks of data are stored or retrieved. The READ/WRITE macro instruction causes the initiation of an input/output operation. The completion of these operations is tested by using synchronization macro instructions. Automatic translation between EBCDIC and ASCII codes is provided for magnetic tape labels and record formats.

Under QSAM, logical records are retrieved or stored as requested. The access method anticipates the need for records based on their sequential order, and normally transfers the desired records to virtual storage, ready for use, before the request for retrieval occurs. When writing data, the program normally will continue as if the record had been written immediately, although the access method routines may block it with other logical records and defer the actual writing until the output buffer has been filled. For direct access storage devices, the actual writing may be deferred until multiple buffers are filled. As with BSAM, automatic translation between EBCDIC and ASCII codes is provided for magnetic tape labels and record formats.

**BASIC PARTITIONED ACCESS METHOD - BPAM:** This access method, when used in conjunction with BSAM, is designed for efficient storage and retrieval of discrete sequences of data (members) belonging to the same data set on a direct access storage device. The data set includes a directory that relates the member name with the address where the sequence of data begins. Each member has a simple name. Members may be added to a partitioned data set as long as space is available in the directory and the data set. Other than directory manipulation, all I/O is performed by BSAM.

**BASIC DIRECT ACCESS METHOD - BDAM:** Under BDAM, records within a data set are organized on direct access volumes in any manner chosen by the programmer. Storage and retrieval of a record is by actual or relative address within the data set. This address can be that of the desired record or a starting point within the data set where a search for the record, based on a key furnished by the programmer, begins. Addresses are also used by BDAM as a starting point for searching for available space for new records.

**INDEXED SEQUENTIAL ACCESS METHODS:** Sequential and direct processing are provided by the indexed sequential access methods (ISAM). Records are maintained in control field sequence by key. A multilevel index structure is system maintained, allowing retrieval of any record by its key. Additions can be made to an existing ISAM data set without rewriting the data set.

The basic indexed sequential access method (BISAM) stores and retrieves records randomly from an indexed sequential data set. Selective reading is performed using the READ macro instruction, and specifying the key of the logical record to be retrieved. Individual records can be replaced or new records added randomly.

The queued indexed sequential access method (QISAM) is used to create an indexed sequential data set or to retrieve and update records sequentially from a data set. Synchronization of the program with the completion of input/output transfer and record blocking/deblocking are automatic. QISAM is also used to reorganize an existing data set.

**VIRTUAL I/O:** The system paging mechanism can be used to perform data set access. This is known as virtual I/O. It uses the system paging mechanism to transfer data set blocks between external page storage and real storage. The user can specify virtual I/O processing for system-named temporary data sets accessed through BDAM, BPAM, BSAM, QSAM, EXCP, and XDAP interfaces. Virtual I/O processing for system-named temporary data sets is established at system generation time.

## MVS/XA Data Facility Product (cont'd)

Page-size (4K bytes) physical blocks are dynamically allocated in external page storage as a virtual I/O data set is created. These blocks are not necessarily contiguous and the virtual I/O data set may span several volumes of external page storage. The blocks are released when the data set is deleted and the space is immediately made available for other paging needs.

In Release 1.1, virtual I/O data set buffers which reside in virtual storage above 16 megabytes are supported via 31-bit virtual indirect data address words (IDAW). Virtual IDAW support applies to all CCWs currently supported by virtual I/O except:

- Transfer in channel.
- Control no-operation.
- Read and sense with skip flag on.

This support is equivalent to that provided by the EXCP processor.

Implementation of virtual I/O processing is compatible with the BDAM, BPAM, BSAM, QSAM, EXCP, and XDAP macro interfaces to a DASD data set. When a request is made for accessing a virtual I/O data set, the channel programs are intercepted and interpreted and the page table entries are manipulated if necessary, so that the desired data will be paged in or out of real storage as requested. For example, the control program reads a virtual I/O data set record into a virtual address space by modifying page table entries so that the 4K byte block(s) containing the record are identified as part of the virtual address space from which the request was made. Most SAM data access is performed without channel program construction or interpretation.

Restart processing currently available for temporary data sets is provided for virtual I/O data sets. Checkpoint and automatic step restart are provided for job failures. Checkpoint, and step and job restart are provided through the applicable Job Entry Subsystem and automatic step restart is provided for system restart processing.

Some of the advantages of virtual I/O are:

- Centralized direct access storage device management.
- Elimination of channel program translation and page fixing requirements.
- Use of the I/O balancing of the paging mechanism.
- Elimination of normal I/O device allocation and DADSM overhead for temporary data sets.
- Compatibility at the object code and JCL level.

**Shared DASD:** A pool of direct access storage devices may be shared by IBM processors in either 370 mode or Extended Architecture mode. Devices supported are 3330/3333, 3340, 3344, 3350, 3375, and 3380; two processors may share a pool of 2305 mdl 2 direct access storage devices. The catalog, user program libraries, and user data sets may be accessed by any processor. Advantages are: Reduced file maintenance, improved operational flexibility, and reduced disk space requirements.

VSAM user catalogs may be shared among OS/VS1, SVS, OS/VS2 MVS Release 3.8, MVS/370 DFP, or MVS/XA DFP. OS control volume catalogs may be shared among the above plus the OS/MFT and OS/MVT systems. While VSAM user catalogs may be shared, reference to specific entry types (e.g., GDG) created by OS/VS2 MVS Release 3.8, MVS/370 DFP, or MVS/XA DFP may be accessed only by those systems. The master catalog cannot be shared.

In an environment where an integrated catalog facility catalog is shared by multiple host systems, either the Data Facility Extended Function licensed program, MVS/370 Data Facility Product, or MVS/XA Data Facility Product must be installed on all systems that can access the shared catalog.

In an environment where an indexed VTOC is shared by multiple host systems, either the Data Facility Device Support licensed program, MVS/370 Data Facility Product or MVS/XA Data Facility Product must be installed on each system that can access the shared VTOC.

Program libraries and other system or user data sets may be shared on a read-only basis. The system does not automatically provide exclusive control of records, or prevent concurrent update or extensions to these data sets. Such data sets should be shared on a read-only basis until safeguards are instituted by each installation. Exclusive access for all other data sets can be controlled by using the RESERVE and DEQ macro instructions.

**VSAM GLOBAL RESOURCE SERIALIZATION:** In order for the changes in the VSAM components of MVS/XA DFP Release 1.1 to allow the sharing of data sets in a global resource serialization complex (ring), each system in the global resource serialization complex must contain the VSAM global resource serialization support.

If data sets are being shared by processors that are not in the same global resource serialization complex, or that do not have VSAM global resource serialization installed, the RESERVE/DEQ functions must be used by all application programs in all systems to ensure the integrity of the data set. Should a system drop out of the global resource

serialization complex and continue to access a VSAM data set which is in use, both the applications within the system in the global resource serialization complex and the application programs in the system(s) outside the global resource serialization complex must use RESERVE/DEQ.

All users must examine their current use of global resource serialization resource name lists (RNLs). If these lists have been used to convert RESERVEs to ENQs for catalogs, then the user must update these lists (i.e., the RESERVEs for catalogs must not be converted). These changes must be accomplished prior to using the MVS/XA DFP VSAM global resource serialization support. For specific details, see the *OS/VS2 MVS Planning for Global Resource Serialization (GC28-1062)*.

**CHECKPOINT/RESTART:** If a job step is terminated before successful completion, checkpoint/restart can make it possible to resume execution from the beginning of the step or from a place within the step. Either way, the restart can be made to occur automatically when the failure occurs.

The CHKPT macro instruction is coded in the user's program at a checkpoint to be taken. A checkpoint is the point at which information about the status of a job step is recorded so that the job step can be restarted later at that point if necessary.

Checkpoint/restart includes a checkpoint routine and several restart routines.

The checkpoint routine gathers and records on a checkpoint data set enough information about the status of the job step and its related control blocks to allow a restart from the place where the checkpoint is taken.

The restart routines can be invoked when a job step is resubmitted for restart, or they can be invoked automatically when a failure occurs. The functions performed by restart routines depend upon the type of restart requested.

If the restart is to be made from the beginning of a job step, for deferred restart only, the RESTART parameter of the JOB statement must contain the name of the step to be restarted, and routines of the initiating task simply bypass preceding steps and begin processing with the named step.

If a step is to be restarted from the beginning automatically, the RD parameter may be used; then restart processing begins during step termination. If RD is not used and the checkpoint DD statement is in the JOB, the job starts automatically at the last checkpoint taken. The step termination routine of job management invokes routines to verify that a restart can be performed and requests the operator to authorize the restart.

If a step is to be restarted from a place where a checkpoint was taken and the job is resubmitted, the RESTART parameter of the JOB statement must identify the step and checkpoint identifier and a SYSCHK DD statement must describe the checkpoint data set.

If a step is to be restarted automatically from a place where a checkpoint was taken, the step termination routine invokes routines to ensure that all data sets for the step are kept.

Checkpoint/restart supports 31-bit callers of it's services.

In MVS/System Product-JES2 Version 2 (5740-XC6) or MVS/System Product-JES3 Version 2 (5665-291), restarted jobs are processed by the job entry subsystem, JES, which returns them to its job execution queue for subsequent initiation based upon priority and resource availability.

### SYSTEM SUPPORT PROGRAMS

**LINKAGE EDITOR:** The linkage editor available with DFP combines separately compiled or assembled object modules into one or more load modules in a format suitable for loading by the control program and for subsequent execution. It also combines previously edited load modules with each other or with object modules. The linkage editor available with DFP does not execute in overlay. This increases the virtual storage requirements by 32K bytes. The linkage editor will run in 24-bit mode.

Although linking or combining of program modules is its primary function, the linkage editor also:

- Supports the specification of 24- and 31-bit addressing modes and residency modes, which may be specified in source programs submitted to Assembler H Version 2, or the linkage editor JCL and control statements. Object and load modules which were acceptable to the OS/VS2 MVS linkage editor are also acceptable to the linkage editor available in DFP which assigns default values of 24 to AMODE/RMODE.
- Inserts relocation dictionary (RLD) record and relocation dictionary/control (RLD/CTL) record block counts into program library members.
- Provides CSECT ordering and page boundary alignment facilities to allow the user to improve paging characteristics of his programs.

**PROGRAM PRODUCTS**
**MVS/XA Data Facility Product (cont'd)**

- Incorporates modules from data sets other than those in its primary input, either automatically or upon request.
- Aids program modification by replacing and deleting control sections as directed by linkage editor control statements.
- Defines the storage requirements for the common control sections generated by the assembler and by FORTRAN compilers, and the static external areas generated by PL/I compilers.
- Provides processing options and logs diagnostic error messages.
- Maintains an audit trail of compilation, linkage editing dates, and levels and modifications on a CSECT basis within a load module via the identification record.
- Provides a service aid feature to allow for expansion of modules to provide maintenance space.
- Processes a control card and parameter permitting the user to supply his authorization level for the authorized program facility (APF).

**PROGRAM FETCH:** Modules that were placed in a load library by the linkage editor can be read into virtual storage throughout the 31-bit addressing range.

Program fetch modifications for MVS/XA DFP:

- Utilizes the RLD and RLD/CNTL block counts in the MVS/XA PDS directory entry to build channel programs.
- Program fetch evaluates RMODE program attributes, then reads the load module into storage within the 31-bit virtual addressing range or the 24-bit virtual addressing range as specified.
- Uses the new Format 1 CCW to read a module into virtual storage within the 31-bit addressing range
- Fetch is a part of the nucleus and runs in 31-bit address mode and resides anywhere in virtual storage.

**LOADER:** The MVS/XA DFP loader combines the basic editing and loading functions of the linkage editor and program fetch in one job step. It loads object modules provided by the compilers and load modules produced by the linkage editor directly into virtual storage throughout the 31-bit addressing range for program execution. The loader executes in 31-bit addressing mode and resides within the 24-bit addressing mode range.

**SYSTEM UTILITIES**

These programs are used to maintain system control data at an organizational or system level to operate in pageable storage. The following functions are performed by the system utility programs:

**IEHPROGM:** Modifies system control data and maintains data sets at an organization level, via scratch, rename, catalog data, etc. IEHPROGM supports the increased number of device addresses.

**IEHMOVE:** Moves or copies logical collections of data. IEHMOVE supports the increased number of UCBs.

**IEHLIST:** Lists system control data such as directory entries of partitioned data sets and VTOC entries. IEHLIST supports the increased number of UCBs and prints the 24- and 31-bit addressing mode and residency mode indicators in a partitioned data set directory. RLD counts for load modules are shown.

**IEHINITT:** Writes volume label sets in EBCDIC, BCD, or ASCII code on magnetic tapes.

**IEHATLAS:** Locates and assigns an alternate track to replace a defective track and copies usage records from the defective track to an alternate track.

**IFHSTATR:** Selects, formats, and writes information from Type 21 (error statistics by volume) SMF records. In MVS/XA DFP, IFHSTATR is run against the output of MVS/System Product's IFASMFDP or MVS/370 DFP.

**Offline 3800:** The offline 3800 Printing Subsystem mdl 1 user is provided with the same functional capability as is available to the online 3800 mdl 1 user. The program executes in an online MVS/XA environment to create control information and place it on magnetic tape. The magnetic tape can then be used to set up the 3800 mdl 1 for the printing of user data.

**DATA SET UTILITIES**

These programs reorganize, change, or compare data at the data set and/or record level, and are required for the proper generation and maintenance of MVS/XA. The following general functions are performed by these utilities for non-VSAM data sets:

**IEBCOPY:** Copies, compresses, merges, loads, reblocks load modules, inserts the count of relocation dictionary records and/or control records, and unloads partitioned data sets.

**IEBGENER:** Copies a sequential data set or members of a partitioned data set, or converts a data set from sequential to partitioned organization.

**IEBPTPCH:** Prints or punches records residing in a sequential or partitioned data set.

**IEBUPDTE:** Updates a symbolic library.

**IEBEDIT:** Produces an edited input job-stream data set from a master input job-stream data set.

**IEBDG:** Can create output data sets with either internally generated test data or externally supplied input. These data sets can be sequential, indexed sequential, or partitioned.

**IEBCOMPR:** Compares two identically organized sequential or partitioned data sets at the logical record level.

**IEBISAM:** Can copy, print, reorganize, load, or unload an indexed sequential data set.

**IEBIMAGE:** Provides means for the user to create or modify and to store in SYS1.IMAGELIB forms control buffer records, copy modification records, graphic character modification records, library character sets, and character arrangement tables. Input to the utility consists of simple control statements. Users can specify for FCB records, forms sizes, number of lines at each vertical spacing, and line positions for simulated channel control punches. For copy modification, control statements include the text and its position within each copy of the pages of a data set. Existing copy modification records can also be modified. Control statements for graphic character modification modules and library character sets provide means for combining and naming groups of graphic characters, including any characters already in SYS1.IMAGELIB, and to assist in storing in the system new graphic characters of the user's own design. Character arrangement tables can be created or modified to print using different character sets, to include graphic character modifications and library character sets, and to assign data codes to graphics or to change existing assignments.

**INDEPENDENT UTILITY:** The independent utility ICAPRTBL does not operate with the MVS/XA control program, but supports MVS/XA by performing stand-alone buffer loading for the 3211 or 3203 mdl 5 printer. ICAPRTBL will not operate in IBM processors operating in Extended Architecture mode.

**SERVICE PROGRAM**

The access method services multi-function service program is used with VSAM data sets for the following:

- Define a VSAM data set or catalog.
- Delete a VSAM data set or catalog.
- Define an integrated catalog facility catalog.
- Delete an integrated catalog facility catalog.
- Convert a sequential or an indexed sequential data set to VSAM format.
- List VSAM or integrated catalog facility catalog entries or records of a data set.
- Copy a data set for reorganization.
- Create a backup copy of a data set.
- Make a data set portable from one operating system to another.
- Define and delete aliases for catalog names and non-VSAM data set names.
- Support generation data groups (GDGs) in non-VSAM data sets.
- Define and format paging data sets.
- Convert OS (CVOL) catalog or VSAM catalog to an integrated catalog facility catalog.
- Move or copy a VSAM catalog or integrated catalog facility catalog.
- Create pointers in the master catalog to the OS control volume catalogs.
- Reorganize catalogs:
  - Move catalogs to different device types.
  - Merge two integrated catalog facility catalogs into a single integrated catalog facility catalog.
  - Split a single integrated catalog facility catalog into two or more integrated catalog facility catalogs.
- Validate the content, format, and consistency of the integrated catalog facility catalogs and data sets.

Access method services is also used to:

- List the counters and status of the 3880 Storage Control mdl 11 and mdl 13.
- Cause data to be read into cache of the 3880-13.

**MVS/XA Data Facility Product (cont'd)**

- Allow or inhibit caching for the 3880-13 or attached device.

It can be invoked through an input job stream containing an access method services command, by a processing program that passes it a command statement, or from a time-sharing terminal.

**SERVICE AID**

**AMBLIST:** This linkage editor service aid program produces various formatted listings which may be used for system serviceability and diagnostic purposes. Depending on options specified on AMBLIST control statements, the following listings may be produced:

- Formatted load module listings.
- Formatted object module listings.
- Maps of:
  - Modified link pack area (MLPA)
  - Extended modified link pack area (EMLPA)
  - Fixed link pack area (FLPA)
  - Extended fixed link pack area (EFLPA)
  - Pageable link pack area (PLPA)
  - Extended pageable link pack area (EPLPA)
- Map and cross-reference listings of the DAT-on nucleus.
- Listings of the data stored in the CSECT Identification records of load modules.
- Load module map and cross-reference listing showing addresses relocated relative to a user-supplied address.
- Load module summary data including entry point address, APF access code, module attributes, and the contents of the module's system status Index.
- Program modifications to a load module library.

The minimum virtual storage requirement for AMBLIST is 64K bytes. AMBLIST supports both 24- and 31-bit addressing and residency mode specifications by indicating so on output listings.

For Release 1.1, VSAM allows programs running in 31-bit mode to create and access buffers in virtual storage above 16 megabytes. VSAM user exits are also supported above 16 megabytes.

OPEN, CLOSE, BLDVRP, DLVRP, and the control block manipulation macros (CBMM) must have their parameter lists in virtual storage below 16 megabytes. Other VSAM macros (GET, PUT, etc.) can have their parameter list above 16 megabytes. The user needs to specify the intent to use 31-bit buffers in the access method control block (ACB) at OPEN time. The ACB is to be kept below 16 megabytes while the request parameter list (RPL) may be placed above 16 megabytes. The RPL and EXLST must be below 16 megabytes if referenced by the MODCB, GENCB, TESTCB, or SHOWCB macros.

Note: MVS/XA DFP Release 1.1 uses the entire 4-byte address field. Programs that use an address field for other than addressing purposes (for example, flags in high order bits) may produce unexpected results.

**SYSTEM GENERATION**

System generation is the process of preparing a specially tailored operating system to match the machine configuration and operating system options selected by the user. This process requires an operational system, either OS/VS2 MVS Release 3.8 or MVS/XA, and requires the program products specified in the "Specified Operating Environment".

**MVS/XA DFP DEVICE SUPPORT CHART**

**I/O Unit Support:** The following units, up to a maximum of 4096 devices, are supported by MVS/XA for the indicated function:

PROGRAM PRODUCTS

MVS/XA Data Facility Product (cont'd)

MVS/XA DFP DEVICE SUPPORT CHART

Input/Output Units	Input Job Stream	In/Out Work Queue	System Output	Primary SYSRES	Program Libraries	C	G	S	I,P,D,A
1403 Printer mdls 2,-7,-N1			X1			X2		X1	
2250-3 Display Station						X3	X		
2305-2 Fixed Head Storage (Notes 4, 5)	X	X7		X	X			X	X
2501 Card Reader	X					X2		X	
2540 Card Read Punch	X12		X11,12			X2		X	
3203-5 Printer			X			X2		X	
3211 Printer			X			X2		X	
3251 Display Station (Note 9)						X3	X		
3262-5			X			X2		X	
3277 Display Station	X					X2			
3278 (Supported as a 3277)	X					X2			
3279 Color Display Station	X					X2			
3284 Printer						X2			
3286 Printer						X2			
3330 Disk Storage (Notes 5, 8)	X	X		X	X			X	X
3333 Disk Storage and Control (Notes 5, 8)	X	X		X	X			X	X
3340 Direct Access Storage Facility (Notes 5, 6, 8)	X	X		X	X			X	X
3344 Direct Access Storage (Notes 5, 8)	X	X		X	X			X	X
3350 Direct Access Storage (Notes 5, 8, 18, 19)	X	X		X	X			X	X
3375 Direct Access Storage (Notes 5, 8)	X	X		X	X			X	X
3380 Direct Access Storage (Notes 5, 8)	X	X		X	X			X	X
3420 Magnetic Tape Unit	X		X					X	
3505 Card Reader	X					X2		X	
3525 Card Punch	X10		X10,12			X2		X	
3800 Printing Subsystem mdl 1			X					X	
3851 Mass Storage Facility (Notes 14, 17)	X15				X15,16			X15	X15
3890 Document Processor								X13	

**MVS/XA DFP Device Support:** The MVS/XA DFP device support chart shows all devices supported by MVS/XA for systems functions and/or non-TP access methods. The chart shows for each device the relevant functions supported. For telecommunications devices see:

- ACF/VTAM Version 2 Release 1 licensed program (5665-280)
- ACF/TCAM Version 2 Release 4 licensed program (5735-RC3)
- BTAM/SP licensed program (5665-279)

Devices that are not shown in this chart have no specific programming support under MVS/XA and their existence is not recognized by the programs.

**Notes:**

1. The Selective Tape Listing feature is not supported.
2. A console must consist of a printer-keyboard, or a card reader and printer to simulate the actions of a printer-keyboard (composite console). See the pages for MVS/System Product-JES2 Version 2 (5740-XC6) or MVS/System Product-JES3 Version 2 (5665-291) licensed program for a further description of this support.
3. DIDOCS supported by MVS/System Product-JES2 Version 2 (5740-XC6) or MVS/System Product-JES3 Version 2 (5665-291) licensed program.
4. Multiple requesting supported.
5. File scan not supported.
6. Rotational position sensing support is an optional feature on 3340.
7. Not supported by MVS/System Product-JES3 Version 2 (5665-291) licensed program.
8. For message queues under TCAM, requires ACF/TCAM Version 2 Release 4 licensed program (5735-RC3).

9. Must be SYSGENed as 2250-3.
10. Supported for read or punch, but not simultaneously.
11. For use with the MVS/XA output writer; not for system messages.
12. Punch-feed-read feature is not supported.
13. QSAM (device-dependent only).
14. Support shown is for 3330s or 3333s as staging devices. If real 3330/3333s are included as part of 3851, see note 15.
15. With 3330/3333 as staging device, rotational position sensing is supported.
16. User program libraries only.
17. 3851 support will require Mass Storage Systems Extensions (5740-XYG) licensed program.
18. 3330 emulation is not supported when the 3350 is attached via the 3880 mdl 11.
19. The 3350 is required to utilize the 3880 mdl 11.
20. The 3380 is required to utilize the 3880 mdl 13.

**Legend:**

- C = Console
- G = Graphic programming support
- S = Sequential access method
- I = Indexed sequential access method
- P = Basic partitioned access method
- D = Basic direct access method
- A = Virtual storage access method
- X = Function supported

## MVS/XA Data Facility Product (cont'd)

### CUSTOMER RESPONSIBILITIES

MVS/XA DFP users of record will automatically receive distribution of Modification Level 1.

The user needs to order and install Device Support Facilities Release 6 (a Class 2 System Control Program) for MVS/XA (5665-257).

Users of either OS/VS2 MVS IEHDASDR or the Direct Access Storage Dump Restore licensed program must order and install Data Facility Data Set Services (DFDSS) (5740-UT3) or a functional equivalent to provide direct access storage device dump and restore functions. If the customer is planning to install DFDSS, it is recommended that this be done well before MVS/XA DFP is installed, in order to back up disk files to tape using the format acceptable to DFDSS for restoration.

Users that have DFDSS installed at the time of MVS/XA DFP installation must re-install, prior to execution in Extended Architecture mode, DFDSS Release 1.2 or later release or modification.

Additionally, current S/370 users and new installations must order and install MVS/XA Data Facility Product and one of the co-requisites: MVS/System Product-JES2 Version 2 (5740-XC6) or MVS/System Product-JES3 Version 2 (5665-291). The linkage editor available with DFP must be used during system generation and subsequent maintenance.

Assembler H Version 2 licensed program (5668-962) must be used to perform the assemblies required for system generation (SYSGEN) and subsequent maintenance of the MVS/XA operating system.

Users intending to use the access method services REPRO encryption/decryption function must order and install one of the following or a functional equivalent:

- Programmed Cryptographic Facility licensed program (5740-XY5).
- Cryptographic Unit Support licensed program (5740-XY6) and its pre-requisites.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

MVS/XA Data Facility Product is designed to operate on the IBM processors operating in Extended Architecture mode.

#### SOFTWARE REQUIREMENTS

MVS/XA Data Facility Product Release 1 requires OS/VS2 MVS Release 3.8 as an installation base, and the functions provided by either MVS/System Product-JES2 Version 2 Release 1.0 (5740-XC6) or MVS/System Product-JES3 Version 2 Release 1.0 (5665-291) for execution and their program distribution libraries for the assemblies required for system generation (SYSGEN).

MVS/XA DFP Release 1.1 requires MVS/XA DFP Release 1.0 and its prerequisites as an installation base, and the functions provided by either MVS/System Product - JES2 Version 2 Release 1 Modification Level 1 (5740-XC6) or MVS/System Product - JES3 Version 2 Release 1 Modification Level 1 (5665-291) and their prerequisites for the assemblies required for system generation.

Assembler H Version 2 licensed program (5668-962) performs the assemblies required for SYSGEN and subsequent maintenance of the MVS/XA operating system.

MVS/XA DFP may be installed via either the System Modification Program Extended (SMF/E) or System Modification Program Release 4.27.

Users of the access method services REPRO encryption/decryption function will require the functions provided by one of the following or a functional equivalent:

- Programmed Cryptographic Facility licensed program (5740-XY5)
- Cryptographic Unit Support licensed program (5740-XY6) and its pre-requisites

### COMPATIBILITY

**Upward Compatibility of User Programs:** This refers to the capability of user programs that use published external interfaces, do not run authorized, and which execute with MVS/370 to perform the same function in the MVS/XA environment. Although this level of compatibility is true in most cases, the user should review this section in its entirety.

**MVS/370 Data Facility Product:** User programs that take advantage of the new devices and functions introduced by MVS/370 Data Facility Product will not operate with MVS/XA DFP.

**Note:** The reader may wish to review the "Compatibility" sections of the Program Product pages for the following licensed programs:

- MVS/System Product Version 2 (5665-291)
- ACF/VTAM Version 2 Release 1 (5665-280)
- ACF/TCAM Version 2 Release 4 (5735-RC3)
- BTAM/System Product (5665-279)

**Indexed VTOC Compatibility:** Both indexed and non-indexed VTOCs are supported by MVS/XA DFP. The support is functionally equivalent to the support introduced to S/370 users with the Data Facility Device Support (DFDS) licensed program. Programs that currently access the VTOC through documented DADSM interfaces will continue to operate without change on volumes with a VTOC index. Programs that access the VTOC via EXCP or SAM will continue to operate without change on volumes with a VTOC index with one exception: Programs that are dependent on the information in the Format 5 DSCB(s) must be modified to use the common VTOC access facility (CVAF) function to obtain the same information from the VTOC index.

#### MVS/XA Program Management Compatibility:

**Linkage Editor:** Object and load modules acceptable to the OS/VS2 MVS Release 3.8 or MVS/370 DFP linkage editor are also acceptable to the linkage editor available in MVS/XA DFP. The linkage editor available with MVS/XA DFP will require 32K more storage than was used by the OS/VS2 MVS Release 3.8 linkage editor.

**Loader:** Object modules acceptable as input to the OS/VS2 MVS or MVS/370 DFP loader are also acceptable to the loader available in MVS/XA DFP.

**Checkpoint/Restart:** User application programs that successfully take checkpoints on MVS/370 may do so on MVS/XA.

**OS/VS2 MVS programs not available with MVS/XA:** Four OS/VS MVS Release 3.8 programs will not be available in the MVS/XA environment upon the installation of MVS/XA DFP. The programs and suggested alternatives for specified functions are listed below:

**IBCDASDI:** Disk initialization functions are currently available in Device Support Facilities.

**IBCDMPRS:** The standalone disk *restore* functions are currently available in the Data Facility Data Set Services (DFDSS) licensed program. The stand-alone disk restore functions will not operate in IBM processors operating in Extended Architecture mode. The stand-alone disk *dump* functions are no longer available or supported in MVS/XA.

#### IEHDASDR:

- Disk initialization functions are currently available in Device Support Facilities.
- Dump/restore functions are currently available in DFDSS.

However, DFDSS does not support the dump format produced by IEHDASDR. S/370 users may order and install Data Facility Data Set Services to create backup tapes in an acceptable format. Dumps taken by DFDSS in an MVS/370 environment may be restored by DFDSS in an MVS/XA environment.

**Analysis Program-1 (AP-1):** The functions to aid in the analysis of DASD error situations are available in Device Support Facilities.

**Note:** The Direct Access Storage Dump Restore (5740-UT1) licensed program creates tape in two formats, neither of which is accepted by DFDSS. Any tape created by these two IBM programs that must be used to restore data, may be restored by the originating IBM programs operating in S/370 mode.

### INSTALLATION CONSIDERATIONS

MVS/XA DFP Release 1.0 is based upon the DM, DS, ST, PM, and UT FMIDs provided with OS/VS2 MVS System Control Program Release 3.8 and of the five licensed programs whose functions have been incorporated in MVS/XA DFP Release 1.0. During installation, these FMIDs are replaced with a single FMID HDP1102. Since not all functions are replaced, the user should review the "Compatibility" section. The stated corequisite licensed program must also be installed prior to execution.

The installation of MVS/XA DFP Release 1.0 via System Modification Program Extended (SMP/E) or System Modification Program Release 4.27 requires a full system generation.

MVS/XA DFP Release 1.1 is an update to MVS/XA DFP Release 1.0.

An IOGEN will be required for:

- The attachment of the 3350 Direct Access Storage to the 3880 Storage Control mdl 11.
- Any change in the value specified in the PCU parameter of the system generation IO-DEVICE macro.

Following the installation of MVS/XA DFP and MVS/System Product Version 2, the user can no longer use the resulting MVS/XA libraries for building or maintaining a non-MVS/XA system.

The following programs support the MVS/XA environment and will enhance the usage of MVS/XA Data Facility Product:

Device Support Facilities Release 6 (5665-257), a Class 2 System Control Program, by providing such functions as direct access storage device initialization and indexed VTOC creation.

The Direct Access Storage Device Migration Aid licensed program (5668-002) provides assistance to the user in moving data from

## MVS/XA Data Facility Product (cont'd)

other supported direct access storage devices to the IBM 3375 or the IBM 3380 Direct Access Storage device.

The MVS/XA Data Facility Product includes the functions in the following licensed programs and no attempt should be made to apply them to an MVS/XA system:

- Data Facility Device Support (DFDS) (5740-AM7)
- Sequential Access Method - Extended (SAM-E) (5740-AM3)
- Data Facility Extended Function (DFEF) (5740-XYQ)
- Offline IBM 3800 Utility program product (5748-UT2)
- Access Method Services Cryptographic Option (5740-AM8)

### MIGRATION

Page data sets on existing 3350 Direct Access Storage volumes must be reformatted prior to attachment to the 3880 Storage Control mdl 11.

**VSAM GLOBAL RESOURCE SERIALIZATION:** In order for the changes in the VSAM component of MVS/XA DFP Release 1.1 to allow the sharing of data sets in a global resource serialization complex (ring), each system in the global resource serialization complex must contain the VSAM global resource serialization support.

If data sets are being shared by processors that are not in the same global resource serialization complex, or that do not have VSAM global resource serialization installed, the RESERVE/DEQ functions must be used by all application programs in all systems to ensure the integrity of the data set. Should a system drop out of the global resource serialization complex and continue to access a VSAM data set which is in use, both the applications within the system in the global resource serialization complex and the application programs in the system(s) outside of the global resource serialization complex must use RESERVE/DEQ.

All installations must examine their current use of global resource serialization resource name lists (RNLs). If these lists have been used to convert RESERVEs to ENQs for catalogs, then the installation must update these lists for the duration of the migration to VSAM and global resource serialization on all processors (i.e., the RESERVEs for catalogs must not be converted). These changes must be accomplished prior to using the MVS/XA DFP VSAM global resource serialization support. For specific details, see the *OS/VS2 Planning for Global Resource Serialization* (GC28-1062).

**Indexed VTOC Migration:** Coexistence with systems that do not support the VTOC index is a major feature of the VTOC index design.

- Any volume with or without a VTOC index that is currently usable on OS/VS2 MVS or OS/VS1 may be moved to the MVS/XA environment and used as-is.
- Device Support Facilities may be used to initialize a VTOC index on these volumes whenever desired, except on volumes whose VTOC does not begin on record 1 of a track (for example, a DOS 'stacked pack').
- A volume with a VTOC index can be moved to and from the following systems which do not support the VTOC index:
  - OS Release 21.8
  - OS/VS2 SVS
  - VSE Advanced Functions
  - OS/VS1, without DFDS (5740-AM6) installed.
  - OS/VS2 MVS, without either MVS/370 DFP (5665-295) or DFDS (5740-AM7) installed.

In general, if the VTOC is modified on any of these systems, the VTOC index will be invalidated and the VTOC converted to the non-indexed format either via existing facilities on these systems or upon return to a system that supports the VTOC index. The user must then re-initialize the index with Device Support Facilities.

- Volumes with the VTOC index that must be used on systems other than those listed above should be converted to the non-indexed VTOC format via Device Support Facilities prior to use on the other system.
- The VTOC index is designed for easy user migration. User job streams, including JCL and IEHPROGM control statements, are fully compatible with indexed and non-indexed volumes. EXCP programs that are converted to use CVAF will operate on both types of volumes. Thus, the installation may gradually convert volumes to the indexed format.

**INTEGRATED CATALOG FACILITY MIGRATION:** The MVS/XA DFP integrated catalog facility program and catalog may be used to replace and will coexist with all currently available catalog functions and facilities. Access method services CVNTCAT function will convert an existing VSAM user catalog or OS (CVOL) catalog to an integrated catalog facility catalog. Individual catalogs may be converted without requiring the conversion of any other catalog. DFEF users that have previously converted, or are in the process of converting, to integrated catalog facility catalogs will not need to repeat that conversion when migrating to DFP.

The MVS/XA Data Facility Program Directory contains information to enable the user to modify the contents of the PLPA following migration to the integrated catalog facility catalogs for the purpose of removal of modules no longer required to support current VSAM catalogs. Users who have previously removed these modules should consider doing so again on completion of the installation of MVS/XA DFP and any subsequent system generation. The application of maintenance may also reinstall these modules resulting in additional removal decisions. The user should also take into account that additional virtual storage constraint relief has been provided through extended pageable link pack area residence of VSAM record management in MVS/XA DFP and such relief as is provided by one or the other of the corequisites: MVS/System Product - JES2 Version 2 (5740-XC6) or MVS/System Product - JES3 Version 2 (5665-291).

### DATA SECURITY, AUDITABILITY and CONTROL

The Resource Access Control Facility (RACF) program product (5740-XXH) Release 4 and Release 5 will execute in an MVS/XA environment, providing security and protection of data resources for those installations requiring it.

MVS/XA DFP provides:

- For non-VSAM data sets to be protected against unauthorized access or alteration via the password parameter on the DD statement.
- For VSAM data sets, passwords that may be defined to control access to the data set, limit alteration of the data set, or limit access to the integrated catalog facility catalog of VSAM catalog.

For transportation or storage of data, security is implemented by encrypting the data, using the facilities of the access method services REPRO encryption/decryption function, and either the Cryptographic Unit Support program product or the Programmed Cryptographic Facility program product.

User management is responsible for the selection, adequacy, and implementation of these features, and the appropriate application and administrative control.

RPO's ACCEPTED: No

MVS/XA SYSTEM INTEGRITY APPLIES: Yes

### PRODUCT CLASSIFICATION

This product contains restricted availability material. On receipt of the product material marked "Restricted Materials IBM", it must be kept in accordance with the Terms and Conditions outlined in either the supplement to the *Agreement for IBM Licensed Programs* (Z125-3359) of the *Agreement for IBM Licensed Programs* (Z125-3358).



**TSO EXTENSIONS (TSO/E)  
RELEASE 1  
MVS/370 (5665-285)  
MVS/XA (5665-293)**

**PURPOSE**

The TSO Extensions (TSO/E) Licensed Program incorporates all the functions of the TSO Command Package (5740-XT6) and in addition provides the TSO user with new function, improved usability, and performance improvements. It will benefit centralized as well as distributed interactive systems. Non-DP professional end users as well as programming professionals will benefit from use of the TSO/E program product. This product is intended to complement full screen System Productivity Facility (SPF) environments as well as enhancing line command terminal environments. The TSO/E Licensed Program is designed to operate in either an MVS/370 or MVS/XA environment. The TSO/E, for MVS/XA systems (5665-293), provides the TEST command function in the MVS/XA environment. It therefore is required if TEST is to be used on an MVS/XA system.

**HIGHLIGHTS of ENHANCEMENTS AVAILABLE in an MVS/370 or MVS/XA ENVIRONMENT**

**NEW FUNCTION**

- A new function, the Interactive Data Transmission Facility, provides the capability to establish and operate a transmission facility for programs and data between any two processing centers on a network.

Applications such as an online, user-to-user message facility and distributed data processing may be developed and supported using the Interactive Data Transmission Facility.

**PERFORMANCE**

- Reductions have been made in the number of I/O operations required to process the data set which contains user mail and notices. These reductions give significant savings in the LISTBC path length which itself is a significant portion of the LOGON path length.
- The normal process of EDITing a model data set before submitting it has been eliminated by extending the function of SUBMIT, thus improving performance of SUBMIT in a commonly used environment.

**USABILITY**

- A full screen LOGON panel is provided which simplifies LOGON. It eliminates the terminal user's need to know command syntax and provides default operands (saved from the previous session) and also provides online help information for each entry field. The user can also specify the first command to be executed after LOGON, which may also be saved from session to session.
- The use of the ALLOCATE command has been simplified by providing the capability to create a data set modeled on the attributes of an existing data set.
- The SUBMIT command has been enhanced to allow more flexibility in the job stream source.
- The "???" PROMPT HELP facility provides additional, more descriptive information for command operands than is available today. In addition, productivity is improved by eliminating the need to re-key information entered prior to the request for help.

The following is a summary of functions in the TSO/E that were in the TSO Command Package:

- Execution of TSO commands and subcommands in the background:  
The Terminal Monitor Program (TMP) allows command execution in the background. The commands are executable if submitted from a terminal, or through a batch, internal, or remote reader facility of the Job Entry Subsystem (JES).
- TSO Command Accounting allows an installation to keep track of individual TSO commands entered during a TSO session.
- Recoverability of workfiles (utility data sets):  
The EDIT Command Processor allows a user to recover a modified workfile if a system, line, or edit failure occurs.  
The CKPOINT subcommand of EDIT is available to eliminate the need for a user to execute SAVE to prevent loss of data. This subcommand is used in conjunction with the EDIT recovery feature.
- The SUBMIT command supports the RACF USER and PASSWORD keyword operands for the generated job statement.
- The ATTRIB and FREE commands are executable as subcommands of EDIT.
- The DOWN subcommand of EDIT has an abbreviation of D.
- The FREE command and subcommand of EDIT provides the ALL keyword for freeing all dynamically allocated data sets.

- The PROFILE command supports keywords which allow the user to decide whether the EDIT recovery option is to be used.
- The ACCOUNT command has keywords which indicate the installation's decision to allow a particular user the ability to use the EDIT recovery option.
- The maximum length of the DEST keyword of ALLOCATE, FREE, and OUTPUT is eight characters, making it compatible with the job control language (JCL).
- MSGCLASS, JOBCLASS, SYSOUT, and HOLD MSGCLASS defaults can be supplied in the user's UADS entry.

**DESCRIPTION**

**ENHANCEMENTS AVAILABLE IN AN MVS/370 or MVS/XA ENVIRONMENT:**

**Interactive Data Transmission Facility:** Two new commands, TRANSMIT and RECEIVE, simplify the process of sending data among nodes in a network. Previously, one could send data as in-stream data in a job, but the process required an in-depth knowledge of JCL and of accounting conventions at the receiving location and any intermediate locations. Now, one need know only the name of the receiving node and the userid of the person to whom one is sending the data.

The Interactive Data Transmission Facility "TRANSMIT" and "RECEIVE" commands may be used in conjunction with the VM/System Product Release 2 SEND FILE and RECEIVE commands. With these two products installed you may exchange data in a compatible format between MVS/TSO and VM systems. For additional information see the VM/System Product Release 2 Licensed Program Announcement.

A typical transmission sequence follows: When a sender enters the TRANSMIT command, TSO gets the data to be sent, converts the data to transmittable format, and writes the data to a SYSOUT file. The data is then routed to the receiving location by JES. When the data arrives at the destination node, a message is sent to the receiving userid via the SEND command announcing the availability of transmitted data. When the receiver issues the RECEIVE command, a message indicates a data set has arrived and the receiver is given the data set name, the name of the sender and the name of the sending node. The receiver is then prompted for a data set name for the data. TSO restores the data to original format and places it in the named data set.

If the AMS Cryptographic Option (5740-AM8) is installed on an MVS/370 system (or DFP on an MVS/XA system) and encryption requested, TSO will use the AMS REPRO command to encrypt data sets before transmitting them. Private key management or system key management may be selected. With private key management, both the sender and receiver must enter an encryption key. With system key management, AMS will select a key and encypher the data.

"Nicknames" can be substituted for node-userid identifiers and thereby simplify what must be entered in order to transmit data. A *names data set* is first built. TSO will use it to translate "nicknames" into node names and userids. The following may be placed in the *names data set*:

- Text to be inserted at the beginning or end of data being transmitted.
- Filename for alternative names data set.
- Log data set name (for information about transmission activity).

A number of user exits will give installation management a means of monitoring transmission activity or altering the way TSO performs some operations. Information from the PARM keyword of the TRANSMIT and RECEIVE commands is passed to all exit routines of the TRANSMIT and RECEIVE command processor routines.

- For *authorization checking*, there are two exits (a transmit startup exit and a receive data set preprocessing exit) for controlling who can transmit and/or receive data, and who can use a particular network path. Also, with the receive exit, the installation can identify persons who are to receive messages not directed to their own userids. The RACF authorization checking macro, RACHECK, could be used for these functions.
- For *unsupported data set types*, the two exits mentioned above can be used in combination with a third, the receive data set post-processing exit. Supported data set types are format F (fixed), V (variable) and U (undefined) length, in sequential or partitioned data sets. Unsupported data set types are ISAM and VSAM data sets, or data sets with user labels or keys. (VSAM data can be unloaded by standard AMS facilities and transmitted in unloaded format).
- For *accounting*, a transmit termination exit is supplied to be used with the receive data set post-processing exit. At each of these, information is available about volume and direction of data traffic.

## TSO Extensions R1 (cont'd)

- For encryption and decryption, exits are available to provide local support for the encryption process.

The TRANSMIT and RECEIVE commands require APF authorization to perform their intended functions.

**FULL SCREEN LOGON:** This new capability, for 3270 terminal users, provides a LOGON panel with a menu of all the LOGON variables. If the userid matches one in the user attribute data set, attributes from the last session will be displayed and the user will be prompted for a password. The user may obtain help for any variable by entering a "?" by the appropriate variable or for all the variables by depressing a Program Function Key. During LOGON if a syntax error is made the following will happen:

- An audible alarm will sound (if terminal is equipped with one).
- An asterisk will appear next to incorrect entries and they will be highlighted.
- A message will appear on the menu.
- The cursor will move to the first incorrect entry.

In addition, the user may specify the next command to be executed after the LOGON process. For example, if the user normally executes SPF and this was specified, SPF will be the next command executed. (Note that this command will be executed after any command entered in the PARM field on the EXEC card of the LOGON procedure.) As with all other LOGON attributes, this field will be initialized to the value specified in the last session.

**ALLOCATE COMMAND ENHANCEMENT:** The ALLOCATE command processor will allow the creation of a new data set based on the attributes of an existing model data set. This function will be implemented using the LIKE(dsn) keyword.

The keyword operands of the ATTRIB command can now be specified with the ALLOCATE command so that:

- Command language users will no longer have to issue the ATTRIB command to specify DCB operands. This allows the user to allocate a data set by using a single TSO command.
- Command language users will be able to override any attribute of an existing data set specified on the LIKE Keyword.

The ALLOCATE command is extended to provide for the RACF protection of DASD data sets and tape volumes. When a RACF-defined user is allocating a permanent tape data set on a private volume as the first file on the first volume in a volume sequence, that tape volume can be RACF-protected by using the new PROTECT keyword operand on ALLOCATE. Since ADSP (Automatic Data Set Protection) is not supported for tape, the user today must issue a separate RACF command to protect the tape volume. Furthermore, when the RACF user does not have the ADSP attribute, a separate RACF command must be issued to protect DASD data sets. With this new PROTECT operand, the tape volume or DASD data set will automatically be protected at the time the specified data set is OPENed for OUTPUT.

New keyword operands will be provided on the ALLOCATE command in support of allocation of SYSOUT data sets.

The limit of concatenating up to 16 partitioned data sets will be increased to 255, the same as for sequential data sets.

**SUBMIT COMMAND ENHANCEMENT:** SUBMIT \* is an enhancement to the SUBMIT command processor that provides a significant performance improvement when the input job stream is to be entered from a terminal or is contained in a command list (i.e., CLIST).

This function is more efficient than the previous function available via the SUBMIT command processor, since the requirement to EDIT a skeleton or model data set prior to submitting a job is eliminated. Installations may now incorporate the JCL within the CLIST and issue the SUBMIT \* command.

The other card functions of this command are unchanged.

The existing SUBMIT \* function of EDIT will continue to select the current EDIT data set as the input job stream.

**PROMPT HELP ENHANCEMENT:** This enhancement provides assistance when requested by the terminal user.

When prompting is being done for most command operands any information in the SYS1.HELP data set pertinent to the operand will be displayed when the user enters a "?". Refer to the *General Information Manual* (GC28-1061) for more specific information. This capability now also makes it possible for an installation to more easily tailor the information about an operand without modifying command processors.

Previously, in order to obtain help a user might have terminated the command, obtained the HELP information, and re-entered the command. "? PROMPT HELP" improves productivity by eliminating the need to terminate the command (before obtaining help) and to re-key previously entered information.

## LISTBC/SEND COMMAND ENHANCEMENTS:

- LISTBC I/O Reduction**  
This enhancement significantly reduces the number of I/O operations required to process a LISTBC mail request. LISTBC now performs a direct read of the user's mail directory record rather than requiring a sequential directory search.
- SEND I/O Reduction**  
A new algorithm has been implemented which significantly reduces search time to locate a free record within the BRODCAST data set when the SEND command is invoked.  
This enhancement will reduce the channel, control unit, and device busy time by keeping a pointer in SYS1.BRODCAST which either points to the first free record or points to some record before the first free record. This pointer will be used to determine where the sequential search should begin.  
Whenever SEND uses a free record it will increment the pointer to point to the next record which may or may not be a free record. Whenever LISTBC creates a new free record which is the first free record in SYS1.BRODCAST, it will update the pointer to point to this new free record.

## ENHANCEMENTS AVAILABLE ONLY WITH TSO EXTENSIONS FOR MVS/XA (5665-293)

### TSO TEST SUPPORT

- Support for testing a program above 16 megabytes (M): Programs to be tested may reside above 16M and use virtual storage above 16M.  
Through the use of TEST subcommands, the user can:
  - Obtain additional virtual storage above 16M.
  - Change the addressing mode of the program being tested.
  - List and alter virtual storage above 16M.
- Cross Memory environments. LIST subcommand will support all Cross Memory op codes. AT subcommand supports most Cross Memory op codes. At an ABEND, information will be displayed which specifies Address Space IDs (this will also occur for TSO programs not under TEST).
- A selected group of TSO commands can now be executed as subcommands of TSO TEST.
- Testing of programs that invoke other user programs has been simplified.

**TSO SERVICES:** Several important service routines (listed below) have been modified to enable them to process data in virtual storage above 16M whenever they are invoked by programs executing in 31-bit addressing mode. Several other important TSO service routines can be invoked in 31-bit addressing mode even though their input must be below 16M. In addition, the number of messages displayed at the operator's console has been reduced by eliminating the monitoring of the TSO Operator Command at the operators console. Only hard copy will be produced.

The following TSO service routines have been modified to enable them to be invoked by programs executing in 31-bit addressing mode:

- These service routines will process data above 16M:
  - PARSE
  - TSO message issuer
  - DAIRFAIL
  - GNRFAIL
- These service routines will process only data in virtual storage below 16M:
  - PUTGET
  - PUTLINE
  - GETLINE
  - STACK

Refer to the *OS/VS2 MVS TSO Extensions General Information Manual* for additional detail on enhancements to TSO TEST and services.

## SPECIFIED OPERATING ENVIRONMENT - MVS/370

### HARDWARE REQUIREMENTS

The TSO Extensions Licensed Program (5665-285) operates on:

- Any IBM processor that is supported by OS/VS2 (MVS) Release 3.8 with the MVS/System Product Version 1.

PROGRAM PRODUCTS

**TSO Extensions R1 (cont'd)**

- Any terminal currently supported by MVS TSO. In addition, the new Full Screen LOGON and the Interactive Data Transmission Facility supports the following:

- 3270 Information Display System Terminals
  - 3275 mdls 2, 12
  - 3276 mdls 2, 3, 4, 12, 13, 14
  - 3277 mdl 2
  - 3278 mdls 2, 3, 4, 5
  - 3279 mdls 2A, 2B, 3A, 3B (base color mode)

The screen sizes supported are:

- 24 rows by 80 columns - mdls 2, 2A, 2B, and 12
- 32 rows by 80 columns - mdls 3, 3A, 3B, and 13
- 43 rows by 80 columns - mdls 4 and 14
- 27 rows by 132 columns - mdl 5

- 8275 Display Terminals, mdls 11 and 12

**STORAGE CONSIDERATIONS - MVS/370:**

The approximate increase in virtual storage requirements are:

**Pageable Link Pack Area:** 55K bytes.

**Private Area:** The new TRANSMIT and RECEIVE commands can be used within a TSO user region size of 128K bytes. The virtual storage requirement for the new SUBMIT \* function depends upon the size of the job stream being submitted. The other functions of this product will result in a small increase in virtual storage requirements and also can be used within a TSO user region size of 128K bytes.

The approximate space requirement increases for system libraries (based on an IBM 3330 Disk Storage with a track size of 13,030 bytes) are:

Library	Bytes	Tracks
SYS1.COMDLIB	75K	6
SYS1.MACLIB	10K	1
SYS1.HELP	400K	30
SYS1.LINKLIB	70K	6
SYS1.LPALIB	60K	5
SYS1.UADS	160 per user	1 per 80 users

**SOFTWARE REQUIREMENTS**

The TSO Extensions Licensed Program (5665-285) is designed to execute with OS/VS2 (MVS) Release 3.8 with the MVS/System Product Version 1. The Interactive Data Transmission Facility function requires that the appropriate level of SP-JES2 or SP-JES3 be installed: For the JES2 environment the MVS/System Product - JES2 Release 3 and for the JES3 environment the MVS/System Product - JES3 Release 3.1. If the Interactive Data Transmission Facility is to be used to send or receive data from a VM System, the MVS/System Product - Release 3.1 is required.

**SPECIFIED OPERATING ENVIRONMENT - MVS/XA**

**HARDWARE REQUIREMENTS**

The TSO Extensions Program for the MVS/XA environment is designed to operate on:

- Any IBM processor that is supported by MVS/System Product Version 2
- Any terminal currently supported by MVS TSO. In addition, the new Full Screen LOGON and the Interactive Data Transmission Facility supports the following:

- 3270 Information Display System Terminals
  - 3275 mdls 2, 12
  - 3276 mdls 2, 3, 4, 12, 13, 14
  - 3277 mdl 2
  - 3278 mdls 2, 3, 4, 5
  - 3279 mdls 2A, 2B, 3A, 3B (base color mode)

The screen sizes supported are:

- 24 rows by 80 columns - mdls 2, 2A, 2B, and 12
- 32 rows by 80 columns - mdls 3, 3A, 3B, and 13
- 43 rows by 80 columns - mdls 4 and 14
- 27 rows by 132 columns - mdl 5

- 8275 Display Terminals, mdls 11 and 12

**STORAGE CONSIDERATIONS - MVS/XA:**

The approximate increase in virtual storage requirements are:

**Pageable Link Pack Area:** 75K bytes

**Private Area:** The new TRANSMIT and RECEIVE commands can be used within a TSO user region size of 128K bytes. The virtual storage requirement for the new SUBMIT \* function depends upon the size of the jobstream being submitted. The virtual storage requirements for the TEST command depend upon the characteristics of the program being tested. For example, a TSO user region size of 128K may be sufficient

to TEST a simple program that does not itself use large amounts of virtual storage. The other functions of this product will result in a small increase in virtual storage requirements and also can be used within a TSO user region size of 128K bytes. The approximate space requirement increases for system libraries (based on an IBM 3330 Disk Storage with a track size of 13,030 bytes) are:

Library	Bytes	Tracks
SYS1.COMDLIB	175K	14
SYS1.MACLIB	10K	1
SYS1.HELP	570K	44
SYS1.LINKLIB	70K	6
SYS1.LPALIB	80K	7
SYS1.UADS	160 per user	1 per 80 users

**SOFTWARE REQUIREMENTS**

The TSO Extensions Licensed Program (5665-293) is designed to execute with the MVS/System Product Version 2. It is not installable on MVS/System Product Version 1.

**DOCUMENTATION**

(available from Mechanicsburg)

*TSO Extensions General Information Manual (GC28-1061).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No

**TSO EXTENSIONS (TSO/E)  
RELEASE 2  
MVS/370 or MVS/XA  
5665-285**

**PURPOSE**

The TSO Extensions (TSO/E) Release 1 licensed program incorporates all the functions of the TSO Command Package (5740-XT6) and in addition provides the TSO user with new function, improved usability, and performance improvements. It will benefit centralized as well as distributed interactive systems. Non-DP professional end users as well as programming professionals will benefit from use of the TSO/E program product. This product is intended to complement full screen System Productivity Facility (SPF) environments as well as enhancing line command terminal environments. The TSO/E licensed program is designed to operate in either an MVS/370 or MVS/XA environment. The desired operating environment is selected by ordering the appropriate feature. The TSO/E feature for MVS/XA systems provides the TEST command function in the MVS/XA environment. It therefore is required if TEST is to be used on an MVS/XA system.

TSO/E Release 2 replaces TSO/E Release 1, incorporating all Release 1 function and performance improvements. TSO/E Release 2 extends the information center concept to the MVS/TSO environment through a new TSO/E Information Center Facility. Significant new performance and functional capabilities are also part of this release. Additionally, the Session Manager program product (5740-XE2) is integrated into TSO/E Release 2 with new device support and ease-of-use features.

**HIGHLIGHTS of ENHANCEMENTS AVAILABLE in an MVS/370 or MVS/XA ENVIRONMENT - TSO/E RELEASE 1**

**NEW FUNCTION**

- A new function, the Interactive Data Transmission Facility, provides the capability to establish and operate a transmission facility for programs and data between any two processing centers on a network.

Applications such as an online, user-to-user message facility and distributed data processing may be developed and supported using the Interactive Data Transmission Facility.

**PERFORMANCE**

- Reductions have been made in the number of I/O operations required to process the data set which contains user mail and notices. These reductions give significant savings in the LISTBC path length which itself is a significant portion of the LOGON path length.
- The normal process of EDITing a model data set before submitting it has been eliminated by extending the function of SUBMIT, thus improving performance of SUBMIT in a commonly used environment.

**USABILITY**

- A full screen LOGON panel is provided which simplifies LOGON. It eliminates the terminal user's need to know command syntax and provides default operands (saved from the previous session) and also provides online help information for each entry field. The user can also specify the first command to be executed after LOGON, which may also be saved from session to session.
- The use of the ALLOCATE command has been simplified by providing the capability to create a data set modeled on the attributes of an existing data set.
- The SUBMIT command has been enhanced to allow more flexibility in the job stream source.
- The '?' PROMPT HELP facility provides additional, more descriptive information for command operands than is available today. In addition, productivity is improved by eliminating the need to re-key information entered prior to the request for help.

The following is a summary of functions in TSO/E that were in the TSO Command Package:

- Execution of TSO commands and subcommands in the background:

The Terminal Monitor Program (TMP) allows command execution in the background. The commands are executable if submitted from a terminal, or through a batch, internal, or remote reader facility of the Job Entry Subsystem (JES).

- TSO Command Accounting allows an installation to keep track of individual TSO commands entered during a TSO session.

- Recoverability of workfiles (utility data sets):

The EDIT Command Processor allows a user to recover a modified workfile if a system, line, or edit failure occurs.

The CKPOINT subcommand of EDIT is available to eliminate the need for a user to execute SAVE to prevent loss of data. This subcommand is used in conjunction with the EDIT recovery feature.

- The SUBMIT command supports the RACF USER and PASSWORD keyword operands for the generated job statement.
- The ATTRIB and FREE commands are executable as subcommands of EDIT.
- The DOWN subcommand of EDIT has an abbreviation of D.
- The FREE command and subcommand of EDIT provides the ALL keyword for freeing all dynamically allocated data sets.
- The PROFILE command supports keywords which allow the user to decide whether the EDIT recovery option is to be used.
- The ACCOUNT command has keywords which indicate the installation's decision to allow a particular user the ability to use the EDIT recovery option.
- The maximum length of the DEST keyword of ALLOCATE, FREE, and OUTPUT is eight characters, making it compatible with the job control language (JCL).
- MSGCLASS, JOBCLASS, SYSOUT, and HOLD MSGCLASS defaults can be supplied in the user's UADS entry.

**DESCRIPTION - TSO/E RELEASE 1**

**ENHANCEMENTS AVAILABLE in an MVS/370 or MVS/XA ENVIRONMENT**

**Interactive Data Transmission Facility:** Two new commands, TRANSMIT and RECEIVE, simplify the process of sending data among nodes in a network. Previously, one could send data as in-stream data in a job, but the process required an in-depth knowledge of JCL and of accounting conventions at the receiving location and any intermediate locations. Now, one need know only the name of the receiving node and the userid of the person to whom one is sending the data.

The Interactive Data Transmission Facility 'TRANSMIT' and 'RECEIVE' commands may be used in conjunction with the VM/System Product Release 2 SEND FILE and RECEIVE commands. With these two products installed you may exchange data in a compatible format between MVS/TSO and VM systems. For additional information see the VM/System Product Release 2 Licensed Program Announcement.

A typical transmission sequence follows: When a sender enters the TRANSMIT command, TSO gets the data to be sent, converts the data to transmittable format, and writes the data to a SYSOUT file. The data is then routed to the receiving location by JES. When the data arrives at the destination node, a message is sent to the receiving userid via the SEND command announcing the availability of transmitted data. When the receiver issues the RECEIVE command, a message indicates a data set has arrived and the receiver is given the data set name, the name of the sender and the name of the sending node. The receiver is then prompted for a data set name for the data. TSO restores the data to original format and places it in the named data set.

If the AMS Cryptographic Option (5740-AM8) is installed on an MVS/370 system (or DFP on an MVS/XA system) and encryption requested, TSO will use the AMS REPRO command to encrypt data sets before transmitting them. Private key management or system key management may be selected. With private key management, both the sender and receiver must enter an encryption key. With system key management, AMS will select a key and encypher the data.

'Nicknames' can be substituted for node-userid identifiers and thereby simplify what must be entered in order to transmit data. A 'names data set' is first built. TSO will use it to translate 'nicknames' into node names and userids. The following may be placed in the 'names data set':

- Text to be inserted at the beginning or end of data being transmitted.
- Filename for alternative names data set.
- Log data set name (for information about transmission activity).

A number of user exits will give installation management a means of monitoring transmission activity or altering the way TSO performs some operations. Information from the PARM keyword of the TRANSMIT and RECEIVE commands is passed to all exit routines of the TRANSMIT and RECEIVE command processor routines.

- For authorization checking, there are two exits (a transmit startup exit and a receive data set preprocessing exit) for controlling who can transmit and/or receive data, and who can use a particular network path. Also, with the receive exit, the installation can identify persons who are to receive messages not directed to their own userids. The RACF authorization checking macro, RACHECK, could be used for these functions.
- For unsupported data set types, the two exits mentioned above can be used in combination with a third, the receive data set post-processing exit. Supported data set types are format F (fixed), V

## TSO Extensions R2 (cont'd)

(variable) and U (undefined) length, in sequential or partitioned data sets. Unsupported data set types are ISAM and VSAM data sets, or data sets with user labels or keys. (VSAM data can be unloaded by standard AMS facilities and transmitted in unloaded format.)

- For accounting, a transmit termination exit is supplied to be used with the receive data set post-processing exit. At each of these, information is available about volume and direction of data traffic.
- For encryption and decryption, exits are available to provide local support for the encryption process.

The TRANSMIT and RECEIVE commands require APF authorization to perform their intended functions.

**FULL SCREEN LOGON:** This new capability, for 3270 terminal users, provides a LOGON panel with a menu of all the LOGON variables. If the userid matches one in the user attribute data set, attributes from the last session will be displayed and the user will be prompted for a password. The user may obtain help for any variable by entering a '?' by the appropriate variable or for all the variables by depressing a Program Function Key. During LOGON, if a syntax error is made, the following will happen:

- An audible alarm will sound (if terminal is equipped with one).
- An asterisk will appear next to incorrect entries and they will be highlighted.
- A message will appear on the menu.
- The cursor will move to the first incorrect entry.

In addition, the user may specify the next command to be executed after the LOGON process. For example, if the user normally executes SPF and this was specified, SPF will be the next command executed. (Note that this command will be executed after any command entered in the PARM field on the EXEC card of the LOGON procedure.) As with all other LOGON attributes, this field will be initialized to the value specified in the last session.

**ALLOCATE COMMAND ENHANCEMENT:** The ALLOCATE command processor will allow the creation of a new data set based on the attributes of an existing model data set. This function will be implemented using the LIKE(dsn) keyword.

The keyword operands of the ATTRIB command can now be specified with the ALLOCATE command so that:

1. Command language users will no longer have to issue the ATTRIB command to specify DCB operands. This allows the user to allocate a data set by using a single TSO command.
2. Command language users will be able to override any attribute of an existing data set specified on the LIKE Keyword.

The ALLOCATE command is extended to provide for the RACF protection of DASD data sets and tape volumes. When a RACF-defined user is allocating a permanent tape data set on a private volume as the first file on the first volume in a volume sequence, that tape volume can be RACF-protected by using the new PROTECT keyword operand on ALLOCATE. Since ADSP (Automatic Data Set Protection) is not supported for tape, the user today must issue a separate RACF command to protect the tape volume. Furthermore, when the RACF user does not have the ADSP attribute, a separate RACF command must be issued to protect DASD data sets. With this new PROTECT operand, the tape volume or DASD data set will automatically be protected at the time the specified data set is OPENed for OUTPUT.

New keyword operands will be provided on the ALLOCATE command in support of allocation of SYSOUT data sets.

The limit of concatenating up to 16 partitioned data sets will be increased to 255, the same as for sequential data sets.

**SUBMIT COMMAND ENHANCEMENT:** SUBMIT \* is an enhancement to the SUBMIT command processor that provides a significant performance improvement when the input job stream is to be entered from a terminal or is contained in a command list (i.e., CLIST).

This function is more efficient than the previous function available via the SUBMIT command processor, since the requirement to EDIT a skeleton or model data set prior to submitting a job is eliminated. Installations may now incorporate the JCL within the CLIST and issue the SUBMIT \* command.

The other card functions of this command are unchanged.

The existing SUBMIT \* function of EDIT will continue to select the current EDIT data set as the input job stream.

**PROMPT HELP ENHANCEMENT:** This enhancement provides assistance when requested by the terminal user.

When prompting is being done for most command operands any information in the SYS1.HELP data set pertinent to the operand will be displayed when the user enters a '?'. Refer to the *General Information Manual* (GC28-1061) for more specific information. This capability now also makes it possible for an installation to more easily tailor the information about an operand without modifying command processors.

Previously, in order to obtain help a user might have terminated the command, obtained the HELP information, and re-entered the command. '? PROMPT HELP' improves productivity by eliminating the need to terminate the command (before obtaining help) and to re-key previously entered information.

### LISTBC/SEND COMMAND ENHANCEMENTS:

- LISTBC I/O Reduction

This enhancement significantly reduces the number of I/O operations required to process a LISTBC mail request. LISTBC now performs a direct read of the user's mail directory record rather than requiring a sequential directory search.

- SEND I/O Reduction

A new algorithm has been implemented which significantly reduces search time to locate a free record within the BRODCAST data set when the SEND command is invoked.

This enhancement will reduce the channel, control unit, and device busy time by keeping a pointer in SYS1.BRODCAST which either points to the first free record or points to some record before the first free record. This pointer will be used to determine where the sequential search should begin.

Whenever SEND uses a free record it will increment the pointer to point to the next record which may or may not be a free record. Whenever LISTBC creates a new free record which is the first free record in SYS1.BRODCAST, it will update the pointer to point to this new free record.

### ENHANCEMENTS AVAILABLE only with TSO EXTENSIONS with the MVS/XA FEATURE

#### TSO TEST SUPPORT

- Support for testing a program above 16 megabytes: Programs to be tested may reside above 16MB and use virtual storage above 16MB.

Through the use of TEST subcommands, the user can:

- Obtain additional virtual storage above 16MB.
- Change the addressing mode of the program being tested.
- List and alter virtual storage above 16MB.
- Cross-Memory environments. LIST subcommand will support all Cross-Memory operation codes. AT subcommand supports most Cross-Memory operation codes. At an ABEND, information will be displayed which specifies Address Space IDs (this will also occur for TSO programs not under TEST).
- A selected group of TSO commands can now be executed as subcommands of TSO TEST.
- Testing of programs that invoke other user programs has been simplified.

**TSO SERVICES:** Several important service routines (listed below) have been modified to enable them to process data in virtual storage above 16MB whenever they are invoked by programs executing in 31-bit addressing mode. Several other important TSO service routines can be invoked in 31-bit addressing mode even though their input must be below 16MB. In addition, the number of messages displayed at the operator's console has been reduced by eliminating the monitoring of the TSO Operator Command at the operators console. Only hard copy will be produced.

The following TSO service routines have been modified to enable them to be invoked by programs executing in 31-bit addressing mode:

- These service routines will process data above 16MB:

- PARSE
- TSO message issuer
- DAIRFAIL
- GNRLFAIL

- These service routines will process only data in virtual storage below 16MB:

- PUTGET
- PUTLINE
- GETLINE
- STACK

Refer to the *OS/VS2 MVS TSO Extensions General Information Manual* for additional detail on enhancements to TSO TEST and services.

**TSO Extensions R2 (cont'd)**

**HIGHLIGHTS for TSO/E RELEASE 2 - MVS/370 or MVS/XA**

- **TSO/E Information Center Facility**  
The TSO/E Information Center Facility allows an MVS installation to easily install and maintain an information center (IC). It permits the information center end user to access supported licensed programs or installation-developed applications via a set of easy-to-use panels. Special IC administration dialogs are provided as well. The Information Center Facility will have HELP panels for most selection panels and online descriptions of all the licensed programs supported.
- **CLIST Enhancements**  
The power and ease-of-use of the CLIST language have been enhanced by the addition of new CLIST functions, and by substantial performance improvements. With these enhancements, end users familiar with languages like BASIC and PASCAL, and ISPF dialog developers can use the CLIST language to easily create new applications. New CLIST function includes:
  - Command output management.
  - New built-in functions and control variables.
  - Text handling support.
  - Program access to variables.
- **TSO Service Facility**  
ISPF dialogs, CLISTs and locally-written TSO application programs gain two distinct new services:
  - Program interface to TSO commands.
  - Authorized service facility.
 Exploitation of these services can allow a richer set of end-user applications under TSO and a reduction in the time and effort to implement those applications.
- **Session Manager**  
The TSO Session Manager provides extended display support for the 3270 Display Terminal and the 3290 Information Panel. The Session Manager enhances the terminal user's productivity when operating in a line-mode environment.  
The Session Manager licensed program (5740-XE2) has been integrated into TSO/E Release 2.  
Enhancements to the integrated Session Manager include support for larger screen sizes and improved usability and flexibility of screen layout for different terminal types. Many other functions have also been improved.
- **ALLOCATE**  
The ALLOCATE and ATTRIB commands have been extended for the 3800 Printer.
- **Resident Notices**  
LOGON performance has been improved by reducing contention for the broadcast data set. The notices displayed at logon time will be kept in an in-storage table to reduce access to the broadcast data set.

**DESCRIPTION for TSO-E RELEASE 2 - MVS/370 or MVS/XS**

**TSO/E Information Center Facility:** The TSO/E Release 2 Information Center Facility is an important element in implementing an MVS-based information center. TSO/E Information Center Facility is a system of selection panels, documentation, and dialogs to help users access a set of IBM licensed programs. Functions for both end users and IC administration personnel are provided. Information Center Facility permits easy access to services via a uniform set of interactive panels. In a user-friendly way, the Information Center Facility helps the user select the appropriate product and prepare for its use by providing a series of prompting panels, help panels, and a first-use tutorial.

An overview of how the Information Center Facility works and what it does from the end user's vantage point follows. The items highlighted represent functions provided by the Information Center Facility.

- First a user is registered (user enrollment) to use the Information Center Facility and the requested programs by the IC administrator.
- Before starting, a user consults a beginner's guide that describes the terminal, how to log on to the system, and the mechanics of using the Information Center Facility, including how to access the tutorial information given in the panels. This guide provides an overview of the services and functions available in the Information Center Facility. In short, it provides what the new Information Center Facility user needs to know in order to get started.
- When the Primary Selection Panel is presented, the user may select additional panels to perform a work-related task, to display

installation news (NEWS), or to obtain first use information (First Use Tutorial).

- The First Use Tutorial interactively explains the services and functions available to the end-user.
- News allows the user to access information the installation wishes to distribute to all Information Center Facility users.
- If the end user chooses a work-related task (such as report preparation or data manipulation), the underlying licensed program is invoked via Conduit Dialogs. These dialogs shield the user from data-processing jargon by requesting setup information in a familiar language.
- The user may also select the computer-based training function available in the Information Center Facility. This offers a simple dialog that lets the user identify a course, browse a course description, browse the course itself, or take the course as a student.
- When the user finishes a selection, another task may be chosen, or use of the Information Center Facility may be terminated. The Information Center Facility is designed so that end users are not left at the terminal without guidance.

The functions provided with the Information Center Facility are:

- **Information on getting started**  
The information for getting started is contained in a hard-copy users' guide. This manual describes the terminal and basic logon procedures from the end user's point of view. It describes the mechanics of using the Information Center Facility, and provides an overview of the services and facilities available for the end user. No prior knowledge of data processing is assumed. This manual directs the user to the first use tutorial panel for additional information.
- **First Use Tutorial Information**  
The first use tutorial is an online tutorial that contains a list of all the functions or services available on the system for Information Center Facility users.  
Together, the guide and the first use tutorial cover the following information:
  - The display terminal.
  - Selection and data entry panels.
  - Help panels.
  - Special keyboard functions (e.g., APL).
  - Overview of Information Center Facility functions and services.
  - Task mapping to the TSO/E publications library.
- **Primary selection panel.**  
The primary selection panel lists the highest level of services available to an individual using Information Center Facility. Different panels will be provided for IC administrators and end users. The panel presented will depend on the user type assigned to the individual at enrollment.
- **Conduit Dialogs**  
The conduit dialogs provide an interactive process for the user to access one of the supported licensed programs installed in the IC. These dialogs mask the underlying system operations that are required to access the requested service. The conduit dialogs will perform the following tasks:
  - Ensure that required resources (data set, etc.) are available.
  - Invoke the requested licensed program.
- **Computer-Based Training Function**  
Computer-based training has been shown to be an efficient means of providing education. Information Center Facility support for this training will allow all users of the information center to benefit from this effective education technique. Full use of this function requires that both the Interactive Instructional Presentation System (5668-012) and the Interactive Instructional Authoring System (5668-011) be installed. If neither of these is installed, descriptions of all available IBM courses may still be viewed.  
Information Center Facility computer-based training lets users:
  - View a list of course names and information on whether or not the courses are installed in the installation.
  - Request the display of detailed descriptions about any course (whether or not it is installed).
  - Browse a course.
  - Initiate a request to be formally enrolled in a particular course.

PROGRAM PRODUCTS

TSO Extensions R2 (cont'd)

- Access a course as an enrolled student or as an author.
- Modify the course descriptions distributed with the Information Center Facility.
- Add additional course descriptions.
- Change the course status as displayed to the user.
- Review enrollment requests, select and enroll students, and send enrollment notifications.

Several courses are available from IBM and these must be ordered separately. (See the IBM education catalog for a list and descriptions.) The installation may also create and offer its own courses.

• User Enrollment

This function assists the IC Administrator in enrolling users. Data entry panels are used to collect information about the user and customize profiles. Information Center Facility adds the user to the names directory, identifies the user to TSO and RACF (if installed), creates a catalog alias, and updates default ISPF profiles. The required underlying commands are issued automatically.

The administrator is given an extensive facility for defining multiple Information Center Facility user categories or types. This allows the administrator to access sets of defaults for TSO, ISPF and RACF with only user-specific information being altered. An administrator facility also allows setting ISPF defaults for the system.

• News

The NEWS function allows the IC administrator to maintain and distribute online information (NEWS) to all TSO/E Information Center Facility users. The administrator can add, update and delete news items which users may then browse. When the administrator adds or updates a news item, users will be notified when logging on to the system that there has been a change.

By entering selection criteria in the appropriate panel, an IC user may:

- Indicate whether or not any NEWS is to be viewed.
- Request a specific NEWS item by name.
- View all NEWS items identified by a specific category.
- View all NEWS items entered in a specific date.
- View a complete list of all current NEWS items.

• Supported Licensed Programs in TSO/E Release 2 Information Center Facility.

The licensed programs listed below are supported in this release with selection panels, help panels, tutorials, and conduit dialogs. Each product to be used with the Information Center Facility must be ordered separately in addition to TSO/E Release 2.

- A Departmental Reporting System II (5796-PLN)\*
- APL Data Interface II (5796-PNJ)\*
- Financial Planning System (5798-CPX)\*
- Graphical Data Display Manager Presentation Graphics Feature (GDDM/PGF Release 2 or Release 3) (5748-XXH)
- Interactive Instructional Presentation System (5668-012)
- Interactive Instructional Authoring System (5668-011)

\* These APL-based products require that VS/APL (5748-AP1) be installed.

Note: The Information Center Facility support of these products with conduit dialogs, help panels and tutorials is external to each of these products. Any interactive assistance provided, once a particular product is entered, is that provided by the product itself.

**CLIST Enhancements:** Functional enhancements in conjunction with significant performance improvements in CLIST statement processing make CLIST a powerful interpretive language candidate for end users familiar with languages such as BASIC and PASCAL. Used with ISPF panels and dialogs, CLIST provides an excellent facility for implementation of new end user services.

• Performance

The CLIST processor has been restructured. Significant performance improvements have been achieved in statement parsing, variable access, and file I/O. The use of MVS services by CLIST processing has been substantially reduced.

A sampling of the ratios of old to new average execution (CPU) times of four commonly used statements follows:

Statement Type	Ratio Old : New
SET	3.5 : 1
PUTFILE	2.7 : 1
GETFILE	2.6 : 1
IF	1.9 : 1

Note: To accurately access the CLIST performance improvements, these development laboratory measurements were performed using CLISTs containing CLIST statements only. No TSO commands are included. Actual performance improvements obtained by any particular user are dependent on many factors. The overall performance for a given CLIST can range from 2% to over 50% improvement in average execution (CPU) time, dependent on the type and mix of CLIST statements, TSO commands, or ISPF services within. These measurements show the comparative improvement between TSO/E Release 1 (old) and TSO/E Release 2 (new).

• Function

- Text Support

Text support has been enhanced by two new built-in functions and a new operand on the CONTROL statement allowing CLISTs to deal with lowercase text. This will allow office systems applications requiring upper/lower case data to be developed.

- Command Output Management

New CLIST variables control the routing of command or CLIST output to the terminal, or to CLIST variables. This allows a CLIST to interpret, reformat, or modify this output. As an example, output of the TSO LIST series of commands could be captured, modified and presented in ISPF panels.

- Additional Built-In Functions

New built-in functions return information about the current environment to CLIST. This allows CLISTs to present data in formats more suitable to the terminal being used, to be aware of the security environment, and to access meaningful data on resource consumption.

- Program Access to CLIST Variables

This new TSO service will allow application programs to examine and manipulate CLIST variables. User-written programs may now fully interact with CLIST and/or ISPF.

- National Symbol Support

In order to move toward compatibility with higher-level language syntax, CLIST will allow national characters as part of a symbol name.

Other CLIST changes have been made to improve usability. See the TSO/E General Information Manual for details.

TSO Service Facility

ISPF dialogs, CLISTs, and locally-written TSO application programs gain two distinct new services:

• Program interface to TSO commands

This new interface, designed with high-level languages under TSO in mind, can be used to execute any primary TSO command as a system service. The design is such that if the command invoked runs AUTHORIZED, it will function normally without comprising MVS system integrity.

As an example, using this interface, a PL/I program could be written which accomplishes dynamic allocation of data sets via the TSO ALLOCATE command and, after completing file processing, issues the RACF PERMIT command to ensure correct data set security.

• Authorized service facility

This function allows CLISTs (and therefore ISPF dialogs), running unauthorized, to execute TSO commands that run AUTHORIZED with no MVS integrity exposures. A new TSO command, issued within a CLIST, with an argument of the target (desired) command and its parameters, provides this new service.

Session Manager - Integrated and Enhanced

The MVS TSO 3270 Session Manager licensed program (5740-XE2) has been integrated into TSO/E Release 2.

The integrated session manager provides extended display support for the 3270 Display Terminal and the 3290 Information Panel. The session manager enhances the terminal user's productivity when operating in a line mode environment.

PROGRAM PRODUCTS

TSO Extensions R2 (cont'd)

The Session Manager provides the following functions:

- Journaling of TSO sessions  
A journal of line-oriented terminal input and output is kept in virtual storage. It can be used to review prior input/output, construct new input from existing journal contents, or save portions of the session by printing, or copying journal contents to a data set.
- Customization of the 3270 Display Terminal and 3290 Information Panel screen layouts.  
Users can dynamically tailor screen layouts and program function key definitions to suit the unique needs of their individual TSO sessions.
- Full-screen support for all line-oriented TSO functions  
The session manager supports existing IBM and user-written commands and applications. Included are such execution processors as TSO TEST, the PL/I Checkout Compiler and the COBOL or FORTRAN Interactive debugging environments.
- Terminal support\*  
Session Manager will now use large screen terminals by dynamically adjusting the screen layout to match the dimensions of the terminal. With the session manager utilizing the maximum screen size, a user's productivity can be increased by allowing more data to be displayed at the terminal. Refer to "Hardware Requirements" for additional detail.
- Numerous other improvements and usability enhancements have been made\*.  
\* These items are new or enhanced in the TSO/E Release 2 Session Manager. See the *General Information Manual* for a more detailed description.

ALLOCATE Enhancements

The ALLOCATE and ATTRIB commands have been extended to support the 3800 Printer. This support provides improved performance and usability for the 3800.

The COPIES, CHARS, FLASH, MODIFY, BURST and OPTCD(J) JCL keyword parameters are now supported for the ALLOCATE command. OPTCD(J) is also supported on the ATTRIB command.

These enhancements allow a reduction in system resources used and a more convenient user interface for the 3800. Background jobs are no longer necessary to use the 3800 Printing Subsystem effectively.

Resident Notices

As the capacity of systems increase, they support larger and larger numbers of users. Contention for resources between these users may cause bottlenecks in the system. The SYS1.BROADCAST data set, which is accessed by users as they log on, is an example.

TSO/E Release 2 avoids most of the I/Os required for LOGON notice processing by keeping an in-storage copy of the notices.

This enhancement is achieved without changing the format or sharability of the SYS1.BROADCAST data set.

**SPECIFIED OPERATING ENVIRONMENT  
TSO/E WITH THE MVS/370 FEATURE**

**HARDWARE REQUIREMENTS**

- TSO/E with the MVS/370 feature is designed to operate on any IBM processor that is supported by OS/VS2 (MVS) Release 3.8 with MVS/System Product Version 1.
- TSO/E will operate on any terminal currently supported by MVS TSO.  
The Full-Screen LOGON, the Interactive Data Transmission Facility, the Session Manager, and the new Information Center Facility (see notes) support:
  - IBM 3270 Information Display System Terminals
    - 3178 mdls C1, C2
    - 3275 mdls 2, 12
    - 3276 mdls 2, 3, 4, 12, 13, 14
    - 3277 mdl 2
    - 3278 mdls 2, 3, 4, 5
    - 3279 mdls 2A, 2B, 3A, 3B (base color mode)
  - IBM 8775 Display Terminal, mdls 11 and 12
  - IBM 3290 Information Panel
    - IBM 3290 support is TSO/E Release 2 only
  - The IBM Personal Computer (with 3270 compatibility)
  - The IBM 6580 Displaywriter (with 3277 RPQ)

Notes:

A minimum screen size of 24 by 80 is required.

Support for the IBM 3278 mdls 3, 4 or 5 and the IBM 3290 is dependent on the maintenance or release level of the underlying teleprocessing access method (TCAM or VTAM). Contact your IBM representative for specific requirements.

TSO/E Release 2 Information Center Facility uses the Interactive Productivity Facility (ISPF) Dialog Manager. ISPF Release 1.1 supports the IBM 3290 Information Panel in compatibility mode as an IBM 3278 mdl 2, 3, 4 or 5.

The following Information Center Facility supported licensed programs have special terminal considerations. See the specific product descriptions for detail.

- Graphical Data Display Manager (GDDM) (5748-XXH) and its Presentation Graphics Feature (PGF)
- The Information Center Facility APL-based products

**STORAGE CONSIDERATIONS - MVS/370 Feature:**

TSO/E Release 1 and 2 Pageable Link Pack Area: 55K bytes.

TSO/E Release 1 and 2 Private Area: The new TRANSMIT and RECEIVE commands can be used within a TSO user region size of 128K bytes. The virtual storage requirement for the new SUBMIT \* function depends upon the size of the job stream being submitted.

The TSO/E release Information Center Facility will result in a small increase over the virtual storage requirements of its prerequisite product ISPF.

The other functions of this product will result in a small increase in virtual storage requirements and also can be used within a TSO user region size of 128K bytes.

The approximate increase in space requirements for the system libraries (based on the IBM 3330 Disk Storage with a track size of 13,030 bytes) for TSO/E with the MVS/370 feature are:

Library	Tracks	
	Rel. 1	Rel. 2
SYS1.CMDLIB	6	8
SYS1.MACLIB	1	3
SYS1.HELP	30	32
SYS1.LINKLIB	6	6
SYS1.LPALIB	5	18
SYS1.UADS	1 per 80 users	1 per 80 users
SYS1.SMLIB	None	13
SYS1.SAMPLIB	None	6

For the TSO/E Information Center Facility, the following additional libraries:

ISPF panels	None	115
ISPF messages	None	40
CLISTs	None	30
CLIST prologs	None	15

**SOFTWARE REQUIREMENTS - MVS/370 FEATURE**

- TSO/E with the MVS/370 feature: Requires OS/VS2 (MVS) Release 3.8 with the MVS/System Product Version 1 Release 1, or subsequent releases.
- The Interactive Data Transmission Facility function of TSO/E, when used in the MVS/370 environment, requires that the appropriate level of MVS/SP-JES2 or MVS/SP-JES3 be installed:

For the JES2 environment the MVS/System Product-JES2 Release 3, and for the JES3 environment the MVS/System Product-JES3 Release 3.1 will be required.

If the Interactive Data Transmission Facility is to be used to send or receive data between an MVS/System Product Version 1 system and a VM/SP system, MVS/System Product Version 1 at Release 3.1 or higher and VM/System Product Release 2 or higher are required.

The following items are for TSO/E Release 2 only:

- TSO/E Information Center Facility: If the Information Center Facility is used, the Interactive System Productivity Facility/Dialog Manager (5668-960) and the Interactive System Productivity Facility/Program Development Facility (5665-268) are required.  
If an IBM 3284, 3286, 3287, 3288 or 3289 Printer is to be used for ISPF or TSO/E Information Center Facility output, the appropriate DSPRINT command processor or the JES/328X Print Facility must be installed on the system.
  - TSO/TCAM Command Processor 'DSPRINT' (5798-AYF)
  - TSO/VTAM Data Set Print 'DSPRINT' (5798-CPF)
  - JES/328X Print Facility (5785-BAB)

PROGRAM PRODUCTS

**TSO Extensions R2 (cont'd)**

- **ALLOCATE and ATTRIB Commands:** If the new operands in the ALLOCATE or ATTRIB commands are used, MVS/System Product Version 1 Release 3.2 or subsequent releases are required.

**SPECIFIED OPERATING ENVIRONMENT  
TSO/E WITH THE MVS/XA FEATURE**

**HARDWARE REQUIREMENTS**

- TSO/E with the MVS/XA feature is designed to operate on any IBM processor that is supported by the MVS/System Product Version 2.
- TSO/E will operate on any terminal currently supported by MVS TSO.

The Full Screen LOGON, the Interactive Data Transmission Facility, the Session Manager, and the new Information Center Facility (see notes) support:

- IBM 3270 Information Display System Terminals
  - 3178 mdls C1, C2
  - 3275 mdls 2, 12
  - 3276 mdls 2, 3, 4, 12, 13, 14
  - 3277 mdl 2
  - 3278 mdls 2, 3, 4, 5
  - 3279 mdls 2A, 2B, 3A, 3B (base color mode)
- IBM 8775 Display Terminal, mdls 11, 12
- IBM 3290 Information Panel
  - IBM 3290 support is TSO/E Release 2 only
- The IBM Personal Computer (with 3270 compatibility)
- The IBM 6580 Displaywriter (with 3277 RPQ)

**Notes:**

A minimum screen size of 24 by 80 is required.

Support for the IBM 3278 mdls 3, 4 or 5 and the IBM 3290 is dependent on the maintenance or release level of the underlying teleprocessing access method (TCAM or VTAM). Contact your IBM representative for specific requirements.

TSO/E Release 2 Information Center Facility uses the Interactive Productivity Facility (ISPF) Dialog Manager, ISPF Release 1.1 supports the IBM 3290 Information Panel in compatibility mode as an IBM 3278 mdl 2, 3, 4 or 5.

The following Information Center Facility supported licensed programs have special terminal considerations. See the specific product descriptions for detail.

- Graphical Data Display Manager (GDDM) (5748-XXH) and its Presentation Graphics Feature (PGF)
- The Information Center Facility APL-based products

**STORAGE CONSIDERATIONS - MVS/XA Feature:**

**TSO/E Release 1 and 2 Pageable Link Pack Area:** 75K bytes.

**TSO/E Release 1 and 2 Private Area:** The new TRANSMIT and RECEIVE commands can be used within a TSO user region size of 128K bytes. The virtual storage requirement for the new SUBMIT \* function depends upon the size of the job stream being submitted.

The TSO/E Release 2 Information Center Facility will result in a small increase over the virtual storage requirements of its prerequisite product ISPF.

The virtual storage requirements for the TEST command depend on the characteristics of the program being tested. For example, a TSO region size of 128K may be sufficient to TEST a simple program that does not itself use large amounts of virtual storage.

The other functions of this product will result in a small increase in virtual storage requirements, and can also be used within a TSO user region size of 128K bytes.

The approximate increase in space requirements for the system libraries (based on the IBM 3330 Disk Storage with a track size of 13,030 bytes) for TSO/E Release 2 with the MVS/370 feature are:

Library	Tracks Rel. 1	Tracks Rel. 2
SYS1.CMDLIB	14	20
SYS1.MACLIB	1	11
SYS1.HELP	44	45
SYS1.LINKLIB	6	6
SYS1.LPALIB	7	18
SYS1.UADS	1 per 80 users	1 per 80 users
SYS1.SMLIB	None	13
SYS1.SAMPLIB	None	8

For the TSO/E Information Center Facility, the following additional libraries:

ISPF panels	None	115
ISPF messages	None	40
CLISTs	None	30
CLIST prologs	None	15

**SOFTWARE REQUIREMENTS - MVS/XA FEATURE**

- TSO/E with the MVS/XA feature: Requires MVS/System Product Version 2 Release 1 and its corequisite MVS/XA Data Facility Product Release 1 or subsequent releases.
- If the Interactive Data Transmission Facility is to be used to send or receive data between an MVS/System Product Version 1 system and a VM/SP system, MVS/System Product Version 1 at Release 3.1 or higher and VM/System Product Release 2 or higher are required.

The following items are for TSO/E Release 2 only:

- TSO/E Information Center Facility: If the Information Center Facility is used, the Interactive System Productivity Facility/Dialog Manager (5668-960) and the Interactive System Productivity Facility/Program Development Facility (5665-268) are required.

If an IBM 3284, 3286, 3287, 3288 or 3289 Printer is to be used for ISPF or TSO/E Information Center Facility output, the appropriate DSPRINT command processor or the JES/328X Print Facility must be installed on the system.

- TSO/TCAM Command Processor 'DSPRINT' (5798-AYF)
- TSO/VTAM Data Set Print 'DSPRINT' (5798-CPF)
- JES/328X Print Facility (5785-BAB)

- **ALLOCATE and ATTRIB Commands:** If the new operands in the ALLOCATE or ATTRIB commands are used, MVS/System Product Version 2 Release 1.1 is required.

**COMPATIBILITY**

TSO/E Release 2 supersedes and includes all the functions of TSO/E Release 1 and TSO Session Manager. Users migrating to TSO/E Release 2 should be aware of the following:

- Resident NOTICES: In a multi-CPU installation, when the broadcast data set is shared among TSO/E Release 2 and non-TSO/E Release 2 systems, all notices should be added on a TSO/E Release 2 system. This ensures that the TSO/E Release 2 systems will keep their in-storage list of notices up to date.

**DATA SECURITY, AUDITABILITY and CONTROL**

Security features available with the previous release of TSO/E continue to be available with Release 2. User management is responsible for the selection, adequacy and implementation of these features, and the appropriate application and administrative control.

**DOCUMENTATION**  
(available from Mechanicsburg)

*TSO/E General Information Manual (GC28-1061-2).*

**SYSTEM INTEGRITY**

IBM will accept APARs where the installation of TSO/E Release 2 introduces an exposure to the system integrity of MVS. Refer to IBM Programming Announcement, "Statement of MVS System Integrity". This program is intended to run authorized.

**RPQs ACCEPTED:** No



PROGRAM PRODUCTS

**5665-288 - MVS/OCCF**  
**MVS/OPERATOR COMMUNICATION CONTROL FACILITY**

**PURPOSE**

MVS/OCCF is a program which allows one or more remote MVS systems to be operated from a host MVS system. It will reside in the remote system(s) and optionally in the host.

**DESCRIPTION**

The specific functions provided to accomplish this are the ability to:

- Send commands issued at the host to the remote for execution.
- Intercept messages at the remote and route them to the host for reply or information.
- Have predefined replies for Write to Operator with Replies (WTOs).
- Generate a series of commands through a command list (CLIST) capability.

A related function, the suppression of unwanted messages, is provided in OS/MVS/SP-JES 2, Release 3, by the Message Processing Facility of MVS Multiple Console Support.

In addition, MVS/OCCF will include 3275 data stream emulation support for the Remote Operator Console Facility (ROCF) of the 4300 processors.

MVS/OCCF will address two major requirement areas of the Interconnected System (IS) environment support for MVS/SP-JES2.

- (1) Remote operator support.
- (2) Programmed operator facility.

Within these two major areas, MVS/OCCF (in conjunction with its prerequisite products) provides support for the Host and Remote requirements as follows:

**HOST REQUIREMENTS:**

- The ability for the host to receive messages from the remote and act on them as required.
- The ability for the host to submit operating system commands to the remote.
- The ability to change the designation of the host operator control point for the remote as required.
- The ability for the host operator control point to receive messages from multiple remote nodes concurrently.
- The ability to switch control from the host to the remote at the discretion of the host.
- A facility to define preprogrammed replies for messages at the remote.
- Utilization of SNA/SDLC protocols to provide line sharing.

**REMOTE REQUIREMENTS:**

- The ability to issue preprogrammed replies to messages.
- The ability to transfer messages to the central host for action/information.
- Notification to the local operator when the host/remote connection fails.
- A command list capability to simplify operator actions.

In addition to the above, MVS/OCCF 3275 data stream emulation support of the 4300 Remote Operator Console Facility will allow an IPL/IML of a remote 4341, 4361 or 4381 MVS or 4300 DOS/VSE system (with ROCF installed) from an MVS host system with MVS/OCCF installed.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

MVS/OCCF is designed to operate on any IBM processor supporting the then most current level of MVS/System Product-JES 2 Release 3.

**Remote IPL/IML of a 4341 MVS System:** For this function, MVS/OCCF must be installed in the host and the remote processor must be an MVS 4341, 4361 or 4381 with the Remote Operator Console Facility (ROCF) installed (see Product Announcement Letter).

**Remote IPL/IML of a 4300, 4361 or 4381 DOS/VSE System:** MVS/OCCF, residing in a host, will IPL/IML a remote 4331, 4341, 4361 or 4381 DOS/VSE Processor. For this function, MVS/OCCF must be installed in the host and the remote processor must be a DOS/VSE 4331, 4341, 4361, or 4381 with the Remote Operator Console Facility (ROCF) installed. See Product Announcement Letters for the 4331, 4341, 4361 and 4381.

**SOFTWARE REQUIREMENTS**

The following programs are required by MVS/OCCF for local operations:

OS/MVS Release 3.8 (BCP) with Processor Support 2  
OS/MVS/SP-JES2 Release 3 (at the then current level)

**Additional Programming Requirements for Remote Operations**

NCCF Version 1 Release 2 or Version 2 (MVS)  
ACF/VTAM Release 2 or 3  
(with the Multi-System Networking Facility, MSNF)  
ACF/VTAM Version 2  
or  
ACF/TCAM Version 2, Release 2 or 3 (with MSNF)

**COMPATIBILITY**

Since MVS/OCCF attaches NCCF, provisions have been made to address those users of the version of NPDA which also attaches NCCF. The user who desires to use NPDA (Network Problem Determination Application) in this environment will be required to indicate this to MVS/OCCF through an MVS/OCCF initialization parameter.

Because NCCF is used for presentation services by MVS/OCCF, the operators' screens will differ from those presented by the Multiple Console Support of MVS.

**INSTALLATION:** MVS/OCCF will be installed using the System Modification Program (SMP).

**SECURITY**

Facilities of NCCF can be used to control access of host operators to MVS/OCCF. At MVS/OCCF initialization, the management of the remote system may specify which MVS commands will be available via MVS/OCCF (i.e., to host operators). Where common-carrier provided communications facilities are employed, management may wish to consider the use of encryption. Management is responsible for the selection, implementation and adequacy of these features.

**DOCUMENTATION** (available from Mechanicsburg)  
*MVS/OCCF General Information Manual* (GC24-5225) is available. An *MVS/OCCF Installation Guide and Reference Manual* and a *Program Logic Manual* will be available by First Customer Shipment date.

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No



PROGRAM PRODUCTS

**5665-290 - DISOSS/370 V3R2 (OS/VS2)  
5666-270 - DISOSS/370 V3R2 (VSE)  
DISTRIBUTED OFFICE SUPPORT SYSTEM/370  
VERSION 3 RELEASE 2**

**PURPOSE**

DISOSS/370, an office systems host program providing host document library and distribution functions, has been enhanced to support distribution among multiple DISOSS/370 Version 3 Release 2 systems and between 5520 Administrative Systems and DISOSS/370 Version 3 Release 2 systems. The 5520 Administrative Processing Program has been enhanced to allow distribution between the 5520 and DISOSS/370 Version 3 Release 2 systems, and to allow the interchange of revisable and final form documents between the 5520 and the 6580 Displaywriter System, the interchange of revisable form text documents between the 5520 and 8100/DOSF Release 4, and the distribution of final form text documents created on a 5520 to an 8100/DOSF. Support continues for the functions provided by DISOSS/370 Version 3 Release 1 for users of the 6580 Displaywriter System, the Distributed Office Support System/8100/DOSF, the Scanmaster I, and the 5520 Administrative System. DISOSS/370 Version 3 Release 2 is designed to operate under the control of OS/VS2 (MVS/370 or MVS/XA) or VSE, and CICS/VS.

**HIGHLIGHTS**

- DISOSS/370 Version 3 Release 2 users are able to submit document distribution requests at their convenience through the support of SNA Distribution Services. This support provides for the transmission of documents to other systems as connections become available.
  - Distribution among multiple DISOSS/370 Version 3 Release 2 systems, including support for personal and priority distribution requests.
  - Distribution between 5520 Administrative Systems with 5611-SS2 Release 3 and DISOSS/370 Version 3 Release 2 systems, including support for personal and priority distribution requests.
- Communication with the 6580 Displaywriter.
  - Provides a host document library for Displaywriter users with file, search, retrieve and delete support.
  - Provides document distribution, including support for personal and priority distribution requests, for Displaywriter users.
- Communication with the IBM Scanmaster I
  - Extends DISOSS/370 Version 3 document distribution and library services support to include image documents.
  - Allows document distribution, including support for personal and priority distribution requests, and filing in the host document library using the Scanmaster I coversheet or numeric keypad.
  - Allows document transmission at the convenience of the sender, without requiring an immediate connection with the receiving Scanmaster I.
  - Allows document delivery either automatically at the Scanmaster I, or allows documents to be temporarily queued in DISOSS/370 until requested by the recipient.
  - In addition to image documents, final form text documents can be printed on the Scanmaster I.
- Communication with the 5520
  - Provides a host document library for 5520 users with file, search, retrieve and delete support.
  - Allows a 5520 user to print a final form text document on a host printer, or format it for input to STAIRS/VS.
  - Allows 5520 users to initiate a S/370 batch job.
- Document Interchange among Workstations
  - Using Document Interchange Architecture (DIA) and Document Content Architecture (DCA), DISOSS/370 can interchange final form text documents among Displaywriter, 8100/DOSF, 5520, and Scanmaster I devices. (See the "Document Distribution and Library Services Interchange" charts for specific interchange capabilities.)
  - Interchange of revisable and final form text documents is supported between the 5520 Administrative System and the 6580 Displaywriter System via a DISOSS/370 System, as well as interchange of revisable and final form text documents between 8100/DOSF and the Displaywriter System. Interchange of revisable form documents is also supported between 8100/DOSF and 5520 through DISOSS/370, as well as the distribution of final form text documents created on a 5520 to an 8100/DOSF. (See the "Document Distribution and Library Services Interchange" charts for specific interchange capabilities.)

- Installation Assist
  - Simplifies the DISOSS/370 installation process by providing a pretested set of editable definition statements.
  - Is compatible with the CICS/VS Starter System and provides the required DISOSS/370, CICS/VS, ACF/VTAM, ACF/NCP and VSAM statements required to add a model DISOSS/370 system to an existing system.
- Application Program Interface
  - Allows user-written application programs to use the DISOSS/370 library and distribution functions.
  - Allows these programs to store data in, or extract it from, their own data bases, and to send this information as a document to DISOSS/370 for storage in the host document library or for distribution to other applications and DISOSS/370 users.
- Online Directory Sample Program
  - Provides a running program in source form to illustrate the use of the DISOSS/370 application program interface.
  - Provides a directory so that users can look up and update user addressing information, such as system name, location, and telephone number.
- User Affinity Support
  - Allows authorized users to work on behalf of others.
  - Provides group mail handling capability for environments where multiple users share a single workstation, such as mail rooms and secretarial workstations.
  - Allows Displaywriter and Scanmaster I recipient groups to be defined so that all documents for the group can be obtained with a single command.
- Improved Structure and Management of Document Library
  - Provides enhanced library integrity using CICS/VS VSAM data base recovery capabilities.
  - Provides online recovery of document space after all authorized users have deleted their access to a document.
- Interactive Service Aids
  - Query routing information used for document distribution.
  - Locate distributed documents.
  - Isolate delays in multi-host distributions.
  - Display distribution queues.
  - Delete records from the queues.

**DESCRIPTION**

**Summary of Functions and Device Support Provided by DISOSS/370 Version 3**

- DISOSS/370 Version 3 Release 2 users are able to submit distribution requests at their convenience through the support of SNA Distribution Services. This support provides for the transmission of documents to other systems as connections become available. DISOSS/370 Version 3 Release 2 will temporarily store documents awaiting route availability to other nodes and then deliver them to subsequent nodes when the routes become available.

**Distribution among multiple DISOSS/370 systems:**

- Users on different DISOSS/370 systems can interchange documents without knowing on which DISOSS/370 system the users are located.

**Distribution between the 5520 Administrative System and DISOSS/370 Systems:**

- 5520 users can now distribute documents to and receive them from DISOSS/370 users, in addition to other 5520 users.

**DISOSS/8100 and Scanmaster I addressing enhancements:**

- DISOSS/370 Version 3 Release 2 allows installations to optionally define DISOSS/8100 users and Scanmaster I users only at the DISOSS/370 system to which they are directly attached.

• 6580 Displaywriter

**Distributing Documents:** Displaywriter users can distribute documents to other DISOSS/370 users. A document can be accompanied by a message if the sender desires. The sender can

**DISOSS/370 V3 R2 (cont'd)**

request a confirmation of delivery message so that he can be informed when documents have been delivered.

DISOSS/370 Version 3 Release 2 allows Displaywriter users to request priority and personal distribution of documents. DISOSS/370 assigns priority distributions to a separate SNA Distribution Services service level which allows priority routing throughout the SNA Distribution Services network. DISOSS/370 uses the service level to allow selection of a unique SNA session for priority requests. Even if the priority service level is not configured to select a separate SNA session, a priority distribution request will be placed ahead of non-priority requests within a given queue. A document that is distributed with the personal designation can be obtained only by the named recipient. A member of an affinity group can obtain a personal distribution for another group member only by supplying the member's user id and password.

Refer to the Document Distribution Interchange chart for specific information on distribution interchange capabilities among workstations.

**Receiving Documents:** Documents distributed to a Displaywriter user are held in a DISOSS/370 queue. A Displaywriter user can request that all documents in the queue be delivered to the workstation or he can request a list of all of the documents in the queue. He can then select a specific document for delivery.

**Filing, Retrieving and Deleting Documents:** Documents created at a 6580 Displaywriter can be filed in the host document library. When the user files a document, he can specify information that can be used to locate the document in subsequent searches. This information consists of search arguments such as the document name, author, document class, date, recipients and keywords describing the contents of the document. In addition, access codes can be included to control access to the document.

To retrieve or delete a filed document, a user first searches the host document library index using any of the search arguments specified when the document was filed. In a search request, search arguments can be truncated, and one or more alternative search arguments can be specified. Once a document has been identified, the user can retrieve it from the host library and store it at the Displaywriter workstation. A document can also be retrieved or deleted by specifying the unique document name assigned by DISOSS/370 when it is filed.

**Scanmaster I**

**Filing Documents:** Image documents can now be filed in the DISOSS/370 library and handled like text documents by users of 8100/DOSF, Displaywriter, or 5520 workstations. Scanmaster I documents are handled by a two step process. The user first enters a document identifier on a special file coversheet, together with the document to be filed. As an alternative, the document identifier and file command can be entered through the Scanmaster I keypad.

After filing the document, the user can then go to his workstation for additional handling. 8100/DOSF users can search, add search terms and access codes, distribute and redistribute, print and delete an image document using their normal menus. Displaywriter users can search for, distribute and delete image documents and 5520 users can search for, print and delete them, both using their normal end-user interface.

**Distributing Documents:** As an alternative to distributing Scanmaster I documents that have been filed in the DISOSS/370 library, users can distribute them directly. They supply addressing information by marking their user identifier and the recipient identifiers on a distribution coversheet, or by keying them in using the numeric keypad. Users can send documents to one or more individual recipients or distribution lists. When multiple recipients are specified, only one copy is sent to DISOSS/370 which in turn sends the requested copies to the receiving Scanmaster I(s).

DISOSS/370 Version 3 Release 2 allows users to request personal and/or priority distribution of documents using the Scanmaster I coversheet or numeric keypad. DISOSS/370 assigns priority distributions to a separate SNA Distribution Services service level which allows priority routing throughout the SNA Distribution Services network. DISOSS/370 uses the service level to allow selection of a unique SNA session for priority requests. Even if the priority service level is not configured to select a separate SNA session, a priority distribution request will be placed ahead of non-priority requests within a given queue. A document that is distributed with the personal designation can be obtained only by the named recipient and not by other users, even though they have affinity with the named recipient. Delivery of personal distributions may be requested only using the keypad, not via automatic delivery.

**Printing Documents:** Distributed documents can be automatically delivered to recipients or they may be saved in the host until they have been requested by the recipient. A Displaywriter user can request a list of all documents in his queue. He can then request printing of image documents, using the Scanmaster I keypad. The

8100/DOSF maillog display contains entries representing image as well as text documents. An 8100/DOSF user can request printing of image documents displayed in his maillog on a host-attached Scanmaster I.

The Scanmaster I can also be used as a draft printer for final form text documents. Final form documents filed in the host document library or distributed from a Displaywriter or 8100/DOSF can be printed on a Scanmaster I.

**5520**

**Filing, Retrieving, and Deleting Documents:** Documents created at a 5520 can be filed in the host document library. When the user files a document, he can specify information that can be used to locate the document in subsequent searches. This information consists of search arguments such as the author, date, and keywords describing the contents of the document. In addition, access codes can be included to control access to the document.

To retrieve or delete a filed document, a user first searches the host document library using any of the search arguments specified when the document was filed. Once a document has been identified, he can retrieve it from the host library and store it at the 5520 workstation. Alternatively, a document can be retrieved or deleted by specifying the unique document name assigned by DISOSS/370 to each document when it is filed.

**Distributing Documents:** 5520 users can distribute documents and messages to other DISOSS/370 Version 3 Release 2 users.

Refer to the "Document Distribution Interchange" chart for specific information on distribution interchange capabilities among workstations.

**Printing Documents at the S/370 Host:** A 5520 user can print a 5520 final form text document stored in the host document library on a S/370 attached 1403-compatible system printer.

**STAIRS/VS Input Formatting:** Using this function, documents created at the 5520 can be prepared for batch input to a STAIRS/VS data base.

**DISOSS/8100/DOSF**

**Distribution and Mail Processing:** DISOSS/8100/DOSF users can distribute documents or messages to other DISOSS/370 users. Optionally, confirmation of receipt can be requested.

DISOSS/370 collects and retains distribution information in the recipient's mail log. This distribution information consists of the date of receipt, the sender, and either the subject of the received document or, in the case of a received message, the message itself. The user can view the mail log in total or view it selectively by specifying criteria such as a date or a date span.

Once a particular mail log entry has been selected, the user can display, print, or redistribute the received document, send a response message to the sender, suspend the mail log entry through the assignment of an action date, delete the entry, or insert a personal note.

**Filing, Retrieving and Deleting:** The user can file documents created at the 8100/DOSF subsystem in the DISOSS/370 host document library. While filing a document, the user can specify filing information that indexes the document and can be used for later retrieval of the document. This filing information consists of search arguments, such as the document name, the author, recipients and keywords describing the contents of the document. In addition, access codes can be added to help control document access.

To retrieve or delete a filed document, a user first searches the host document library using any of the search arguments specified when the document was filed. In a search request, search arguments can be truncated, and one or more alternative search arguments can be specified. Once a document has been identified, it can be retrieved to the subsystem, displayed at the subsystem, printed on the host or the subsystem, transferred to other DISOSS/370 users, or deleted.

Filing and retrieval of documents can be performed interactively or in deferred mode. Deferred processing is particularly applicable for large documents because the operation is executed in parallel to other tasks performed at the terminal.

**Host Printing:** This facility allows the user to request printing of a document filed in the host document library on a host-attached printer. The 6670 is supported as a host line printer.

**STAIRS Input Formatting:** Using this function, documents created at the 8100/DOSF subsystem can be prepared for batch input to a STAIRS/VS data base.

**Job Submission:** The job submission capability allows the user to send predefined jobs to the host system for batch execution.

This capability can also be used to submit a document from the subsystem to the host along with a job. A user-written program

PROGRAM PRODUCTS

DISOSS/370 V3 R2 (cont'd)

can place this document into a data set for subsequent host application processing.

The following chart summarizes the functions available to users at each of the workstations through DISOSS/370:

• Functional Support Summary

Functions Available through DISOSS/370 Version 3							
Workstation	Document Distribution			Library Services	Host Services		
	Send	View	Print	Redistrib- ute from Maillog	File Search Retrieve Delete	Host Print (Note 1)	Format for STAIRS/VS (Note 2)
8100/DOSF	X	Note 3	X	X	X	X	X
5520	X	X	X	-	X	X	X
Displaywriter	X	X	X	-	X	-	-
Scanmaster I	X	-	X	-	File only	Note 5	-
Application Interface	X	Note 4	Note 4	-	X	X	X

Legend:

X = Function can be performed.

- = Function cannot be performed.

Note 1 = The user can request printing of a document on a host-attached 1403-compatible printer or Scanmaster I. (This is in addition to the local printing support provided by the devices.)

Note 2 = Storage and Retrieval System/Virtual Storage (5740-XR1 OS/VS, 5740-XR4 DOS/VS).

Note 3 = In addition to viewing documents created on the 8100/DOSF, the user can also view and browse documents filed in the host document library without first retrieving them.

Note 4 = A user-written application program can receive distributed documents.

Note 5 = The Scanmaster I can be used as a host printer for both final form text and image documents.

• Document Interchange among Workstations

The workstations supported by DISOSS/370 Version 3 use a variety of data streams available with document content architecture (DCA). The following summarizes the data streams used by each workstation:

**8100/DOSF:** The 8100/DOSF system can use both the Distribution Services and Library Services functions provided by DISOSS/370. Documents can be sent from the 8100/DOSF to DISOSS/370 in either the 8100 internal or the revisable form text data streams. Documents can be received at the 8100 in the 8100 internal, revisable or final form text data streams. (When an 8100 internal or revisable form document is received at the 8100 as a result of distribution, it is automatically formatted by the receiving 8100, and is not available for editing. Document Library Services can be used to retrieve a revisable copy of the document from the host document library.) DOSF Release 4 or a subsequent release is required for support of the revisable form text data stream, and viewing of final form text data stream at an 8100/DOSF.

**6580 Displaywriter:** The 6580 Displaywriter can use both the Distribution Services and Library Services of DISOSS/370 Version 3. The Displaywriter can send and receive revisable and final form text documents and word processing records.

**5520:** The 5520 can use both the Distribution Services and Library Services of DISOSS/370. The 5520 can send and receive documents in the revisable and final form text data streams, the 5520 internal data stream, word processing files, and WP/EBCDIC data stream. Note: 5520 internal refers to file descriptors, profile recovery documents, stored procedures, and 5520 revisable documents created by 5520 Systems with 5611-SS2 Release 2. 5611-SS2 Release 3 does not generate the 5520 internal data stream but will pass it through from attached systems.

**Scanmaster I:** In addition to sending and receiving image documents, a Scanmaster I can also print a subset of the final form text data stream. Image and text documents can be distributed for printing on a Scanmaster I. In addition, an image document, filed in the host document library, can subsequently be directed to a Scanmaster I, by a Displaywriter, 5520, or 8100/DOSF for printing.

The DISOSS/370 approach to document interchange is to store a document as it was entered; it is not converted to a standard data stream. Then, when DISOSS/370 receives a distribution or retrieve request, if the target workstation can accept the document data stream, the document is delivered without change. If the target workstation cannot accept the document data stream, DISOSS/370 will attempt to perform a data stream transformation. Using this approach, the following interchanges are possible:

• Document Interchange Using Document Distribution Services

**8100/Displaywriter Interchange:**

- If an 8100 internal document is sent from an 8100 to a Displaywriter, DISOSS/370 transforms it to the final form text data stream. The document can then be viewed, printed, or converted to a revisable form at the Displaywriter, for minor revisions.

- If a revisable form text document is sent from an 8100, using DOSF Release 4, to a Displaywriter, DISOSS/370 sends it to the Displaywriter in the revisable form text data stream. The document can then be revised, viewed or printed at the Displaywriter.

- The Displaywriter can send both revisable and final form text documents to the 8100/DOSF through DISOSS/370. Final form text documents can be viewed using direct document view facility, or using the 8100/DOSF Release 4 Browse facility, or can be printed using DOSF Release 3 or later on a 5210 Printer mdl E01/E02 with EC 996869.

- When a revisable form text document is sent from a Displaywriter to an 8100, the receiving 8100 automatically transforms it to final form text. It can then be viewed using the 8100/DOSF Browse facility on a 5210 printer.

Because these documents were created in different environments, they can contain concepts not understood by the 8100 transformation. Therefore, the fidelity of the document transformation is necessarily limited. However, many typical documents can be converted while retaining their external appearance. A revisable form copy of the document can be retrieved from the DISOSS/370 host document library. For more information, see "Document Interchange Using Library Services".

**8100/5520 Interchange:**

- 8100/DOSF and 5520 can interchange revisable form documents using 8100/DOSF Release 4 and 5520 with 5611-SS2 Release 3. A revisable form document created on any single standard U.S. 5520 keyboard (keyboard IDs 001, 002, 003, 004, 005, 006, 007, 008) can be sent to an 8100, where it is automatically transformed to final form text. There it can be viewed using the 8100/DOSF browse facility, or printed on a 5210 Printer mdl E01/E02 with EC 996869. To revise the document, the user can retrieve it from the host document library and transform it to 8100 internal format. See "Document Interchange Using Library Services" for more information.

- A final form document created on a 5520 can be viewed using the direct document view facility or the 8100/DOSF browse facility, and can be printed on a 5210 Printer.

- A revisable form document sent from 8100/DOSF to a 5520 can be revised, viewed, or printed at the receiving 5520.

PROGRAM PRODUCTS

DISOSS/370 V3 R2 (cont'd)

**8100/Scanmaster I Interchange:** If an 8100/DOSF document is routed to a Scanmaster I, DISOSS/370 transforms it to the final form text data stream for printing at the Scanmaster I. In addition, the Scanmaster I can file image documents in the DISOSS/370 host document library. The 8100/DOSF system can subsequently print or redistribute these image documents from the host document library to a Scanmaster I.

**Displaywriter/Scanmaster I Interchange:** Displaywriter systems can distribute final form documents for printing on a Scanmaster I. In addition, Scanmaster I can file image documents in the DISOSS/370 host document library. The Displaywriter system can direct the distribution of these image documents from the host document library to a Scanmaster I.

**5520/Displaywriter Interchange:** Revisable and final form text and word processing records (files) can be interchanged between the Displaywriter and 5520 through DISOSS/370 Version 3 Release 2 using both distribution and library services.

**5520/Scanmaster I Interchange:** The 5520 can direct a final form text or an image document stored in the host document library to a Scanmaster I for printing.

**Document Distribution Interchange Matrix:** The following chart shows which combinations of workstations can participate in DISOSS/370 document distribution and the level of document interchange at which they can participate. The level of interchange shown is that provided by the latest release levels of each of the products. Refer to the previous description of "Document Interchange Using Distribution Services" for a more detailed explanation of the interchange capabilities.

Source Workstation (Data stream)	Destination Workstation			
	8100/ DOSF	Display- writer	5520 (7)	Scan- master
8100/DOSF				
8100 Internal Revisable Form	P/V (1)	P/V/C	No	P
Displaywriter Revisable Form	P/V (1)	P/V/R	P/V/R	No
Final Form Records/Files	P/V	P/V/C	P	P
5520				
Revisable Form	P/V (1)	P/V/R	P/V/R	No
Final Form Records/Files	P/V	P/V/C	P	P
5520 Internal WP/EBCDIC	No	No	P/V/R	No
Scanmaster Image (2)	No	No	No	P

**Legend:**

- P = Printable
- V = Viewable
- R = Revisable
- C = Convertible from final form text to Displaywriter internal revisable format for minor revision.

**Notes:**

**Note 1:** When receiving an 8100 internal or revisable form document as a result of distribution, the receiving 8100 automatically formats it. When a revisable copy of the document is desired, DISOSS/370 library services may be used.

**Note 2:** An image document that has been filed in the host document library can be printed on a Scanmaster I using the print command at an 8100/DOSF, the run application program menu at a 5520, or the distribute command at an 8100/DOSF or Displaywriter.

**Document Interchange Using Library Services**

**8100/Displaywriter Interchange:**

- When an 8100 internal document, filed in the host document library, is retrieved by a Displaywriter, it is automatically transformed to final form text by DISOSS/370. The document can then be viewed, printed or converted to Displaywriter internal revisable form at the Displaywriter.
- A revisable form text document, filed in the host document library by an 8100/DOSF Release 4, can be retrieved by a Displaywriter where it can be viewed, printed, or revised.
- A revisable form document, filed in the host document library by a Displaywriter, can be retrieved by an 8100/DOSF Release 4

where it can be viewed or printed on a 5210 Printer mdl E01/E02. To revise the document, the user can transform it to 8100 internal form.

- A final form text document, filed in the host document library by a Displaywriter, can be viewed at an 8100 using the direct document view facility only.

**8100/5520 Interchange:**

- An 8100 internal document, stored in the host document library and retrieved by a 5520, is transformed to final form text by DISOSS/370 before being sent to a 5520. Once retrieved, it can be printed at the 5520.
- A revisable form document filed by an 8100/DOSF Release 4 can be retrieved by a 5520, where it can be revised, viewed or printed.
- A revisable form document filed by a 5520 can be retrieved by an 8100/DOSF Release 4 where it can be viewed or printed on a 5210 Printer mdl E01/E02. The document can be revised by transforming it to 8100 internal format.
- A final form document filed by a 5520 can be viewed at an 8100 using direct document view facility only.

**Displaywriter/5520 Interchange:** The Displaywriter and 5520 can interchange revisable and final form text documents and word processing records (files) using library services.

- A 5520 can revise, view, and print revisable form documents, and can print final form documents created on a Displaywriter.
- A Displaywriter can revise, view, and print revisable form documents created on a 5520. Final form documents created on a 5520 can be viewed, printed, and converted to Displaywriter internal revisable format for minor revision.

**Library Services Interchange:** The following chart shows which workstation combinations can participate in DISOSS/370 library services and the level of document interchange at which these workstations can participate. The level of interchange shown is that provided by the latest release levels of each of the products. Refer to the previous description of "Document Interchange Using Library Services" for a more detailed explanation of the interchange capabilities.

Filing Workstation (Data stream)	Retrieving Workstation		
	8100/ DOSF	Display- writer	5520
8100/DOSF			
8100 Internal Revisable Form	P/V/R	P/V/C	P
Displaywriter Revisable Form	P/V/T	P/V/R	P/V/R
Final Form Records/Files	V	P/V/C	P
5520			
Revisable Form	P/V/T	P/V/R	P/V/R
Final Form Records/Files	No	P/V/R	P
5520 Internal WP/EBCDIC	No	No	P/V/R
Scanmaster Image (1)	No	No	No

**Legend:**

- P = Printable
- V = Viewable
- R = Revisable
- C = Convertible from final form text to Displaywriter internal revisable format for minor revision.
- T = Transform from revisable form to 8100 internal for revision. If the document is to be revised on a Displaywriter attached to the 8100, then no transformation is required.

**Notes:**

**Note 1:** An image document that has been filed in the host document library can be printed on a Scanmaster I either using the print command at an 8100/DOSF or 5520, or the distribute command at an 8100/DOSF or Displaywriter.

**Note for Displaywriter document conversion from final to revisable form:** Because many of the word processing commands, such as margin spacing, are resolved in final form documents, repagination of a converted document may not have satisfactory results, and other revisions may be cumbersome. Refer to the *IBM Displaywriter System*

PROGRAM PRODUCTS

**DISOSS/370 V3 R2 (cont'd)**

*Electronic Document Distribution Compatibility Guide (G544-2185)* for more information.

**Note for interchange of revisable documents:** When they are created in different environments, revisable documents sometimes express common concepts in different ways. Each has concepts that the other cannot express at all. Therefore, the transformation between any two forms of revisable documents will necessarily be limited. However, many typical documents can be converted while retaining their external format.

- **Installation Assist**

To simplify the installation process, DISOSS/370 Version 3 provides an installation assist package. This package works with the CICS/VS Starter System and consists of editable sample definition statements for installing DISOSS/370 Version 3. The package includes statements for DISOSS/370 itself as well as matching CICS/VS, ACF/VTAM, VSAM, and ACF/NCP statements. The package supports a multi-host DISOSS/370 system configured with two Displaywriters, two 8100s, two Scanmasters, and two 5520s.

The package contains the CICS/VS table entries required to include DISOSS/370 in the CICS/VS subsystem. These definitions can be combined with the CICS/VS Starter System definitions to generate a pretested CICS/VS DISOSS/370 system.

In addition, matching ACF/VTAM and ACF/NCP definitions that are required to add the Displaywriter, 5520, 8100, and Scanmaster I devices to existing network definitions are provided. Unloaded DISOSS/370 Version 3 data sets and VSAM access method services jobs required to define an initial DISOSS host document library and user profile data set are also included.

Using the installation assist package can reduce the time required to install DISOSS/370 Version 3. By following the steps in the *Distributed Office Support System/370 Version 3 Installation Guide*, the user can modify the supplied definitions to create the appropriate production configuration.

- **Application Program Interface**

The application program interface (API) allows user-written programs executing on the same CICS/VS subsystem as DISOSS/370 to use DISOSS functions. These applications can file, search for, retrieve, and delete documents from the host document library. They can also modify the document description (for example, add search terms), print documents on a host-attached printer, and distribute documents to other DISOSS users and application programs.

DISOSS/370 provides these functions by accepting, over the API, a set of Document Interchange Architecture (DIA) commands.

The application interface also serves as a replacement for the Host Text Library User Exit routine provided by previous DISOSS/370 versions.

- **Online Directory Sample Program**

A sample program is provided with DISOSS/370 Version 3 to illustrate the use of the DISOSS/370 application program interface (API) and to provide an online directory. This program is provided in PL/1 source form to facilitate development of customer applications using the DISOSS/370 API.

The directory is intended to be used in the following way. With the aid of a DISOSS-supplied skeleton document, 8100/DOSF and Displaywriter users fill the following information for each directory entry: User name, user system identifier, Scanmaster I numeric identifier, location and telephone number. Optional fields, such as address, and job title can also be added. Using standard distribution panels, users send the directory document to the host directory program which maintains a directory file. Users can add, change, or remove directory entries.

Users can find the directory entry for an individual, or all the entries for a location, by sending a request to the directory program. Truncated names can be used if a user is uncertain of the correct spelling of a name. The directory program returns a document containing the entries that meet the criteria. Users can then display the document or print it for manual use.

- **User Affinity Support**

DISOSS/370 Version 3 extends user affinity support to include Displaywriter and Scanmaster I users. 8100/DOSF, Displaywriter, 5520 and Scanmaster I users can be defined so that they can work on their own behalf or on behalf of others. In addition, Displaywriter and Scanmaster I users can be defined as part of recipient groups so that they can either obtain their own mail or that of the entire group.

- **Improved Management of Document Library Space**

The organization of the host document library has been improved to provide online reclamation of document space. Document space

will be reclaimed after all authorized users have deleted their access to a document. With DISOSS/370 Version 3, it is no longer necessary to execute an offline library reorganization utility to reclaim available space. The library reorganization utility need only be executed to archive documents or to restore archived documents.

The host library uses VSAM keyed sequential data sets (KSDS) which provide enhanced document library integrity by enabling DISOSS/370 to take full advantage of the CICS/VS VSAM data base recovery capabilities.

**CUSTOMER RESPONSIBILITIES**

Installation of DISOSS/370 requires systems programming and systems administration resources. Customers must install DISOSS/370, CICS/VS and the associated prerequisite programs specified under "Software Requirements". In addition, customers must define the operating environment to DISOSS, initialize the document library, create the user profile information data base, and initialize other data sets used internally by DISOSS. The installation assist package is provided to facilitate this process.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

DISOSS/370 Version 3 Release 1 is designed to run on any IBM S/370, 4331, 4341, 4361, 4381, 303X, or 308X Processor having a minimum of 2 megabytes of real storage that meets the minimum requirements for either of the prerequisite operating system programs, OS/VS2 (MVS) or VSE, and CICS/VS.

DISOSS/370 requires 1.2 megabytes of virtual storage in addition to that required for the appropriate release of CICS/OS/VS or CICS/DOS/VS. Additional storage requirements will vary depending on user configuration and workload.

It is estimated that a minimum of 55.5 megabytes of DASD storage will be required for the IBM-supplied DISOSS modules and the files required to operate DISOSS/370 Version 3 Release 2. Additional DASD storage will be required to contain the document library, library indexes, user profiles, and other DISOSS files. The sizes of these files will depend on user-controlled variables.

**SOFTWARE REQUIREMENTS**

IBM DISOSS/370 is written in a proprietary language.

DISOSS/370 Version 3 is designed to operate in the following environment:

- CICS/OS/VS (5740-XX1) Version 1 Release 6
- ACF/VTAM OS/VS2 Version 2 (5665-280)
- MVS/System Product 1 or System Product 2
  - JES 2 MVS/SP-JES2 Version 1 Release 3 (5740-XYN)
  - JES 3 MVS/SP-JES3 Version 1 Release 3 (5740-XYN)
  - JES 2 MVS/SP-JES2 Version 2 (5740-XC6) (MVS/370 compatibility mode only)
  - JES 3 MVS/SP-JES3 Version 2 (5665-291) (MVS/370 compatibility mode only)
- ACF/NCP/VS
  - Version 1 Release 3 (5735-XX1)
  - Version 2 Release 1 (5735-XX9)
- CICS/DOS/VS Version 1 Release 6 (5746-XX3)
- ACF/VTAM VSE Version 2 Release 1 (5666-280)
- DOS/VSE Release 3 with VSE/Advanced Functions (5745-030)
- VSE/VSAM Release 2 (5746-AM2)
- VSE/POWER Release 2 (5746-XE3)

**Notes:**

- DISOSS/370 requires the use of the Virtual Storage Access Method (VSAM).
- In an MVS environment, MVS Information Distribution Workstation Support (5740-AMA) is required if the SNA version of the IBM 6670 is used as a host line printer.
- DISOSS/370 Version 3 supports the 5520 Administrative Processing Program (5611-SS2) Release 2 and Release 3 for Library Services.
- DISOSS/370 Version 3 Release 2 supports the 5520 Administrative Processing Program (5611-SS2) Release 3 for Document Distribution.
- DISOSS/370 Version 3 operates with the Displaywriter Electronic Document Distribution (EDD) licensed program (5608-SR8) which requires either Textpack 4 (5608-TR4) or Textpack 6 (5608-TR6).
- In the IBM 8100, the following are required:
  - IBM Distributed Processing Control Executive (DPCX) (5761-DS1) Release 2.2, with feature #6001, and subsequent releases unless otherwise specified.

PROGRAM PRODUCTS

**DISOSS/370 V3 R2 (cont'd)**

- IBM Distributed Office Support Facility (DOSF) (5761-XR1), Release 2.1 together with IBM Host Prep (5735-XR3) Release 4.1, and subsequent releases unless otherwise specified.
- DPCX Release 3, DOSF Release 3, and Host Prep Release 5, and subsequent releases are required for printing final form text documents on a 5210 Printer with EC 996869 and for handling image documents.
- DOSF Release 4 or a subsequent release, along with required prerequisite programs, is required for support of the revisable form text data stream.
- IBM Distributed Office Support System/8100/DOSF (DISOSS/8100/DOSF) Release 1 (5668-955) and subsequent releases unless otherwise specified.

**COMPATIBILITY**

DISOSS/370 Version 3 will not operate on OS/VS1, ACF/TCAM, ACF/VTAME, or IMS/VS. Customers using these programs should consider migrating to a supported environment. Refer to the "Specified Operating Environment" section for details.

**MIGRATION**

DISOSS/370 Version 3 is designed as an extension of DISOSS/370 Versions 1 and 2 and DISOSS/VSE Releases 1 and 2. Users who wish to take advantage of the extended functions provided by DISOSS/370 Version 3 can migrate from DISOSS/370 Versions 1 or 2 to DISOSS/370 Version 3. DISOSS/370 Version 3 provides utilities to assist in converting the host document libraries and the host user profile data base from Version 1 or 2 format to the Version 3 format. Some manual editing of control statements will be required to change the host user profile from Version 1 to Version 3. DISOSS/VSE Release 1 and 2 users can migrate in a similar fashion.

DISOSS/370 Version 3 Release 1 users migrating to DISOSS/370 Version 3 Release 2 must create a new host user profile. This can be done with the same definitions used to create the DISOSS/370 Version 3 Release 1 host user profile. In order to take advantage of DISOSS/370 Version 3 Release 2 enhancements for document distribution among multiple hosts and naming conventions to reduce network maintenance, changes must be made to the host user profile creation definitions.

IMS/VS users who wish to migrate to DISOSS/370 Version 3 on the CICS/VS subsystem can use these utilities as an aid in migrating and in converting from DL/1 to the VSAM access method. Some manual editing of control statements will be required to change the user information profile data set.

**PERFORMANCE CONSIDERATIONS**

Capacity planning for each individual DISOSS/370 Version 3 Release 2 host in a customer's environment can be accomplished by using the DISOSS/370 Version 3 Release 1 *Capacity Planning Guides* for both MVS and VSE. The IBM aid SNAP/SHOT will be available at first customer shipment to model inter-DISSOSS/370 host load in a Version 3 Release 2 environment and to evaluate individual customer performance capability.

**INSTALLATION**

DISOSS/370 provides the following utilities and techniques to simplify the installation process and maintenance of its data sets:

- Model operating environment definition statements, provided by the easy install package, which may be customized to meet the needs of each installation. (These statements replace the generation facilities provided by previous DISOSS versions.)
- Default values for installation parameters, which provide a guideline and reduce installation time and effort whenever these values are acceptable.
- Definition statements for use in creating the jobstream required to load an 8100/DOSF controller with the DISOSS/8100/DOSF program product.
- A utility that supports the creation and maintenance of user profile information, such as the user's name, password, and access codes.
- A utility that supports the creation and maintenance of distribution lists for use with Scanmaster I.
- Utilities that support the migration of DISOSS/370 Versions 1 and 2 or DISOSS/VSE Releases 1 and 2 host document libraries and user profile data bases to the DISOSS/370 Version 3 environment.
- Utilities that allow users to delete, backup and restore selected documents from the library, transfer ownership of all documents from the owner to another user, and print the search arguments for documents stored in the library.

**DATA SECURITY**

Installations can protect their DISOSS resources from unauthorized access by assigning user passwords that are maintained as a part of the user profile information.

DISOSS/370 is designed to provide document security based on the interaction of access codes and document ownership:

• Access Codes

Access codes can be assigned to users centrally, at the host, and to documents, during filing. To access a filed document, a user must be assigned an access code that matches one access code of the document to be retrieved.

• Document Ownership

DISOSS/370 provides two types of document ownership:

- Primary document ownership which is assigned to the filing or original distribution requestor. Only primary owners of a document are authorized to assign access codes to the document or delete existing access codes.

- Secondary document ownership which is assigned to the recipients of distributed or redistributed documents. These recipients are not authorized to assign or change access codes.

Document deletion requests can be issued only by the document owners and will result in deletion of that person's ownership. Deletion by all owners causes the document to be physically deleted from the host document library.

The combination of access codes and document ownership characteristics determine the privacy characteristics of a document. There are three levels of document privacy:

- Private - These documents are those that are accessible only to the primary owner. Private documents have not been assigned any access codes and have not been distributed to any secondary owners.
- Shared - These documents are accessible only to users authorized either through access codes or primary or secondary ownership.
- Public - These documents are accessible to all authorized DISOSS/370 users. They carry an access code of zero.

In an OS/VS2 (MVS) environment, a DISOSS/370 customer can choose to use the Resource Access Control Facility (5740-XXH) to provide additional protection for the Document Library and User Information Profile data sets.

For applications in which sensitive data is sent over external communication facilities, users may augment these facilities with cryptography.

**DOCUMENTATION**

(available from Mechanicsburg)

*Distributed Office Support System/370 Version 3 Release 2 Licensed Program Specifications (GC30-9557) ... Distributed Office Support System/370 Version 3 Release 2 General Information (GC30-3085) ... Distributed Office Support System/370 Version 3 Release 2 Installation Guide (SC30-3090) ... Distributed Office Support System/370 Version 3 Release 2/VSE Installation Guide (SC30-3232) ... Distributed Office Support System/370 Version 3 Release 2 Installation and Administration Reference (SC30-3092) ... Distributed Office Support System/370 Version 3 Release 2 Messages (SC30-3094) ... Distributed Office Support System/370 Version 3 Release 2 Diagnosis Guide (SC30-3097) ... Distributed Office Support System/370 Version 3 Release 2 Planning Guide (SC30-3093) ... Distributed Office Support System/370 Version 3 Release 2 Administration Guide (SC30-3091) ... Distributed Office Support System/370 Version 3 Release 2 Application Programming (SC30-3096) ... Distributed Office Support System/370 Version 3 Release 2 Diagnosis Reference (LY30-3069) ... Distributed Office Support System/370 Version 3 Release 2 Scanmaster I User's Guide (SC30-3095) ... Distributed Office Support System/370 Version 3 Release 2 Keypad Template (SX27-3543) ... Distributed Office Support System/370 Version 3 Release 2 Instruction Cards (SX27-3544).*

**SYSTEM INTEGRITY**

IBM will accept APARS where the installation of DISOSS/370 Version 3 Release 2 introduces an exposure to the system integrity of OS/VS2 (MVS). Refer to Programming Announcement dated October 21, 1981. DISOSS/370 Version 3 is intended to run unauthorized.

RPOs ACCEPTED: No

PROGRAM PRODUCTS

**5740-XC6 - MVS/SP-JES2 V2.1.1**  
**5665-291 - MVS/SP-JES3 V2.1.1**  
**MVS/SYSTEM PRODUCT-JES2**  
**VERSION 2 RELEASE 1 Modification Level 1**  
**MVS/SYSTEM PRODUCT-JES3**  
**VERSION 2 RELEASE 1 Modification Level 1**

**PURPOSE**

MVS/SP 2.1.1 is an enhancement to the first release of MVS/System Product Version 2 (which will be identified as MVS/SP 2.1.0 in this document). MVS/SP 2.1.1 contains additional virtual storage constraint relief over the prior release, additional serviceability items for large system complexes, and additional operational improvements and device support. MVS/SP 2.1.1 incorporates most of the new functions announced for MVS/SP Version 1 Release 3.0, MVS/SP Version 1 Release 3.1, MVS/SP Version 1 Release 3.2, and MVS/SP Version 1 Release 3.3.

**INTRODUCTION**

MVS/SP 2.1.1 will be used as a generic term to refer to both: MVS/System Product-JES2 Version 2 Release 1 Modification Level 1 ... MVS/System Product-JES3 Version 2 Release 1 Modification Level 1.

MVS/SP 2.1.0 is the base on which subsequent releases are to be installed, and is a prerequisite to MVS/SP 2.1.1.

**DESCRIPTION**

Items included are listed below:

- Identification of the releases of the licensed programs.
- Highlights of each release of the licensed programs.
- A description of the Base Control Program.
- A description of the JES2 support.
- A description of the JES3 support.
- The identification of pre-requisite and co-requisite items.
- Information concerning configuration requirements, system generation and maintenance requirements.
- Information concerning related products which will probably be used in this environment.

**IDENTIFICATION OF THE MVS/SP VERSION 2 RELEASES**

**MVS/SP 2.1.1:** There are two licensed programs offered in this release. The Base Control Program is the same in both licensed programs. The licensed programs are:

- MVS/System Product-JES2 Version 2 Release 1 Modification Level 1.

This licensed program consists of a Base Control Program and Job Entry Subsystem 2 (JES2). This release has the following characteristics:

- The JES2 component of this release is functionally equivalent to the JES2 component of MVS/SP 1.3.3.
- MVS/SP-JES2 2.1.0 is a pre-requisite.
- Data Facility Product (DFP) Release 1.1 is a co-requisite.

- MVS/System Product-JES3 Version 2 Release 1 Modification Level 1.

This licensed program consists of a Base Control Program and Job Entry Subsystem 3 (JES3). This release has the following characteristics:

- The JES3 component of this release is functionally equivalent to the JES3 component of MVS/SP 1.3.1. This JES3 component is also functionally equivalent to the JES3 component of MVS/SP 2.1.0.
- MVS/SP-JES3 2.1.0 is a pre-requisite.
- Data Facility Product (DFP) Release 1.1 is a co-requisite.

**MVS/SP 2.1.0:** Two licensed programs were announced on October 21, 1981. The Base Control Program is the same in both licensed programs. The licensed programs are:

1. MVS/System Product-JES2 Version 2 Release 1 Modification Level 0.

This consists of a Base Control Program and Job Entry Subsystem 2 (JES2). This release has the following characteristics:

- The JES2 component of this release is functionally equivalent to the JES2 component of MVS/SP 1.3.0.
- MVS/SP 2.1.0 must be installed on OS/VS2 MVS Release 3.8.
- Data Facility Product (DFP) Release 1.0 is a corequisite.
- A SYSGEN is required.

2. MVS/System Product-JES3 Version 2 Release 1 Modification Level 0.

This consists of a Base Control Program and Job Entry Subsystem 3 (JES3). This release has the following characteristics:

- The JES3 component of this release is functionally equivalent to the JES3 component of MVS/SP 1.3.1.

- MVS/SP 2.1.0 must be installed on OS/VS2 MVS Release 3.8.
- Data Facility Product (DFP) Release 1.0 is a corequisite.
- A SYSGEN is required.

**TERMINOLOGY**

The following terms will be used throughout:

- MVS/System Product Version 2 (MVS/SP V2)

This term will be used to identify topics which are common to all releases and all modification levels of MVS/System Product Version 2.

- Data Facility Product (DFP)

DFP is a licensed program which contains data management support, device support, program library management support, and utility functions.

- MVS/XA

MVS/System Product-JES2 V2 or MVS/System Product-JES3 V2 is a required part of MVS/XA. MVS/SP V2, the co-requisite Data Facility Product (DFP) (5665-284) licensed program, plus selected modules and macro instructions from OS/VS2 MVS Release 3.8 comprise MVS/XA.

MVS/XA supports the following systems when they are operating in S/370 Extended Architecture mode:

- 3081 Processor Complex
- 3083 Processor Unit
- 3084 Processor Complex

MVS/XA provides many enhancements, particularly in areas that address constraints connected with programming. Examples of the enhancements are: Additional virtual storage and an additional number of I/O devices. These and other enhancements will be described in the following topics.

**INSTALLATION AND MAINTENANCE REQUIREMENTS**

**SYSGEN Requirements**

- MVS/SP 2.1.0 requires a SYSGEN.
- If MVS/SP 2.1.0 was previously installed, a SYSGEN is not required for MVS/SP 2.1.1 (MVS/SP 2.1.1 may be applied directly to the users' system libraries using an appropriate level of the system maintenance program).

See the section "Installation Considerations" for additional information.

**Optional Program Products:** For installations desiring to use the following programs, the specific releases stated below are required to function with MVS/SP V2:

- For users of Resource Measurement Facility (RMF), the RMF Version 3 licensed program is required. This is a new version of RMF and is a total replacement for existing RMF support.
- For users of TSO TEST, TSO Command Package, or TSO/E for MVS/370, the TSO/E for MVS/XA licensed program or equivalent is required.

**MVS/SP 2.1.1 - HIGHLIGHTS**

The major items in this release are:

- Support for the 3880 model 11 and model 13.
- Virtual Storage Constraint Relief of approximately 400K bytes, providing additional capacity for large subsystems and applications. The virtual storage constraint relief in MVS/SP 2.1.1 is in addition to that in MVS/SP 2.1.0. It was obtained by moving system modules and data areas from the virtual storage area below 16 megabytes to the area above the first 16 megabytes. Further information is contained in the section "Virtual Storage Considerations".
- Improvements in the processing of the system link library concatenation, to eliminate the need to tune the LNKLIST libraries for performance and to reduce the complexity of system maintenance for many large systems.
- Automated dump analysis and suppression of duplicate dumps by selected components along with many other serviceability enhancements, to improve system programmer productivity.
- Numerous RAS enhancements, including the ability to restart SMF after a failure without an IPL and the movement of SMF to a private address space.

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

The changes to SMF combine to make SMF more reliable and provide improved availability of SMF, which is particularly important with the continued growth in processor capacity and the resultant dependence on SMF data to monitor and report on the workload of the system.

- Improved operation and control for multi-system environments by allowing the SYS1.LOGREC data set to reside on a volume other than SYSRES, by allowing multiple PAKLST parmlib members, and concatenated LPALIBs. (Each of these items is described below).

- Support of Separate SYS1.LOGREC data sets.

The LOGREC change allows an installation to share SYSRES for multiple systems and to keep a separate SYS1.LOGREC data set for each system. The separate LOGREC data sets will be located through the Master Catalog. The SYSRES volume will remain the default.

- Support for multiple PAKLSTs.

Multiple PAKLST parmlib members allow an installation to define separate parmlib members (IEAPAKxx) for each system which must be maintained rather than having separate copies of SYS1.PARMLIB. The PAKLST parmlib members are specified via a new system parameter keyword, 'PAK'. If the keyword is not specified, the default will be 'PAK=00', thus maintaining compatibility for current installation procedures.

- Support for Concatenated LPALIBs:

This allows an installation to have separate data sets for the individual systems that must be maintained rather than alternate copies of the entire SYS1.LPALIB. The data sets are specified in a set of LPALSTxx members in SYS1.PARMLIB, and they will be concatenated to SYS1.LPALIB in order to form the list of data sets to be used when constructing the Pageable Link Pack Area (PLPA). The LPALST parmlib members are specified via a new system parameter keyword 'LPA'. If the keyword is not specified, SYS1.LPALIB will be used.

In addition, MVS/SP 2.1.1 contains support for the program function recently announced for MVS/System Product Version 1. These items include:

- Support to allow multiple copies of ACF/TCAM Version 2 Release 4 (5735-RC3) program product to operate concurrently in the same processor.
- ISAM space recovery (previously available in MVT and SVS).
- Deferred mounting of volumes supported by dynamic allocation.
- 3800 Printing Subsystem keywords supported by dynamic allocation.
- Support for the MVS/Operator Communication Control Facility (MVS/OCCF) in the JES2 environment. MVS/OCCF is a program which allows one or more remote MVS Systems to be operated from a host MVS System. The following support is provided for MVS/OCCF:

- The MVS/OCCF user can acquire or alter the use of a console. This support allows MVS/OCCF to obtain and release a console, change the routing/destination codes of a console, or request whether messages are to be broadcast to all subsystems.

- Commands can be issued at a console on the remote system with the result displayed on the host MVS/OCCF console, with the converse capability being available.

- Multiple console Support (MCS) consoles can be initialized at IPL via the command PARMLIB facility. After IPL, the master console operator or an operator at an MVS/OCCF console may direct commands to other consoles to correct systems problems related to MCS consoles.

- Eleven additional JES2 user exits

- Exit 0 - Pre-Initialization Exit.

Allows an installation to change the initialization options, alter JES2 control blocks, and initialize installation-defined control blocks. It can also instruct JES2 to bypass the initialization options or to terminate initialization processing.

- Exit 14 - Job Queue Work Select Exit.

Allows the algorithm in the user exit routine to search the JOB Queue and return a JOB Queue Element or allow normal JES2 searching.

- Exit 15 - Output Data Set/Copy Select Exit.

Allows the user to create separation pages for each data set or copy of a data set, instead of creating separation pages only at the start and end of a job.

- Exit 16 - Notify Exit.

Allows the user to examine or modify the message text before the \$WTO for the notify message is sent.

- Exit 17 - BSC RJE Signon/Signoff.

Allows the user in a BSC RJE environment to implement additional security checks over the standard password check, limit the number and types of remote devices that can be on a system at any one time, and at Signoff to gather statistics of terminal usage.

- Exit 18 - SNA RJE Logon/Logoff.

Allows the user in an SNA RJE environment to implement additional security checks over the standard password, check, limit the number and types of remote devices that can be on a system at any one time, and at signoff to gather statistics of terminal usage.

- Exit 19 - Initialization Statement Exit.

Allows the user to implement additional checking of the initialization statement, make alterations to the values supplied or to implement installation initialization statements.

- Exit 20 - End of Job Input.

Gives the user the opportunity to specify or override the System Affinity (SYSAFF), the execution mode and priority of the job.

- Exit 21 - SMF Record Exit.

Makes available the JES2 control blocks which are required by the SMF exit (IEFU83). This exit will be taken whenever a JES2 processor submits an SMF record (for processing by the JES2 subtask which actually issues the SMF WTM's).

- Exit 22 - Cancel/Status Exit.

Allows the users to define their own criteria for job selection and job ownership to the Subsystem Interface's Cancel/Status Interface.

- Exit 24 - Post Initialization Exit.

Gives the user the ability to make modifications to JES2 control blocks prior to the end of initialization. The exit may also initialize and process installation-defined control blocks.

- User Control of JES2 Sysout Data Set Grouping.

JES2 Improvements to the usability and operational characteristics of output processing and its associated command processing.

- New Output JCL statements which allow the user to specify which data sets are to be contained in an output work unit. The user can also specify the setup characteristics and the priority for the output group.

- Operational enhancements provide improved procedures for limiting the formation of demand setup groups, limiting which output device will process demand setup groups, limiting the use of user-specified priorities for output and reducing operator intervention. Overall these enhancements will assure that the efficient processing of the user's output will not be disrupted by the increase in the amount of demand setup work.

- Dynamic Add/Delete of Spool Data Sets

A new JES2 facility which gives an installation the capability to dynamically add and delete spool data sets (without warm starts) with minimal impact to the normal processing of work.

- Capability for the operator to dynamically add or delete spool data sets eliminating the need to resort to a warm start which impacts the normal processing of work.

- A number of operator commands will be enhanced to display the jobs on a volume or the volumes used by a job.

**MVS/SP 2.1.0 - HIGHLIGHTS**

The major items in this release are:

- 31-bit Virtual Addressing: The memory map allows the full range of 31-bit virtual addressing to be utilized by system and user programs executing in 31-bit addressing mode. The new memory map provides complementary extended areas above 16 megabytes for most of the areas that exist below 16 megabytes (e.g., Private and Extended Private, Nucleus and Extended Nucleus, PLPA and Extended PLPA, SQA and Extended SQA).

MVS/SP V2 allows programs to execute in 24-bit addressing mode or in 31-bit addressing mode. The 24-bit addressing mode is provided for programs that were designed for execution in MVS/370 and for programs that do not require greater than the 24-bit addressing range (16 megabytes). Extensive support has been provided to insure that programs prepared for 24-bit environments (i.e., 24-bit addressing mode) will execute correctly.

PROGRAM PRODUCTS

MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)

Insertions, deletions and changes which have been made to system interfaces, and to system control block structures will be identified.

In 31-bit addressing mode, programs may utilize the entire 31-bit (two gigabyte) virtual addressing range. In this release, the user can begin to take advantage of the 31-bit virtual addressing support provided by system services. Many Base Control Program services fully support 31-bit virtual addressing while others support a 31-bit interface (but still require parameters and data to be below 16 megabytes virtual). Other interfaces only support the MVS/370 level of interface.

The EXCP Processor provides a new interface to support 31-bit virtual addresses for data transfer operations (e.g., address of the I/O area specified in read or write requests). In this support, the user supplies the 31-bit virtual address in an Indirect Data Address Word (IDAW) associated with the CCW.

- Virtual Storage Constraint Relief (VSCR): Programs that were designed for 24-bit virtual addressing will continue to execute and use storage below 16 megabytes. These programs will benefit from MVS/SP V2's use of the two gigabyte address range. Many system data areas have been moved to extended system areas and many system programs have been modified to execute in the address range above 16 megabytes, thus making available increased virtual storage below 16 megabytes for those programs that require it. Specific changes include:
  - Most of the storage management control blocks have been moved to locations above 16 megabytes virtual.
  - Most programs which support the Generalized Trace Facility (GTF), recovery/termination, print dump, Region Control Task (RCT), and dumping services have been moved to Extended Pageable Link Pack Area (i.e., above 16 megabytes Virtual).
  - Selected control blocks that currently reside in SQA have been moved to Extended SQA.
  - The system trace table has been moved from SQA to a private address space.
  - Portions of the nucleus have been moved to an extended nucleus which resides above 16 megabytes virtual.

In S/370 Extended Architecture, the segment boundaries occur at one megabyte intervals. Since MVS/SP V2 uses segment entries to provide isolation, the effect of rounding must be considered in all assessments of virtual storage requirements.

The 31-bit virtual addressing capabilities provide a base whereby programs can be designed to take full advantage of the large address range.

- Nucleus changes: The Nucleus of MVS/XA has been relocated so that it resides partially below and partially above the 16 megabyte virtual address boundary. The requirement for contiguous error free real storage has been reduced. Sections of the nucleus are protected from accidental destruction by erroneous stores or modification to these areas.

Those portions of the nucleus that execute DAT-off have been placed in a new nucleus module IEAVEDAT and it is referred to as the DAT-off nucleus. This module is loaded in contiguous high real storage and is not virtually addressable in any address space. The remainder of the nucleus continues to be named IEANUC0x and is referred to as the DAT-on nucleus.

- Increased number of I/O devices: The new maximum number of devices is 4,096.
- Enhanced support for real addresses above 16 megabytes: The locations above 16 megabytes real are supported for I/O operations as well as space for backing virtual pages, system data areas and programs. I/O support for these locations is provided by Indirect Data Address Words (IDAWs) with the existing Channel Command Word format (Format 0 CCW), and with a new Channel Command Word format (Format 1 CCW).

Most user programs have no dependencies on real addresses. Thus, this extended real storage support will be transparent to most user programs. Some programs, however, depend on real addresses. For example, programs that execute Virtual=Real (V=R) or existing programs that use EXCPVR require real storage below 16 megabytes. For these programs, MVS/SP V2 will automatically supply real frames below 16 megabytes when a page fix is requested. Users may also request virtual storage which is backed below 16 megabytes. To make more real storage below 16 megabytes available for those programs that require it, MVS/SP V2 has relocated portions of major system areas (such as the Nucleus, LSQA and SQA) to frames above 16 megabytes.

Interactive environments such as TSO can use additional real storage for working set pages, thereby reducing demand paging and increasing capacity and responsiveness.

- Support of the S/370 Extended Architecture Channel: The I/O Supervisor and related areas support the increased flexibility and

improved RAS characteristics of the S/370 Extended Architecture Channel.

Operating under MVS/SP V2, the dynamic reconnection facility of the dynamic path selection function of the 3380 Direct Access Storage (model AA4) allows the device to reconnect to any channel path identified by the originating system. By improving the probability of finding an available path from a device, this function may increase the effective throughput or it may improve response time. In addition to changes in the I/O Supervisor (IOS), the Systems Resources Manager (SRM) component has been modified to allow higher thresholds of channel utilization in support of this function.

- S/370 Extended Architecture Trace: The S/370 Extended Architecture includes additional trace capability. A queue of trace buffers is provided for each processor. System trace, which supports the S/370 Extended Architecture, provides branch tracing, address space ID tracing and explicit software-initiated tracing. Provisions are made for the system operator to control the new trace facilities through extensions to the TRACE operator command.

The system trace now operates concurrently with GTF.

- RAS Enhancements

RAS Overview: As IBM products and systems play a more important role in the operation of our customers' business, there is increased dependence on the reliability, availability, and serviceability of products and systems.

MVS/SP V2 includes new and improved reliability, availability, and serviceability (RAS) features. These features provide significant improvements in error detection and recovery, error data capture, operations, and dumping and dump formatting options. These features are designed to improve system reliability and availability, to enhance operator and installation control of MVS/XA, and to decrease the problem determination and debug time for both system and user dumps.

These new and improved RAS features are an indication of the on-going focus on large systems RAS.

- RAS Highlights

- Error Detection and Recovery Improvements

Improvements in error detection improve the ability of MVS/XA to protect itself from errors. New capabilities improve the ability to detect and correct error conditions.

- A new hardware protection mechanism is used to protect selected key system areas from overlays. This protection is applied to individual 4K pages.
- The S/370 Extended Architecture Channel is used to provide improved access to all I/O devices in the event of a processor failure.
- The Missing Interrupt Handler (MIH) is initialized as part of every IPL.
- Additional FRRs were added to IOS, VSM, RSM.
- Allocation detects and recovers from I/O errors on devices being allocated.

- Error Data Capture Improvements

Problem determination and debugging are simplified by the collection of additional error data.

- On system mode errors, RTM captures key debugging information before it can be changed by recovery processes.
- Tracing enhancements include support of the new hardware trace mechanism, operator control of dynamic trace options, new trace table entries, and improvements in trace entry content and formatting. Also, the trace buffers have been placed in a separate address space.
- GTF improvements include extended support for user trace entries, new I/O architecture support, and concurrent tracing with the system trace.
- A new SLIP-SVCDUMP interface has been created to improve the content of dumps requested by SLIP.
- Changes to the I/O Supervisor (IOS) storage manager permit better tracking of the use of IOS storage areas.

- Dumping and Dump Formatting Improvements

Some new dumping and formatting options have been provided to assist the collection and presentation of the information needed for debugging but to eliminate that which is not needed.

- New SNAP/ABDUMP options allow the dumping of selected portions of subtask data, and of user selected subpools.

PROGRAM PRODUCTS

MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)

- Subtask data will automatically be supplied on dumps resulting from x22 ABENDs (cancels).
- Output of the SNAP/ABDUMP subpool (SPLS) option will be in ascending address order.
- Support is provided for exit routines that receive control when SNAP/ABDUMPs are requested and before the dump is taken.
- New SVCDUMP options allow the selection of areas by subpool number and storage key.
- SNAP/ABDUMP and SVCDUMP provide options to reduce the amount of nucleus data dumped.
- SVCDUMP will dump storage around the location (i.e., PSW instruction address) at which an error was detected.
- Support is provided for exit routines to receive control after SVCDUMPs have been taken.
- New formatters for IOS, Virtual Storage Manager (VSM), Real Storage Manager (RSM) and Auxiliary Storage Manager (ASM) are provided for use with PRINT DUMP.
- A new PRINT DUMP formatter is provided to format the System Trace table.
- The PRINT DUMP SUMMARY, FORMAT, and LPAMAP verbs are enhanced.
- Improvements have been made to the PRINT DUMP user exit interface to improve its usefulness.
- IPCS Support  
IPCS will provide interactive dump viewing and problem analysis capabilities for MVS/XA. IPCS will also provide usability improvements.
- Miscellaneous Enhancements  
Additional improvements have been made to assist problem identification.
  - New operands on the ABEND, CALLRTM, and SETRP macros permit the specification of the abend reason code.
- Operational Improvements:  
Operational improvements aid the operator and the installation to control the MVS/XA system. In addition, operational improvements are provided that permit simplified and improved problem determination.
  - Authorized programs may add, modify, or delete entries in the SVC Table through use of the new SVCUPDTE macro instruction.
  - IOS Recovery attempts to move RESERVEs so as to avoid the requirement to stop systems which are sharing the device(s).
  - IOS Recovery avoids stopping other tightly coupled processors when communicating with the operator.
  - HOT I/O (i.e., an invalid repeated interruption condition caused by a hardware malfunction) recovery actions can be defaulted, thus bypassing the need for operator intervention.
  - The system trace table size and tracing options may be changed dynamically by the system operator.
  - The CANCEL and FORCE commands have been enhanced to terminate address spaces that are not cancellable today. Address spaces are also cancellable by Address Space Identifier (ASID).
  - Dumps that are normally not needed for problem determination will be suppressed. The SLIP NODUMP function has been extended to consider dump type as selection criteria.
  - A new operator command, DUMPDS, permits the dynamic connection, disconnection, or clearing of SYS1.DUMP data sets.
  - Extensions to the SYS1.DUMP data set support permits use of the DUMP option of the IEASYSxx member of SYS1.PARMLIB for selection of the SYS1.DUMP data sets. Up to 100 SYS1.DUMP data sets may be connected to SVCDUMP at one time. Suffixes to the SYS1.DUMP data set name may be numbers from 00 to 99.
  - Enhancements have been made to the DISPLAY DUMP command to assist problem determination for dumps in the SYS1.DUMP data sets.
  - Improvements have been made to Stand-Alone Dump to improve its usability and to provide additional control. Stand-alone dump will support 'shared (non-dedicated) paths' to output tapes and DASD devices.
  - New operator console support permits the installation to control the use of up to seven colors, underscoring, blinking, and reverse image display through specifications in SYS1.PARMLIB.

- When AMDPRDMP is used to offload a SYS1.DUMP data set, it will provide a brief description of important information about the dump. This information will be helpful for both dump management and problem determination.

- JES2: The JES2 component supplied with MVS/SP 2.1.0 is functionally equivalent to the JES2 component supplied with MVS/SP 1.3.0. (See "Installation Considerations".)

In loosely-coupled (multiaccess spool) JES2 environments, co-existence can occur only between processors using the same level of JES2.

- JES3: The JES3 component supplied with MVS/SP 2.1.0 is functionally equivalent to the JES3 component supplied with MVS/SP 1.3.1. (See "Installation Considerations".)

In loosely-coupled JES3 environments, co-existence can occur only between processors using the same level of JES3 components.

DESCRIPTION OF MVS/SP V2

MVS/SP V2 BASE CONTROL PROGRAM (BCP): The MVS/SP V2 BCP is composed of routines which assist in the:

- Entering and scheduling of work.
- Supervising the execution of work.
- Managing of system resources.
- Satisfying of I/O Requests.
- Recovering from errors.
- Support of Multiprocessing.
- Monitoring of system activity.

Each of these areas is described in the following sections.

ENTERING AND SCHEDULING OF WORK

JOB MANAGEMENT: Job Management controls the processing of jobs. It performs a variety of functions that include processing commands, reading and interpreting job and step definitions, allocating data sets and I/O devices, scheduling jobs, and writing system messages and job output.

Job management functions are performed by the master scheduler, the job entry subsystem (JES2 or JES3), and the job scheduler.

The master scheduler initializes the system and responds to operator commands by initiating the requested actions. The job entry subsystem reads job definitions, schedules the jobs for processing, and records job output data. The job scheduler builds control blocks in the scheduler work area (SWA) and initiates and terminates the processing of jobs and job steps.

MASTER SCHEDULER: The master scheduler is a system-initiated task that is established when the system is loaded. Its functions can be divided into two categories: Initialization and command processing.

Master scheduler initialization includes:

- Initiating the console communications address space (COMTASK) to handle all communication with the operator consoles.
- Initializing the subsystem interface.
- Initiating the allocation address space.
- Initialization will diagnose invalid entries in the current Eligible Device Table (EDT).
- Initializing the event notification facility.
- Establishing an ESTAE environment to handle system task failures during initialization.
- Initializing the system management facilities (SMF).
- Initializing the missing interruption handler.

Command processing includes the reading, scheduling, and executing of operator commands issued through a console device, an input job stream or a remote workstation.

The scheduling of a command consists of preserving the command and readying a task to continue processing the command. A command scheduling routine operates under either the console communications task (when the command was issued from a console device), or the reader task (when the command was issued through an input job stream).

The executing of a command is the performance of the function specified by the command. The functions are performed either as new tasks (established by the master scheduler or COMTASK) or as parts of existing system tasks.

JOB ENTRY SUBSYSTEMS: The Job Entry Subsystem is assigned the responsibility of readying of jobs and removal of job output (while the supervision of job execution is assigned to MVS/SP V2 BCP components).

There are two job entry subsystems available for use with MVS/XA: Job Entry Subsystem 2 (JES2), and Job Entry Subsystem 3 (JES3). A

PROGRAM PRODUCTS

MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)

fundamental difference between the two subsystems is the manner in which they manage multiple processor complexes.

The JES2 concept is one of decentralized control and a common job queue -- each JES2 processor operates independently of the others, but each may add jobs to or select jobs from the common job queue.

JES3 exercises centralized control over all processors. JES3 also uses a common job queue, but all jobs reach the queue only through one central JES3 component that selects and distributes work to the processors. This permits centralized resource control for devices, volumes, and data sets and gives the opportunity for fuller resource utilization.

JOB MANAGEMENT FACILITIES

Some of the major facilities provided for job management are multiple console support, system log, hardcopy log, and system management facilities.

**MULTIPLE CONSOLE SUPPORT - MCS:** Multiple console support (MCS) allows one operating system to use many operator consoles. Each console in a multiple console configuration is defined by specifying the operator commands the system will accept from that console, a console to act as an alternate if a failure occurs, and the types of messages the console will receive.

In a system with MCS, one console acts as the master console and the rest (up to ninety-eight) are secondary consoles. The master console is the basic console required for operator-system communication; it alone can accept all possible operator commands, change the status of the hardcopy log and the messages to be recorded on it, switch to a different master console, and receive all messages not specifically assigned to any other console. A secondary console is any console other than the master console; it handles one or more functions assigned to it (for example, it might handle tape activity).

The following list identifies the types of consoles supported by MVS/SP V2. MVS/SP V2 requires a minimum of one full-capability console. Note: The MVS/SP V2 minimum console requirement is in addition to the consoles required by the IBM processor operating in S/370 Extended Architecture mode.

Devices supported by Multiple Console Support (MCS)

MVS/SP V2 supports the following as consoles:

<b>Input/Output Console (3)</b>	<b>Control Unit</b>
2250 mdl 3	2848
3251 (when SYSGENED as 2250M3)	3258
3277 mdl 2 (2)	3272, 3274-1B, 1D, 21B, 21D, 31D
3278 mdls 2, -2A, -3, -4	3274-1B, 1D, 21B, 21D, 31D
3279 mdls 2A, -2B, -3A, -3B (4)	3274-1D, 21D, 31D
<b>Output only Console (1) (3)</b>	
3277 mdl 1 (2)	3272, 3274-1B, 1D, 21B, 21D, 31D
3278 mdl 1	3274-1B, 1D, 21B, 21D, 31D
3284 mdls 1 and 2 (2)	3272, 3274-1B, 1D, 21B, 21D, 31D
3286 mdls 1 and 2 (2)	3272, 3274-1B, 1D, 21B, 21D, 31D
<b>Composite Console</b>	
<b>Combination Card Reader/Printer (1)</b>	
<b>Card Readers:</b>	
2501	
2540	2821
3505	
<b>Printers:</b>	
1403	2821
3211	3811
3203-5	
4245	
<b>Remote Console</b>	
2740	

Notes:

- (1) A composite console must consist of a printer-keyboard or a card reader and printer to simulate the actions of a printer-keyboard. MCS allows output only consoles as secondary consoles.
- (2) The 3277 mdl 1, 3284 mdl 1 and 3286 mdl 1 attach via a 3272 mdl 1 or 2. The 3277 mdl 2, 3284 mdl 2, and 3286 mdl 2 attach via a 3272 mdl 2 only.
- (3) DIDOCS supported.
- (4) Use of seven colors and extended highlighting are supported on the 3279-2B and the 3279-3B. Specification of their use is governed by the Message Processing Facility (MPF) members of SYS1.PARMLIB.

**DEVICE INDEPENDENT DISPLAY OPERATOR CONSOLE SUPPORT (DIDOCS):** Device independent display operator console support (DIDOCS) is a facility that enables graphic display devices to be used as

operator consoles. Its use can result in faster communication between the system and the operator than can be achieved with standard printer-keyboard or composite console devices.

DIDOCS provides the following advantages to the operator:

- Ability to respond to a message or enter a command while messages are being written to the screen.
- Ability to see action messages to be answered and to delete any no longer needed.
- Ability to use the cursor, or selector light-pen when available, to delete messages and perform other display-oriented functions.
- Ability to initiate automatic command entry either with the selector light-pen or with the program function keyboard by an operator command.

**STATUS DISPLAY SUPPORT (SDS):** SDS provides a clear and understandable presentation of information to a system operator. It provides the following advantages to the operator: Ability to obtain a contiguous out-of-line display within specified display screen areas ... ability to obtain a dynamic status display from an operator command.

**SYSTEM LOG:** The system log is recorded in a SPOOL data set. It contains communications between problem programs, operators, and the system. It may contain the following kinds of information: Operating data entered by problem programs using a write-to-log (WTL) macro instruction ... Descriptions of unusual events that occurred during a shift ... Write-to-operator (WTO) and write-to-operator with reply (WTOR) messages ... Accepted replies to WTOR messages ... Commands issued through operator's consoles and the input stream, and commands issued by the operating system.

**HARDCOPY LOG:** The hardcopy log is a permanent record of system activity that is mandatory for systems with an active display console or multiple active consoles; for other systems, the primary console device serves as the hardcopy log. The hardcopy log is kept on another, non-display, console device or can also be kept on the system log.

Since multiple console support allows more than one console in a system, an installation should find it helpful to record all the messages issued by and to a system. The hardcopy log is a place to collect these messages, and therefore, an installation can review system activity by reviewing message activity.

SUPERVISING the EXECUTION of WORK

**MVS/SP V2 SUPERVISOR:** The Supervisor provides global functions for all work being done in the system. The Supervisor, in general, automatically controls the use of the Processor, I/O, real storage, and virtual storage. It provides a variety of services such as program loading, storage allocation, serialization services, timer services, work dispatching and interruption handling. To perform its function, the supervisor receives control following an I/O, external, or program interruption or through a program-requested supervisor call (SVC) interruption.

**SUPERVISOR FUNCTIONS:** Supervisor functions include:

- Managing system resources.
- Managing the content of virtual storage (Contents Supervision).
- Satisfying I/O requests.
- Recovering from errors.
- Supporting Multiprocessing.
- Monitoring system activity.
- Supporting Cross Memory Services.

Areas involved include:

**INTERRUPTION PROCESSING:** When an interruption occurs, the supervisor receives control, saves the status of the interrupted routine, analyzes the interruption, and passes control to the appropriate routine to process the interruption.

**CREATING DISPATCHABLE UNITS OF WORK:** Units of work are represented by control blocks in order to identify and keep track of all work in the system. The two types of control blocks which represent units of work are Task Control Blocks (TCBs) and Service Request Blocks (SRBs).

**SERVICE MANAGEMENT (SRB SUPPORT):** The service management function consists of dispatching and queuing techniques allowing system components to provide services that execute enabled, serialized, and in parallel. The basic control structure used by the service manager incorporates two levels of system priority, global and local. Service requests (SRBs) queued at the global level are given a higher priority than that of any address space, regardless of the address space in which they will be dispatched. SRBs queued at the local level are given a priority equal to that of the address space in which they will be dispatched, but higher than any task within that address space.

**DISPATCHING WORK:** After supervisor routines process interruptions, the dispatcher determines the unit of work which has the highest priority and passes control to that unit of work.

**SERIALIZING THE USE OF PROCESSORS:** In a multiprogramming system, instruction sequences can be interrupted, to be resumed later. The supervisor offers services that can be used to prevent other

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

programs from using resources owned by the interrupted routine. This support includes the management of locks, support of local requests to enqueue (ENQ) resources, and Global Resource Serialization (GRS).

**MANAGING SYSTEM RESOURCES**

The System Resource Manager (SRM) has two objectives:

- To distribute the system's resources among address spaces according to the installation's performance objectives.
- To achieve the optimal use of those resources from the viewpoint of system throughput.

An installation specifies its requirements for the first objective in a member of SYS1.PARMLIB called the Installation Performance Specification (IPS).

The system programmer can also influence many of the decisions of SRM by means of information stored in another member of the SYS1.PARMLIB data set.

**RESOURCE MANAGEMENT:** The control program can dynamically regulate the utilization of most system resources. A central set of system resource management routines coordinates the scheduling of various system resources attempting to both maintain efficient resource utilization and also to satisfy installation specified performance objectives.

With this support each job/user will belong to one of several installation-defined performance groups. The scheduling of system resources will then be controlled so that each job/user receives resources at a rate prescribed for the associated performance group by the installation. Jobs or TSO transactions can be associated with different resource consumption objectives as a function of the resource demand of the job or transaction. This is specified by having multiple performance group periods for a performance group.

The load on various system resources is monitored and resource scheduling decisions are made which will attempt to correct detected imbalances and overloads. For example, SRM monitors I/O interrupt activity and adjusts the number of processor(s) available for handling I/O interrupts.

The number of address spaces resident in real storage and eligible to use system resources (the multiprogramming level) is dynamically controlled based on contention for system resources. This is accomplished by swapping address spaces in and out of real storage.

The ability of address spaces resident in real storage to use the processor(s) can be controlled and dynamically changed as necessary to meet the installations' responsiveness and throughput goals.

Real storage is distributed among address spaces by the Real Storage Manager (RSM) under the direction of the SRM.

Real storage can be allocated to address spaces based on their demand relative to other address spaces for maximum throughput. Real storage can be allocated to address spaces with specific response time goals in mind and the amount can be dynamically adjusted to control the paging rate of the address spaces within acceptable limits. The SRM will use real storage, if available, to contain address spaces that are not demanding system resources, such as TSO address spaces waiting for the terminal user to enter a command.

The allocation of data sets for which no specific device has been explicitly or implicitly requested is controlled by the SRM. The selection of a device is based on the contention on the paths to devices and contention on the devices themselves.

**STORAGE MANAGEMENT:** Multiple address space supervision is provided by system resource management routines, real storage management routines, auxiliary storage management routines, and virtual storage management routines.

- The virtual storage manager (VSM): VSM's main function is to control the allocation and deallocation of virtual storage within each address space as directed by requesting GETMAIN and FREEMAIN macro instructions. See Figure 1 for a presentation of the MVS/XA Virtual Storage Map. In addition, VSM is comprised of routines that perform the following functions:

**Address Space Creation and Deletion:**

Creates and deletes the VSM control blocks necessary to describe new address spaces.

**Task Initialization and Termination - initializes the VSM control blocks necessary to describe storage that is related to individual tasks.**

**Obtain/Free User Regions - creates and deletes the VSM control blocks necessary to describe the portion of the user's private area that is used for the user's problem programs.**

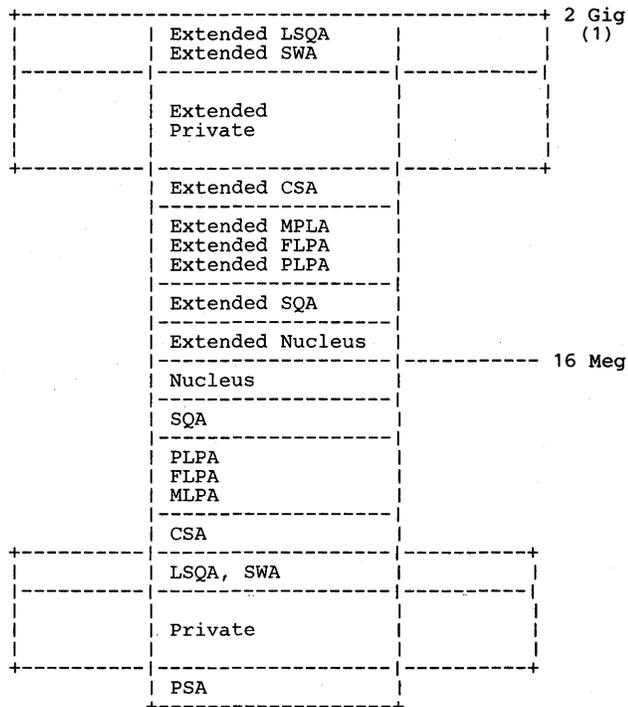
**Support the following VSM services:**

- VSMLIST - Provides information about the allocation of virtual storage within an address space.

- VSMLOC - Verifies that a given storage area is getmained.
- VSMREGN - Provides the starting address and size of the non-extended and extended private area.
- CPOOL- Provides a high performance, general purpose cell management service.

VSM has been restructured to:

- Support a full two-gigabyte virtual address space. This support allows for movement of code and data to the extended virtual area and can provide relief to users currently constrained by the 16-megabyte virtual storage address limit.
- Provide functionally oriented routines and remove inter-component dependencies for easier serviceability.
- Enhance recovery for a higher degree of availability.



**Figure 1. MVS/XA Virtual Storage Map<sup>2</sup>**

Note 1: 'GiG.' = gigabytes = 2<sup>30</sup>

Note 2: Figure not drawn to scale

- The real storage manager (RSM): RSM provides backing of virtual pages and directs the movement of virtual pages between real storage and auxiliary storage. RSM has been restructured to:
  - Support extended real addressing.
  - Handle virtual page requests for Page Fix, Page Free, Page Load, Page Out, Page Release, and Page Anywhere.
  - Create segment and page tables for each virtual address space.
  - Direct address space swapping.
- Provide service for the VIO facility.
- The auxiliary storage manager (ASM): ASM initiates the paging I/O necessary to transfer pages in and out of real storage (both individual page requests and block paging requests, such as swapping). ASM performs space management for all external page storage data sets. ASM also maintains and retrieves copies of the temporary virtual I/O (VIO) data set pages.

ASM has three types of direct access data sets. These types are: Page data sets, swap data sets, and SYS1.STGINDEX (ASM's journaling data set).

- Page data sets are VSAM data sets that make up the page space portion of auxiliary storage. ASM uses this page space to store the paged-out portions of all virtual storage address spaces and VIO data set pages. Each data set is formatted in 4096-byte records called slots.

To page efficiently, ASM divides the pages of the system into classes, namely PLPA, common, and local. A fourth class (duplex), is optional and provides system recoverability. The four types of page data sets and their usage are:

PROGRAM PRODUCTS

MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)

1. PLPA (pageable link pack area) page data set -- contains pageable LPA pages of the system plus ASM control information (including the quick start record). This page data set is filled during a cold start IPL and becomes effectively a read-only data set once PLPA has been constructed. The only exception occurs when overflow from the common page data set is written to this area.
2. Common page data set -- contains the non-PLPA virtual pages in the system common area.
3. Duplex page data set (optional) -- used for a secondary copy of the PLPA and common page data sets to provide system recoverability for a permanent I/O error on either of these data sets.
4. Local page data sets -- contain private address space unique pages, VIO data sets, and LSQA pages if there were no swap data sets available.

Local page data sets are placed on one of two circular queues to optimize performance.

- Swap data sets are VSAM data sets that are used to store and retrieve the set of LSQA (local system queue area) pages and working set pages belonging to an address space. Working set pages are private area pages that are swapped in with the address space.

Each data set is formatted in 4,096-byte slots, but ASM utilizes them in groups of twelve slots called swap sets. The contiguous slots of a swap set allow ASM to process the critical LSQA pages more quickly in groups instead of as individual pages.

- SYS1.STGINDEX data set is a key-sequenced VSAM data set used to store journal information. For example, ASM maintains a copy of the last checkpointed association between VIO pages and auxiliary storage on this data set. This provides recoverability in a step restart situation or warm start IPL.

ASM will assign paging and swapping devices to a higher Interruption Subclass (ISC) than other I/O devices in the system. This will allow paging completions to be presented to the system with a higher priority than other I/O interruptions that are pending.

**MANAGING THE CONTENT OF VIRTUAL STORAGE  
(CONTENTS SUPERVISION)**

**CONTENTS SUPERVISION:** This support provides the facilities that respond to both system and user application requests which identify a requirement for a specific program (i.e., load module). The external interfaces to this function include: ATTACH, LINK, XCTL and LOAD.

**LNKLST Processing:** When Contents Supervision detects the need to search for a load module in LNKLST (i.e., SYS1.LINKLIB and any program libraries concatenated to it), it will employ a mechanism which eliminates channel and device contention caused by directory searches.

This support also:

- Eliminates the need to tune the LNKLST library directories for performance.  
This improves system programmer productivity, particularly in a large multi-system environment.
- Improves dynamic update of modules in these program libraries.
- Raises the maximum number of data sets that can be concatenated in LNKLST.
- Allows non-APF authorized libraries to be included with APF authorized libraries in the LNKLST concatenation.

Channel and device contention caused by LNKLST directory searches are removed by providing an in-storage, hashed directory for the LNKLST concatenation. After the hashed directory is created at system initialization, there is no I/O issued to the actual LNKLST data set directories, thus reducing contention on the channel and LNKLST devices. The hashed directory is created from the concatenated list of data sets specified in the LNKLSTxx PARMLIB members. The directory is kept in a separate LNKLST Lookaside (LLA) address space and the function is invoked directly from BLDL, so there is no customer intervention required to activate it. The resident BLDL table is eliminated.

The need to tune the LNKLST library directories for performance has been eliminated. The search for a module in the LNKLST concatenation is now performed against the hashed directory, thus performance is not dependent on the order of data sets in the concatenation. With this performance dependency eliminated, the requirement for tuning the order of data sets in the LNKLST concatenation or moving modules between data sets has been eliminated. The occurrence of multiple copies of the same module in multiple data sets continues to be supported by the LNKLST Lookaside (LLA) function. The processing performed in this case is the same as with the previous mechanism, that is, the first occurrence of the module in the concatenation will be used.

Two other restrictions on LNKLST concatenation processing have been removed in MVS/SP 2.1.1. First, if specified by the operator, non-APF authorized libraries included in the LNKLST concatenation will remain non-APF authorized and only those LNKLST libraries named in the APF table will be APF authorized. This new function allows the installation to include non-authorized, user libraries in the LNKLST concatenation, thus avoiding the need for separate JOBLIBs or STEPLIBs for each user. Secondly, the restriction of 16 data sets in the LNKLST concatenation has been removed. (The limit of data sets is now governed by similar restrictions to the data management restrictions.)

The LLA function provides a new mechanism to control updates to modules accessed through the LNKLST concatenation. An operator command is provided to refresh the hashed directory. When it is invoked by the operator, a new hashed directory is built by the LLA function. In this manner, any modules in the LNKLST concatenation which have been changed or added since the last creation of the hashed directory will be included in the new directory. After the new directory is created, the old directory is deleted, and any subsequent searches will use the new directory. The LLA function serializes access to and update of the directory by a locking mechanism. The operator can issue a command to stop the LLA function. This command provides a mechanism to synchronize use of the LLA directories across multi-system complexes.

The use of a separate address space for the LLA function can provide a high degree of availability because it lessens the chance of an unintentional modification which might cause a system outage or error. In addition, the use of the separate address space allows the customer to influence the performance of the LLA function by putting it in a separate SRM performance group. The separate performance group allows the customer to monitor and influence the working set size for the LLA function and thus the amount of paging done for the LNKLST directory.

The combination of these changes provides greatly simplified system tuning and library maintenance (particularly for multi-system complexes) and has reduced the channel and device constraints caused by the heavy utilization of the LNKLST libraries.

**SATISFYING I/O REQUESTS**

**IOS:** The Input Output Supervisor (IOS) provides a central facility to control and conduct I/O activity through MVS/XA. IOS has been restructured to:

- Support and utilize the S/370 Extended Architecture Channel.
- Provide functionally oriented routines to handle the many differing types of events connected with the initiation of I/O, the completion of I/O, and unsolicited I/O events.

Included in the functionally oriented design of IOS are:

- A routine to perform I/O initiation (including the handling of the subchannel, device control, I/O initiation and subchannel redrive).
- Disabled I/O interrupt handler. This routine performs the initial processing of solicited or unsolicited I/O interrupts, including the analysis of the Interruption Response Block (IRB) and the invocation of the caller's Disabled Interrupt Exit Routine (DIE), if one was specified.
- I/O Completion Enabled Handling routines which complete the processing of I/O interrupt events. These routines interface with I/O Driver exit routines and with Error Recovery Procedures (ERPs), when required.
- Channel Recovery routines which handle channel errors reported through Machine Check Interrupts.
- Missing Interrupt routines which monitor and report missing I/O interrupt conditions, and mount requests.
- Routine handling the Purging and Restoring of I/O requests.

In support of the S/370 Extended Architecture Channel, IOS utilizes the extended capabilities of the Channel Subsystem. In this environment, the following aspects are significant:

- The program (i.e., IOS) view is independent of the physical structure of the channel, the configuration of channel paths, and the addressability of control units and devices.
- Any processor can access the channel to execute any I/O instruction.
- Access to channel facilities is independent of the physical structure of the channel and the current channel, control unit, or device state.
- The channel can request an I/O interruption on any processor.

In this environment, there is a dedicated subchannel for each device. I/O operations are initiated by issuing the START SUBCHANNEL instruction. The channel will accept (and either initiate or hold for later initiation) one I/O request per subchannel (i.e., per device). To a large degree, the channel has assumed the responsibility of scheduling the I/O requests. IOS is no longer responsible for attempting to locate alternate paths to a device (if the initial path to the device is busy at the time an I/O request is initiated).

I/O operations can be initiated on any processor. Initially, only the processor that executed the IPL process is enabled for I/O interrupts.

PROGRAM PRODUCTS

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

SRM will monitor the I/O operations and optionally will adjust the number of processor(s) currently handling I/O interrupts.

The S/370 Extended Architecture Channel establishes several formally defined interfaces connected with the I/O events. One of these is the Operation-Request Block (ORB). This control block is the required parameter to the START SUBCHANNEL Instruction. Additional architected interfaces have been established in connection with I/O Interruption processing (e.g., Interruption Response Block (IRB), and Extended Status Word (ESW)).

**RECOVERY ROUTINES ASSOCIATED WITH IOS**

**THE SUBCHANNEL LOGOUT HANDLER (SLH):** SLH handles interrupt status which contain logout data. The main functions provided are:

- Processing of the Extended Status Word (ESW) upon detection of situations where the subchannel logs out this information.
- Record the error on the SYS1.LOGREC data set.
- Build an Error Recovery Procedure Information Block for subsequent use by the Error Recovery Procedure (ERP).
- Issue message to the operator to inform him of the event.
- The Subchannel Logout Handler processes situations where the sub-channel has logout data to be presented to the system. These situations include:
- Storage or key errors which may have occurred on the data buffer, the CCWs or the IDAWs.
- Inability to present measurement data. This has no effect on the I/O operation itself, but does affect the statistics normally presented concerning I/O operations.
- Interface Control Checks.
- Channel Control Checks.

The SLH presents status to the Real Storage Manager (for storage or key checks) or to the Monitoring Facility (for measurement checks).

**CHANNEL RECOVERY:** The Channel Recovery functions within IOS handle channel anomalies which are reported through Channel Report Words.

The goal is to report any/all abnormal situations and to initiate recovery operations where possible or appropriate. The S/370 Extended Channel Architecture provides for the ability to localize error reporting to the specific area of failure (e.g., sub-channel, channel path, etc.).

**ALTERNATE PATH RETRY (APR):** APR ensures that an alternate path to a device is tried (whenever possible) when a failing path is detected.

The operator may vary paths to a device online or offline by means of the VARY PATH command. He can vary offline all paths except those to shared direct access storage devices which have an outstanding RESERVE.

**UNCONDITIONAL RESERVE SUPPORT (Alternate Path Recovery):** The Unconditional Reserve Support determines the need (and applicability) of invoking the Unconditional Reserve Error Recovery Procedure. Factors involved in the analysis include:

- Type of condition which triggered the event.
- Type of device (support limited to DASD).
- Type of control unit.

When Unconditional Reserve is issued, the 3770-2 or 3880 Storage Control will:

- Clear the indicators in the control unit that indicate that the addressed device is reserved to a particular path.
- Set indicators in the control unit indicating that the addressed device is reserved to the current path.

Additional actions are taken in cases where a string switch feature is present.

When the command is accepted, all of the above operations are executed unconditionally and without regard for the current status of the control unit or the string switch.

**THE MISSING INTERRUPTION HANDLER (MIH):** MIH is a standard facility that notifies the operator if a device-end, channel-end, or mount interruption is not received within a specified period of time. (MIH also detects 'start pending' and 'request queued plus device idle' situations). A SYS1.PARMLIB member can be used to establish the time interval for each device or for groups of devices. The absence of such interruptions may mean that a mount message has not been satisfied or that a device has malfunctioned. Specific actions an operator may have to take depend upon the conditions he encounters. He may be required to ready a device on which a volume has been mounted, examine indicator lights on the device for abnormal signs, or terminate the job. In the case of channel end interruptions, MIH will invoke I/O restart to attempt to retry. Additionally, MIH will record via recovery management when device-end or channel-end interruptions are not received.

**INPUT/OUTPUT CONFIGURATION PROGRAM (IOCP)**

The channel operations of the IBM processor operating in S/370 Extended Architecture mode are controlled by the External Data Controller (EXDC). The EXDC requires specific data about the

hardware I/O configuration so that channel operations can be performed. In order to define the input/output configuration, the IOCP is executed with the following input data:

- Channel paths on the processor complex.
- Control units attached to the channel paths.
- I/O devices assigned to the control units.

The MVS/XA system generation process is modified to allow MVS/XA users, in most cases, to create a single set of statements which can be used as input to both the MVS/XA system generation process and to the IOCP.

To meet changing I/O requirements, IOCP can be used to define a new I/O configuration.

IOCP is available in two versions:

- An MVS/XA version which can be executed as an MVS/XA job via JCL statements; and,
- A stand-alone version which can be executed from the system or service support console.

The I/O configuration data is stored in two I/O configuration data sets which reside on the integrated processor controller file in the IBM processor operating in S/370 Extended Architecture mode. Two levels of the data are provided to allow the definition and testing of a new configuration without affecting an existing configuration. At power-on reset, either of the two definitions can be utilized to control I/O operations.

IOCP can read from both levels of the configuration data in order to produce reports which describe the I/O configuration.

**EXCP PROCESSOR**

The EXCP Processor provides services for direct use by application programs and for many of the data management access methods (which issue the EXCP request on behalf of the application program).

Areas of support include:

- Construction of a copy of the channel program that was supplied with the request. The new copy of the channel program is constructed utilizing real main storage addresses (as opposed to the virtual main storage addresses supplied in the original copy).
- Page Fixing the required areas involved in the I/O operation.
- Notifying the requestor on the completion of the request. This includes notification of successful or unsuccessful termination of the operation.
- For authorized users, the EXCPVR interface is supported. At this interface, the user provides his own real channel program and is responsible for Page Fixing all areas involved in the request.

The EXCP Processor supports the Format 0 Channel Command Word.

The EXCP Processor supports the Indirect Data Address Word (IDAW) when specified in the user's channel program for data transfer operations. This support is provided to permit the user to supply 31-bit virtual addresses in an IDAW. When EXCP is issued, the channel program may contain CCWs with the IDAW flag on. The EXCP Processor will support this indicator by referencing the addressed IDAW and will use its content as the basis for building the executable channel program.

**RECOVERING FROM ERRORS**

**RECOVERY MANAGEMENT:** Recovery management monitors the flow of control through recovery processing for system, address space, and task failures, and performs normal and abnormal task and address space termination processing. It provides to system functions, and optionally to problem programs, the means necessary to intercept, attempt recovery, and record unexpected or expected error situations. The recovery processing is designed to operate at different levels of control. If a recovery routine for a process operating at one level of control is unable to recover from an error, the error is passed to a recovery routine at a previous (higher) level of control.

In addition to the recovery routines described below, the I/O Supervisor (IOS) contains specialized error recovery routines. These routines were described under 'Satisfying I/O Requests' earlier in this section.

**THE MACHINE CHECK HANDLER (MCH):** MCH records, via recovery management, all machine checks and determines if recovery from a malfunction was made by the Instruction Retry or Error Correction Code facilities of the IBM processor operating in S/370 Extended Architecture Mode. If the malfunction is not corrected by the machine facilities, MCH performs certain analyses and provides a record of the analysis to the Recovery Termination Manager. The appropriate software recovery routines are then invoked. In a tightly-coupled multiprocessing (MP) environment, MCH may initiate ACR on a non-failing processor (as described later in this section).

**DYNAMIC DEVICE RECONFIGURATION (DDR):** DDR allows a demountable volume not marked permanently resident to be moved

## MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)

from one device to another. The request to move a volume may be initiated by the system or by the operator. The system will initiate a DDR request to the operator upon detection of a permanent error.

**ALTERNATE CPU RECOVERY (ACR):** ACR processing is invoked when a Processor in a tightly-coupled multiprocessing (MP) environment can no longer function. ACR processing is invoked by a signal that is sent by the failing Processor before it enters a permanent wait or stopped state. This signal is either a hardware-generated malfunction alert (MFA) or a software-generated emergency signal (EMS). When ACR processing is invoked on a non-failing Processor, it monitors the recovery processing of tasks from the failing Processor in an attempt to recover those activities which were on the failing Processor and continue system operations.

In S/370 Extended Architecture, I/O operations need not be monitored (by ACR) since all processors have access to all devices.

**DUPLICATION OF SYSTEM DATA AREAS:** Any common pageable system areas (e.g., Link Pack Area) will optionally be written to two separate paging data sets which may be on two separate devices. The additional copy will be utilized if on the first attempt to access the information, an I/O failure occurs.

### SUPPORTING MULTIPROCESSING

Multiprocessing (MP) is a capability of the control program that supports tightly-coupled processors with shared real storage. MP is an integral part of MVS/System Product V2. The Processors are treated as system resources and are assigned by the supervisor to process any dispatchable unit of work. Multiprocessing is designed to provide more efficient and more flexible allocation of execution time and main storage for a single job stream than uniprocessing with separate processors. Availability on multiprocessors is supported by:

- Any processor can access the channel to execute any I/O operation. Hence, any processor can take over the I/O responsibility for the complex.
- Commands which allow the logical and physical reconfiguration of hardware resources.
- Recovery management support that reduces the impact of software and solid hardware failures.
- Alternate Processor Recovery processing that allows a non-failing Processor to attempt recovery of tasks in progress on a failing processor.

A locking structure providing a number of locks in the control program allows more parallelism over previous systems. With the use of separate address spaces for jobs and subsystems, queues and control blocks associated with only one virtual address space can be manipulated without preventing another Processor from performing similar control program functions in other address spaces.

### MONITORING SYSTEM ACTIVITY

**SYSTEM MANAGEMENT FACILITIES - (SMF):** SMF collects and records system information. The information obtained can be used in management information reports that describe system efficiency, performance, and usage. The SMF records contain such data as: System configuration ... Job and job step identification ... Processor and input/output device usage ... Device Connect Time ... Temporary and non-temporary data set usage and status ... Virtual and real storage usage ... Status of removable direct access volumes ... Paging statistics.

The SMF component is critical to MVS accounting, performance analysis and capacity planning. The SMF component has been modified to execute in a separate address space. This improves the reliability of SMF by isolating it from unintentional modification. It also improves overall system availability since SMF is now restartable after a failure. The installation no longer has to re-IPL the system in order to resume SMF recording after a failure. To protect the reliability of SMF, repeated abends in user exits will no longer cause SMF to terminate. Instead, SMF will mark the failing exit inactive.

Processing for the SMF data set has also been improved. The data set will be preformatted with dummy records rather than binary zeroes. In this way, the SMF dump program will not have to read to physical end of file when processing a partially full data set. Instead, it will recognize the dummy record as the end of the data set. Data sets that have been preformatted for the previous level of SMF (i.e., with binary zeroes) can also be processed by this new level of SMF.

The use of an SMF address space has also allowed an increase in the number of buffers for SMF use. The buffers are no longer kept in common storage, thus the number of buffers is limited only by the amount of private area virtual storage available.

SMF provides exits to installation-supplied routines that can monitor the operation of a job or job step and generate the installation's own SMF records. The exit routines can cancel jobs, write records to the SMF data set, open and close user-defined data sets, suppress the writing of certain SMF records, and enforce installation standards (such as identification of users). The IEFUSI (User Step Initiation) exit can be employed to monitor (or change) the region size parameter. Dummy routines are automatically provided for all unused exits. SMF records

contain additional accounting information to reflect new system environmental characteristics ... SMF provides an exit from the system control program, which receives control each time an SMF record has been formatted and is ready to be written out; this exit can prevent the record from being written ... an exit is provided whenever a job is ready to be purged from the system ... SMF recording data sets must reside on a direct access device ... OUTLIM is supported.

### SUPPORTING CROSS MEMORY SERVICES

Cross memory services increase the efficiency of communication between address spaces by reducing the requirement for communicating through the common area. Cross memory services allow programs to pass control to programs in other address spaces and allow direct data movement between two defined address spaces. When cross memory services are utilized by areas of the control program (see list below), the use of these services is transparent to the user.

Cross memory services, together with auxiliary address spaces for some system components and subsystems, reduces the system virtual storage (nucleus, PLPA, SQA, CSA) requirements for specific environments. Additionally this storage is protected by being isolated in a separate private address space. Examples of functions that use cross memory services are:

- Global resource serialization

The use of cross memory services permits global resource serialization to place ENQ/DEQ control blocks in the private area of a separate address space. This reduces common storage usage and provides RAS benefits.

- JES3

JES3 allows an installation to significantly reduce its use of common storage for buffers and staging areas by storing some of this data in the private area of a JES3 auxiliary address space and using cross memory services to access the data.

- PROGRAM MANAGER

A program manager extension, virtual fetch, tailored for IMS/VS, uses cross memory services and provides a performance potential for IMS installations. This enhancement reduces execution time and channel contention for program fetching during application scheduling.

- CONSOLE COMMUNICATIONS TASK

This use of cross memory provides virtual storage savings by having the communications task execute in its own address space and use cross memory services to communicate with user address spaces and the master address space. The communications task control blocks for console support, write-to-operator messages, and console message queuing, previously located in the common service area (CSA), are now in the private area of the communications task address space.

### MVS/SP V2 RAS CHARACTERISTICS/IMPROVEMENTS

Improvements have been made in the system RAS characteristics. These include:

- Support of page protection which will detect and prevent any erroneous attempts to change the contents of selected portions of the nucleus, PLPA (including the Extended PLPA), MLPA (including the extended MLPA), and the FLPA (including the Extended FLPA). The MLPA and FLPA may be optionally unprotected.

The protection is on the basis of a 4K page (where previously protection was for a segment).

- MVS/SP V2 trace facilities enhancements:

- The IBM processor operating in S/370 Extended Architecture mode provides new hardware support for tracing certain branch instructions and address space tracing. A new TRACE instruction is provided to record significant software events. The MVS/SP V2 System Trace supports these new hardware tracing mechanisms.

- The system trace options and trace table size may be changed dynamically. In MVS/SP V2, the System Trace tables are constructed in a new (separate) address space.

- New trace table formatting options are provided.

- Both GTF and the new S/370 Extended Architecture trace can be executed concurrently.

- GTF has been enhanced to trace additional events.

- GTF support for CCW Trace is integrated into MVS/SP V2.

- New dumping and formatting options have been provided to assist the collection and presentation of the information needed for debugging, eliminating that which is not needed.

At the time a dump is taken, any WTO type messages which were issued by disabled or locked routines and which still remain in the in-storage buffer, will contain a timestamp (time of day clock). This will permit the coordination of such messages with entries in the System Trace Table and the headers for LOGREC entries.

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

These buffered messages can be key to quick problem resolution and (with the addition of the timestamp) pertinent messages can be distinguished from those that are irrelevant. During normal operation, the timestamp will not appear when the message is sent to the operator.

Improvements to SVCDUMP will improve system availability and assist the management of SYS1.DUMP data sets. Enhancements have been made to stand-alone dump to improve its usability.

- Printdump has been enhanced through these improvements:
  - MVS/SP V2 printdump will execute on MVS/SP V2 or MVS/SP V1 to format MVS/SP V2 dumps.
  - ASM, VSM, RSM and IOS Control Block Formatters are provided.
  - A new formatter for the system trace table is provided. The system trace entries will be formatted in first-in, first-out order, so as to resemble a hardcopy log of events. This new format should improve system programmer productivity since it eliminates the need to search for and decode the trace buffer in the hexadecimal portion of the dump. This function is invoked through a new Print Dump verb, TRACE.
  - The title page is expanded to include parts of the dump header information which may be helpful in performing problem determination and problem management.
  - New options on the FORMAT verb permit selection of the address spaces to be formatted. The default is to format only the address spaces for which error indicators are set or were current at the time of the dump.
  - The output of the SUMMARY formatter is restructured for ease-of-use.
  - A dump index will be provided to indicate the starting pages in the dump of the output of each of the print dump formatters, plus additional data depending upon the formatter. An INDEX DD statement may be used to cause the index to appear at the front of the dump.
  - LPAMAP will list all the modules in the link pack area. A new operand is used to indicate whether the module list is to be sorted by entry point address or by module name.
  - The interface provided to user exits (formatters) is enhanced. Exits can now obtain up to 4K bytes of dump data at a time. Exits can now access real storage, processor status records, or the dump header record.
- SNAP/ABDUMP provides the following new support:
  - The SUBTASKS option causes the inclusion of subtask data in a dump. This subtask data is always automatically included in x22 ABEND dumps.
  - The SYMPTOM option provides concise information about the error (ABDUMP only).
  - The SUM option provides information about the areas being used by the program at the time of error plus user selected control blocks (ABDUMP only).
  - The SUBPLST option dumps the data in the selected subpools.
  - The ALLNUC option dumps the complete DAT-on nucleus. The existing NUC option will dump only the non-protected parts of the DAT-on nucleus.
  - The dump index will be expanded to identify the page number in the dump of the job's active load module(s).
  - User subpool areas (requested by the SPLS option) will be printed in ascending address order.
  - New pre-ABDUMP exit support will allow an installation to tailor or suppress abend dumps.
- SVCDUMP provides the following new support:
  - The SUBPLST option causes the dumping of the data in the specified subpools.
  - The KEYLIST option causes the dumping of the data in the specified keys within the subpools specified by the SUBPLST option.
  - The ALLNUC option causes the dumping of the complete nucleus (DAT-on and DAT-off). The NUC option will dump only the non-protected parts of the virtual nucleus.
  - New information is put into software error (SYS1.LOGREC) records to identify the results of an unsuccessful attempt to take an SVCDUMP.
  - SVCDUMP-SLIP interface is used to allow the dumping of the areas in use at the time of the SLIP event. This improves the usefulness of dumps requested by SLIP.
  - SVCDUMP insures that the area around the point of error is included in the dump regardless of the options selected.
  - A new task termination resource manager will attempt to protect the system from SVCDUMP errors by freeing resources and resetting the system dispatchable before task termination completes.
  - A new command, DUMPDS, is provided to connect, disconnect, or clear SYS1.DUMP data sets.
  - An extension to the DUMP option of the IEASYSxx SYS1.PARMLIB member can be used to identify the SYS1.DUMP data sets to be initialized for use at IPL time.

Thus, many SYS1.DUMP data sets may be cataloged in the system master catalog, but only the selected ones are used by MVS/SP V2.

- MVS/SP V2 will support up to 100 SYS1.DUMP data sets.
- New post-SVCDUMP exit support will allow an installation to provide exit routines to automate the offloading of SYS1.DUMP data sets, to perform some automated dump screening, or to take other actions that the installation desires.
- Enhancements have been made to Stand-Alone Dump.
  - SADMP now supports devices (tape, DASD, console) attached on 'shared (non-dedicated) paths'.
  - The console address list has been expanded from 1 to 21, and SADMP will only consider the listed devices to be consoles. This will avoid having SADMP respond to any device that presents the first attention interrupt.
  - SADMP previously required the residence volume, output device, and console to be attached to the same processor (Channel set). This restriction is removed.
  - A means to specify additional storage to be dumped has been added to both the residence volume initialization process (to allow local defaults) and to operator prompting (to allow dynamic additions). This can be used, for example, to dump selected areas of private storage.
  - SADMP will prompt the operator when a labeled tape is mounted instead of unloading it. SADMP will display the volume serial number and request permission to erase the label. This removes the requirement that non-labelled tapes be kept available for SADMP.
  - The user may now choose where SADMP will load itself (instead of having a fixed location). With knowledge of the local configuration, this can be used to avoid storage areas with defective locations.
  - Residence volume initialization has been simplified from a SYSGEN-like two stage process to a single step batch job.
  - Informational messages, which slow stand-alone dump, may optionally be suppressed.
- Enhancements have been made to SLIP.
  - SLIP dumps now contain registers and related data areas, some control registers from time of interrupt.
  - SLIP dump suppression may be tailored by type of dump (i.e. SYSABEND, SYSUDUMP, SYSDUMP, or SVCDUMP).
  - SLIP supports the keyword, REASON=x which filters non-PER traps based on the reason code of the ABEND or CALLRTM macro. The syntax rules for the REASON keyword are the same as those for the COMP (completion) keyword, and can only be used in a SLIP trap where the COMP keyword has been specified.
  - SLIP users may perform logical AND and OR functions on any number of DATA triplets.
  - The user may specify the name of a nucleus module when defining a PER or non-PER trap. This is done through the keyword NUCMOD=x.
  - A parameter on the ACTION keyword (ACTION=NOSUP) will prevent DAE and other dumping services from suppressing the dump for a particular error.
- The S/370 Extended Architecture Channel provides RAS improvements.
  - The channel selects and controls the paths to I/O devices.
  - Because I/O devices are not associated with a processor, I/O recovery in the event of a processor failure is no longer necessary.
- Additional Functional Recovery Routines
  - Additional FRRs have been added to IOS, VSM and RSM.
- Operational improvements are provided.
  - New SYS1.PARMLIB support allows the installation to control the display output at the MVS/XA Operator Console. Seven colors, reverse image, underscore and blinking may be selected.
  - The CANCEL command will be executed to support termination of tasks which are:
    - Not initialized to the point where a job name has been assigned.
    - Not unique (i.e., two started tasks with the same name).
  - The FORCE command will be extended to support termination of address spaces which are:
    - Non-cancellable.
    - Not initialized to the point where a job name has been assigned.
  - SLIP commands are automatically set to suppress dumps that are normally valueless. These SLIP commands are maintained in a new SYS1.PARMLIB member (IEACMD00) that can be modified by the installation.
  - Improvements have been made to the DISPLAY DUMP command to provide information which may be useful for problem determination.

PROGRAM PRODUCTS

MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)

- Enhancements have been made to the MIH, including support for installation options via PARMLIB specification. A SYS1.PARMLIB member can be used to establish the time interval for each device or for groups of devices.
- Usability Enhancements: At the installation's option, the SYS1.PARMLIB data set may be blocked and multi-extent.
- A restartable wait state is loaded to inform the operator that IPLs may not succeed since the nucleus is in more than one extent.

**TIMESHARING OPTION - TSO**

TSO provides users a general purpose timesharing capability. Terminal users share remote access to the facilities of the system for conversational interaction -- preparation, syntax checking, execution, updating of programs and data -- concurrently with normal background operations. TSO provides conversational remote access to the system environment for both the experienced professional programmer and the individual with little or no experience with computers.

**TIMESHARING:** Each timesharing user has a private virtual address space.

The edit and scheduling functions of timesharing are integrated in the Base Control Program.

The data set handling commands allow allocation of multi-volume and multi-unit data sets, non-direct access data sets, and VSAM and virtual I/O data sets. Terminal users can allocate and unallocate concatenated data sets (other than VSAM and ISAM). Timesharing users may be selectively authorized by the installation to allocate data sets requiring volume mounting. Under installation control, timesharing users can direct SYSOUT data sets to remote stations defined to either Job Entry Subsystem.

The installation may specify a time interval which establishes a period that will permit a timesharing user to reconnect to the system in the event of a line disconnect. Should the interval lapse prior to the user reconnecting to the system, then the system will automatically save any data set which the user was in the process of editing.

Remote Entry Subsystem workstations are identified to the system in the same manner as TSO terminal users.

**FEATURES**

- General purpose time sharing capability operating concurrently with background operation within one operating system.
- Each timesharing user is assigned to an individual virtual address space.
- Data sets can be dynamically allocated by programs executing in the time sharing address space. Devices can also be dynamically allocated.
- Real storage utilization reflects the actual requirements to execute the program in the time shared address space.
- Time sharing provides an environment for creating and executing conversational programs. A device-independent BSAM/QSAM interface to terminals is provided for ease of development and installation of terminal-oriented application programs.
- Programming languages and data management are compatible between conventional (batch) programs and programs developed at the terminal. Batch or terminal-developed programs can be stored, retrieved and executed locally (at the computer center) or from the remote terminal allowing the use of data sets by time shared or other address spaces.
- Use of ACF/TCAM or ACF/VTAM to handle timesharing terminal types allows the same terminal and/or communications lines to be used for timesharing or other applications.
- The ACCOUNT facility may be executed in a background environment. It enables a batch-entry or remote user to update the user attribute data set (UADS) and the broadcast data set (BROADCAST) in a background environment.

The TEST facility of TSO is supported by TSO Extensions for MVS/XA licensed program. See the appropriate pages for a description of the support.

TSO offers language support for online development, debugging and execution of programs in COBOL, FORTRAN, PL/I, BASIC, APL, PASCAL and Assembler. For more detailed descriptions of the language products designed for use under TSO, see the Program Products section. As previously stated, the TEST facility is supported through the TSO Extensions for MVS/XA licensed program.

Language facilities available to the terminal user include: Compilation, usually invoked with a single command ... Linkage editing or loading ... Program execution with terminal I/O capabilities for interactive application.

Command Procedure allows the user to specify compiler-type functions to control execution of his CLISTS, with control options to handle error exiting, including nesting of CLISTS, If/Then/Else and Do While/End

Syntax, Read/Write to/from CLIST, local and global options, external file - I/O and symbolic substitution.

The use of ACF/VTAM or ACF/TCAM allows the use of many SNA terminal types.

TSO users may wish to consider using the Time Sharing Option 3270 Display Support and Structured Programming Facility licensed program. See the appropriate section for further information.

**JOB ENTRY SUBSYSTEMS**

**JES2 COMPONENT DESCRIPTION:** JES2 is a specialized component of MVS/SP-JES2 which operates in the same processor with MVS/XA to perform the peripheral functions associated with batch job processing. JES2 is started as a job entry subsystem. Control of designated unit-record devices is assumed, the specified intermediate storage direct access device(s) are initialized, and job processing begins. JES2 has four major processing stages which relate to its four major external functions. These are:

1. **INPUT STAGE** - This stage reads jobs simultaneously from a variable number of various types of online card readers and remote terminals. These jobs are then entered into a priority queue to await processing by the next stage.
2. **CONVERTER STAGE** - This stage passes the Job Control Language (JCL) to the MVS/SP V2 Converter which merges the specified procedures from the appropriate Procedure Library, performs a basic syntactical scan, and converts the JCL statements into an 'internal text' format which JES2 SPOOLS for later use by the MVS/SP V2 Interpreter. The jobs are then queued by job class to await processing by the next stage.
3. **EXECUTION STAGE** - This stage removes jobs based upon priority and class from the queue established by the Converter Stage and passes those jobs to MVS/SP V2 for processing. Input cards are supplied as required to the executing program and print and punch records are received and written onto JES2 intermediate storage. At the completion of a job, it is placed in a queue to await processing by the next stage.
4. **OUTPUT STAGE** - This stage transcribes the print and punch output generated by jobs in the previous stage to printers and punches. A variable number of various types of printers, punches and remote terminals can be operated simultaneously.

**JES2 STANDARD FEATURES:** The standard features of JES2 include:

- **JOB INPUT SERVICE** provides for low-overhead reading of job streams and storing of data on SPOOLing volumes for later high-speed retrieval for up to 99 concurrently active local card readers in any combination of devices as follows: 2540 reader ... 2501 reader ... 3505 reader (80-column punched cards only) ... 3525 punch (with read feature).
- **CONVERTER SERVICE** provides for the merging of the submitted JCL with user-selected or installation-selected procedure libraries and for an early scan of this combined JCL for syntactical errors.
- **EXECUTION SERVICE** provides for selection of jobs and execution monitoring for up to 99 concurrently executing jobs as follows: Selection of jobs based upon job class and initiator priority class list of up to 36 classes for each initiator ... automatic delaying of jobs with duplicate OS jobnames ... automatic deblocking and blocking of user SYSIN/SYSOUT data ... counting of lines, cards, and execution duration with optional operator notification and/or cancellation ... interface for SMF counting of SYSIN data.
- **MULTIPLE SPOOLING VOLUME SUPPORT** provides for balanced utilization of up to 36 volumes for any combination of any models of the following devices (one required): 3330 ... 2305 mdl 2 ... 3340 ... 3350 ... 3375 ... 3380. Warm start capability provides for checkpointing critical JES2 information sufficient for: Optionally restarting jobs which were executing ... restarting print and punch at the last checkpoint.
- **JOB OUTPUT PRINT SERVICE** provides for low overhead printing of job streams, system message, and user data print output for up to 99 concurrently active local printers in any combination of devices as follows: 1403 Printer mdl 2, 7, N1 ... 3211 Printer ... 3800 Printing Subsystem ... 3203 mdl 4 and 5. Note: Only the 3203 mdl 5 can be attached to IBM processors operating in S/370 Extended Architecture mode.
- **SPECIAL FORMS SUPPORT** provides for the routing of print (on a job or data set basis) and punch data (on a data set basis) to special forms output queued for output as directed by the operator.
- **INTERNAL READER FACILITY** provides the ability for any task within the system to submit jobs to JES2 for batch execution as though entered from a JES2 card reader.
- **CONSOLE SUPPORT** provides for direct entry for JES2 commands and JES2 abbreviated replies to WTORs through MVS/SP V2 operator consoles.

PROGRAM PRODUCTS

MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)

- JES2 interfaces directly with the MVS/SP V2 SMF writer to produce seven SMF records (types 6, 26, 43, 45, 47, 48 and 49). JES2 also provides two user SMF exits (IEFUSO and IEFUJP).
- JOB OUTPUT PUNCH SERVICE provides for low overhead punching of job stream user punch output for up to 99 concurrently active local punches in any combination of devices as follows: 2540 punch ... 3525 punch.
- EXECUTION BATCHING provides the facility for passing jobs directly to a processing program such as a 'one-step' monitor, reducing the overhead of OS scheduling and allocation for short running jobs requiring limited system facilities.
- PRIORITY AGING provides for automatically increasing the JES2 scheduling priority of jobs which have been in the system for extended periods of time.
- REMOTE JOB ENTRY provides for high speed communications with binary synchronous and SNA batch workstations which may be used for job stream input and output as well as operator control of the devices and jobs associated with the remote (see 'JES2 RJE Features').

USER EXIT FACILITIES

- The JES2 User Exit facilities enable installations to individually tailor the JES2 component of MVS/System Product-JES2 to the requirements of their own operating environment.
- Specific IBM-defined exit points are provided at strategic points in JES2 code. The installation-supplied exit routines are 'logical extensions' of the JES2 environment. The exit code is assumed to be authorized.
- The installation is also provided with the general facility to specify its own exit points by coding the exit macros in the source code of JES2.
- Individual exit points can be controlled by initialization parameters and by system operator commands.

SPOOL OFFLOAD FACILITY

- A facility is provided to give the installation the capability to dump and later restore the data from the JES2 spool. This facility will function using either tape, DASD or MSS virtual volumes as the offload media.
- Release and spool device-independent data formats allow customers to use the spool offload facility as a future JES2 cold start circumvention mechanism when migrating from release to release or changing spool devices. At present, a cold start can cause loss of jobs and sysout data; this facility would permit a cold start to be performed without such losses or the need to drain the system.

SPOOL PARTITIONING FACILITY

- Spool Partitioning provides a means of reducing the impact of the failure of a single storage device on the total spool space. The total number of volumes eligible for spool space allocation for each job can be limited. Through the use of this facility, the probability of a job's data becoming inaccessible due to a device failure can be reduced. Exit points are provided to enable the installation to control the allocation of spool space: The installation will also have the option of doing a warm start without all previously mounted volumes available.

USER CONTROL OF SYSOUT DATA SET GROUPING

- The SYSOUT Data Set Grouping support provides new Output JCL statements which allow the user to specify which data sets are to be contained in an output work unit. The user can also specify the setup characteristics and the priority for the output group.
- Operational enhancements provide improved procedures for limiting the formation of demand setup groups, limiting which output device will process demand setup groups, limiting the use of user-specified priorities for output and reducing operator intervention. Overall, these enhancements will assure that the efficient processing of user's output will not be disrupted by the increase in the amount of demand setup work.

DYNAMIC ADD/DELETE OF SPOOL DATA SETS

- Dynamic Add/Delete of Spool Data Sets provides a capability for the operator to dynamically add or delete spool data sets. This eliminates the need to resort to a warm start which impacts the normal processing of work.
- A number of operator commands will be enhanced to display the jobs on a volume or the volumes used by a job.

ERROR RECOVERY FACILITY

- This facility, similar in structure to the operating system's ESTAE/FRR recovery scheme, allows internal JES2 'processors' to deal with programming errors which previously caused JES2

termination. SYS1.LOGREC recording of all JES2 errors, regardless of whether recovery is successful, is also provided.

JES2 MULTI-ACCESS SPOOL FEATURE (MAS): JES2 allows from two to seven MVS/370 and MVS/XA Systems to share the JES2 input, job and output queues through the use of Shared DASD. This feature may be used to share the workload or a pool of JES2-controlled devices among processors. Jobs may be routed to any specific system or all systems in this multi-access spool complex. Furthermore, JES2-controlled unit record and remote devices need not, but may, be attached to each processor.

Each processor operates asynchronously within the multi-access spool complex, i.e., there is no master-slave relationship. Because of this operating design, any system in the complex can recover the workload accepted into the complex by any other system. Another system in the complex can have the RJE, TSO and unique unit record devices of the failing system physically switched to it and continue processing those jobs previously entered into the spool queue.

Another function supplied by the JES2 multi-access spool feature is the ability to isolate a processor for testing purposes. A processor may be designated as operating in independent mode, and in so doing, will only process jobs that are both routed to it and are themselves designated to be executed on that processor in independent mode.

JES2 RJE FEATURES: Those features common to all JES2 RJE configurations are as follows:

- JES2 RJE supports up to 1,000 remote workstations communicating over nonswitched (point-to-point) or switched lines.
- JES2 RJE provides for concurrent operations over as many as 1,000 lines assigned to unique communication line adapter addresses of the following types: SDA Type II on a 2701 for Binary Synchronous ... 3704 providing 270X emulation ... 3705 providing 270X emulation ... 3704/3705 SNA.
- Output routing control provides for print and punch output to be directed to the devices attached to the remote, to the central system, or to other remotes as designated by JES2 initialization parameters, by control cards submitted with the job, or by operator command.
- Remote operator control provides a subset of the JES2 operator commands for display of information and control of jobs and devices associated with the remote.
- Operator message output provides for transmission of messages and responses to remote operators with online MULTI-LEAVING workstations with consoles immediately, and optional saving of messages for all other remotes until the remote is online and has a printer available.
- Workstation programs, when required, are supplied as extensions of JES2 and are contained on the MVS/SP V2 distribution libraries in source form.
- Terminal support on the central system provides for communication with: 2772 (Binary Synchronous) ... 2780 (Binary Synchronous) ... 3780 (Binary Synchronous) ... 5110 Computer (as a 2772 BSC) ... S/360 mdl's 20, 25, 30, 40, 50, 65, 65MP, 67 (in 65 mode), 75, 85, and 195 (MULTI-LEAVING) ... All virtual storage S/370 processors (MULTI-LEAVING) ... IBM processor (operating in S/370 or S/370 Extended Architecture mode) (MULTI-LEAVING) ... 1131 (MULTI-LEAVING) ... System/3 (MULTI-LEAVING) ... System/32 or System/34 (MULTI-LEAVING as a System/3) and System/32 or System/34 (SNA as a 3770) (MULTI-LEAVING as a System/3 or MULTI-LEAVING as a S/360 or S/370) and System/36 (SDLC as a 3770 or multiple logical units) ... 8100/DPPX (multiple logical unit SNA) ... 8100/DPPX/SP (multiple logical unit SNA).

To achieve this flexibility of terminal-sharing, JES2 uses the VTAM application program interface for the support of the SNA terminals which are attached to a 3704/3705 in network control mode.

SNA terminals supported by JES2 in MVS/SP V2 are the non-programmable models of the 3771, 3773, 3774, 3775, 3776 and 3777 Communication Terminals, the System/32 (as a 3770), the System/34 (as a 3770), the System/34 (as a 3770 with multiple logical units), the System/36 (as a 3770 with multiple logical units), the 6670 Information Distributor (through the program product MVS/Information Distribution Workstation Support, 5740-AMA), the 3790 Communication System and the 8100/DPCX Information System. Support for the 3770 family of devices includes the the 3262 Line Printer mdl's 2 and 12, the 3784 Line Printer, the 3521 Card Punch, the 3501 Card Reader and the 2502 Card Reader.

- The signon feature provides for remote identification and line security through remote and line passwords.
- Remote characteristics support utilizes the unique features on each remote as follows: Full text transparency (required for object decks) ... text compression ... print line width truncation ... outer size and blocking capabilities. Note: Multipoint or multidrop line features are prohibited.

PROGRAM PRODUCTS

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

- Remote job priority adjustment provides for favoring or limiting the JES2 scheduling priority of jobs submitted from each remote workstation.
- Line restart feature provides for warm starting of print output after remote workstation or line failures.

**NJE FEATURES:** The Network Job Entry (NJE) facility provides for the transmission of selected jobs and in-stream data sets, system output (SYSOUT) data sets, operator commands and messages, and job accounting information from one computer system to another across a communication link.

A job entry network consists of one or more interconnected computer systems (called nodes), running under MVS/XA, OS/VS2 MVS, VM/370, or DOS/VSE. These nodes have the capability of communicating with one another and passing the information indicated above from one node to the next. The number of JES2 nodes which can exist within a job entry network ranges from one to 1,000.

The JES2 nodes can be single processors (UP/AP), tightly coupled multiprocessing processors, dyadic processors, or multi-access spool systems.

In a JES2 node, a job may enter the network via any local or remote input device and will be queued for transmission to another node if the node of entry is not the execution node. A job designated for execution at another node is either transmitted directly to that node or is transmitted through intermediate nodes located along a path to the execution node. Transmission of jobs along BSC communications links is handled on a store-and-forward basis; that is, a job must be completely received by a node before any action will be taken to either execute the job or transmit the job to another node. Once a job has been completely received by a node, the transmitting node frees the resources that were allocated to the transmitted job. Transmission of jobs through ACF/VTAM links is logically direct to the execution node.

At each JES2 node, appropriate accounting information is collected and produced for local accounting. In addition, network accounting number support is provided by JES2 NJE. This permits accounting numbers to be assigned across the network and provides initialization parameters, conversion tables and routines and user exits to convert local accounting numbers to network accounting numbers and vice versa. All accounting information is produced through standard System Management Facilities (SMF) in JES2 nodes.

**NETWORK PATH MANAGER:** A network path manager running in each JES2 processor in the job network interfaces with JES2 and the multi-access spool facility to communicate with all other network path managers. The network path managers control the routing of data through the network by providing best-path and alternate-path information to other NJE components. No single node is designated as a network manager; any subset of an NJE network can function entirely on its own.

**JES3 COMPONENT DESCRIPTION**

**JOB ENTRY SUBSYSTEM 3 - JES3:** The JES3 component of MVS/SP-JES3 is designed to improve the operational environment of the computer installation by aiding many of the operator functions. JES3 can improve installation workload scheduling, increase the workload capacity, and reduce turnaround time. JES3 provides a single system image for the execution of many jobs concurrently on the connected processors.

JES3 can support up to eight JES3 processors, any of which can be a tightly coupled multiprocessor, operating under the control of MVS/SP-JES3. A JES3 configuration consists of a global processor that controls all job input and output, and the scheduling of time sharing users, batch jobs and, optionally, devices. One to seven additional JES3 processors, called JES3 local processors, can be connected to the JES3 global processor. Each processor is attached to the JES3 global processor by a channel-to-channel (CTC) adapter which is used to communicate control information. The JES3 global processor handles all SYSIN and SYSOUT data to and from peripheral devices.

JES3 design and the shared spool concept help to improve the overall complex availability by permitting any JES3 local processor, if properly configured, to assume JES3 global functions. Should the JES3 global processor fail in a loosely coupled configuration, the operator can move the JES3 global function to any properly configured JES3 local processor. The degree of this availability depends on the presence of appropriate alternate CTC paths and switchable peripheral devices.

As the installation workload grows, capacity can be increased by increasing the size of processors, by using multiprocessor configurations, and/or by adding additional JES3 local processors, operating under the control of MVS/SP-JES3. JES3 enables such expansion with minimal disruption to the operational environment. Jobs are distributed to available processors depending on job priority, device requirements, user specification, and processor dependencies. (A processor dependency is an attribute of a job that requires it to execute on a specific JES3 processor. For example, if a job uses a device that is attached to only one processor, then the job has a processor

dependency and must execute on the processor that can access the device.)

Remote job processing from binary synchronous communications (BSC) and systems network architecture (SNA) terminals is supported. JES3 also provides multiprogrammed background utilities which the operator can invoke.

**SOME OF THE FEATURES OF JES3 ARE:**

- Single operator interface to the entire system.
- Complex-wide data set integrity.
- Job Networking (BSC).
- Automatic scheduling of interdependent jobs (dependent job control).
- Optional auxiliary address space to reduce CSA requirements.
- Generalized peripheral scheduling and improved output service that includes related INQUIRY/MODIFY processing.
- Performance features, for example:
  - Ordered seek I/O queuing
  - SIO drivers for RJP, CTCs, spool and printers
  - Unserialized path for allocation
  - VTAM authorized path
  - Main store resident control blocks
- Optional invocation of JES3 writer processing as a separate JES3 task in the JES3 address space. This provides more utilization of IBM's tightly coupled processors.
- Extensive RAS capability, for example:
  - Functional recovery routines
  - ESTAE recovery routines
  - Alternate Path Channel-to-channel (ACTC)
  - Dynamic system interchange
  - Spool I/O error recovery, partitioning and RAS support
  - HOTSTART of JES3 address space with or without an IPL WARMSTART of JES3 system
- Facilities to help prevent and recover from JES3 out of storage conditions.
- Automatic scheduling of up to seven attached local processors (including multiprocessors).
- Centralized console service with message suppression.
- Logical device grouping with consoles defined for the group.
- Installation-specified, operator-controlled job selection algorithms for scheduling local processors.
- Numerous user exits.
- Deadline scheduling.
- Simulated console support for non-programmable remote terminals (2770, 2780, 3780).
- Multitasking of the Converter/Interpreter and locates.
- Checkpoint/Restart support for jobs.
- SMF support.
- Early JCL diagnosis through JES3's use of the VS2 Converter and Interpreter.
- Support of TSO Foreground Initiated Background functions.

**JOB NETWORKING:** This facility provides for the transmission of selected jobs, in-stream data sets, operator commands and messages, system output data sets and job accounting information from one computer complex to another across binary synchronous telecommunications facilities or channel-to-channel adapters. The use of standard interface protocols enables communication among similar and dissimilar operating systems such as MVS/SP-JES3, MVS/SP-JES2 and VM/SP and the RSCS Networking licensed program. Routing from the originating network node to the destination node is controlled by a routing table at each node in the path. Strings of duplicated characters are compressed into shorter representations, reducing data flow between nodes. Operator commands permit manual intervention to control the network. JES3 Networking utilizes the security functions normally in effect at each node.

**REMOTE JOB PROCESSING (RJP)**

**BINARY SYNCHRONOUS COMMUNICATION (BSC):** JES3 Remote Job Processing (RJP) permits the input, processing and output of jobs to and from terminals remote from the installation. This function is achieved through the use of the 3704 or 3705 Communications Controller (emulator mode), or the 2701 Data Adapter interface with binary synchronous communication (BSC) terminals. BSC remote terminals are used as remote card readers, printers and card punches, with job output routed optionally to any remote terminal or local output device.

For more detailed information related to JES3 BSC RJP, see *Introduction to JES3* (GC28-0607).

**SYNCHRONOUS DATA LINK CONTROL (SDLC):** JES3 SNA RJP provides JES3 remote job processing support for SNA terminals in a terminal-sharing environment where multiple applications may establish logical connections with the terminal on a per-session basis. To achieve this flexibility of terminal-sharing, JES3 uses the VTAM application program interface for the support of the SDLC terminals which are attached to a 3704/3705 in network control mode.

SDLC job entry stations supported by JES3 are the 8100 Information System under DPPX or DPPX/SP, the 8100/DPCX Information System, the 5280 Distributed Data System, the 3790 Communication

## MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)

System and the 3770 Data Communication System (except for the 3773 mdls P1, P2 and P3, all SDLC models are supported). Multiple Logical Unit (MLU) 3776 mdls 3, 4 and 3777 mdls 3, 4 with up to six independent and concurrent sessions are supported. Also supported are the 3262 Line Printer mdls 2, 12, the 3784 Line Printer, the 3203 Printer mdl 3, the 3521 Card Punch, the 3501 Card Reader, and the 2502 Card Reader when attached to a 3770. In addition, JES3 supports the 6670 Information Distributor (SNA version) through the MVS/Information Distribution Workstation Support licensed program (5740-AMA). The 3790 Communication System and 8100/DPCX Information System support a single RJE workstation which can handle up to five logical concurrent processing sessions with JES3.

Functional characteristics of the JES3 SNA RJP support for SDLC terminals are as follows:

- Half duplex session flow.
- Multidrop operation.
- 3770 diskette, 8100/DPPX or 8100/DPPX/SP disk operations, 8100/DPCX disk operations, and 3790 disk operations are transparent to JES3.
- Data stream provides compression of repeated characters outbound to the 8100 Information System under DPPX with DPPX/RJE or under DPPX/SP with DPPX/SP/RJE, the 3790 Communication System, the 8100/DPCX Information System, and to the 3770 Data Communication System.
- Data compaction is supported outbound to the 8100 Information System under DPPX with DPPX/RJE or under DPPX/SP with DPPX/SP/RJE, the 3790 Communication System, the 3776 mdls 3 and 4, the 3777 mdls 1, 3 and 4 of the 3770 Data Communication System, and the 8100/DPCX Information System.
- Single or multiple LUs (allowing multiple sessions) in a job entry station.
- Provides device setup for the 3790, the 8100 Information System under DPPX with DPPX/RJE or under DPPX/SP with DPPX/SP/RJE, and 8100/DPCX by use of the Peripheral Data Stream Information Record (PDIR).

### JES3 JOB MANAGEMENT

**INPUT SERVICE:** Input Service consists of two phases, each consisting of several non-resident modules:

- **READER PHASE:** Jobs are read from an input device and placed on a spool in batches.
- **CONTROL STATEMENT PROCESSING PHASE:** Jobs are read from the spool and processed.

**INTERPRETER SERVICE:** Interpreter service converts JCL statements to scheduler control blocks (SCBs) for use by the scheduler component. It also determines resource requirements and creates control blocks for use by JES3 main device scheduler (MDS) function. Every job must pass through the interpreter service before it can be scheduled for execution. This service comprises primarily the converter/interpreter (CI) dynamic support programs (DSPs).

The critical option in creating MDS control blocks is choosing the type of setup for JES3-managed devices. The setup options available with JES3 are:

1. **JOB SETUP:** The interpreter assigns each unique volume used throughout the job to a separate device, except where JCL explicitly indicates otherwise. This type of setup generally improves job turnaround at the expense of efficient device usage.
2. **HIGH WATERMARK SETUP:** The interpreter assigns a number of mountable devices (discounting permanently resident or reserved volumes) of each device type equal to the maximum number of volumes required in any single job step, unless the JCL explicitly indicates otherwise. This type of setup makes efficient use of devices, but may slow job turnaround due to dismounting and mounting of volumes.
3. **EXPLICIT SETUP:** The programmer specifies in a JES3 control statement which DD statements are (and which are not) to be setup.

The entire MDS function is optional, and additionally, the automatic setup options (job and high watermark) are separately selectable for DASD, tape and MSS virtual devices. These options are supplied as an installation default and can be overridden by JES3 control statements.

**DATA RESOURCE MANAGEMENT:** The main device scheduler (MDS) is a JES3 facility that controls the setup of resources (devices, volumes and data sets) associated with job execution on a processor. MDS services consist of volume fetching, allocation of data resources, volume mounting and verification, and deallocation of data resources. MDS services are part of the main scheduler element in normal job processing. Once a job is in execution, MDS services can also be invoked to process dynamic allocation requests.

**VOLUME FETCHING:** MDS determines a job's requirements for mountable volumes and issues operator messages to a tape or DASD library, requesting that the required volumes be 'fetched' to the computer area. As an installation option, after the issuing of these messages, MDS will either make the job immediately eligible for data

resource allocation, or will wait for operator 'go ahead' that the required volumes are available.

**DATA RESOURCE ALLOCATION:** Data resource allocation facilities fall into three overlapping categories: (1) Selection of a job relative to other jobs competing for resources; (2) selection of an eligible processor on which to attempt allocation; (3) assignment of devices, volumes and data sets to the selected job.

**SELECTING A JOB:** In general, jobs are considered for data resource allocation in priority order. The first job that can acquire data resources on an eligible processor will be granted those resources.

**SELECTING A PROCESSOR:** This choice of a 'setup' processor does not restrict the eligibility of that job to run on only that processor. In allocating devices, preference is given to devices that are shared by other processors eligible to execute the job. If all devices allocated to the job are shared by another processor, that processor also remains eligible to run the job.

**ALLOCATING DATA SETS, VOLUMES AND DEVICES:** JES3 provides data set integrity protection across processors in the JES3 complex in accordance with the JCL-specified data set disposition and dynamic allocation. This means that a job which holds exclusive access to a data set will prevent other jobs from allocating successfully.

**MDS** keeps track of the volume currently mounted on each device to minimize volume movement and attempts to satisfy further requests for the volume on the device where it is already mounted. MDS supports dynamic device reconfiguration (DDR) through the subsystem interface for JES3-managed tape and disk drives.

**VOLUME MOUNTING AND VERIFICATION:** Once all required resources have been assigned to a job, MDS issues 'mount' messages, requesting that the operator mount the first required volume on a specified device. MDS then verifies that each volume has been correctly mounted by reading its volume label.

Once all required volumes for a job have been mounted and verified, the job is passed to the generalized main scheduler (GMS) for execution processing selection.

**JES3 3850 MSS FEATURES INCLUDE:** Allocation to mounted volumes for non-specific requests for new, non-VSAM data sets.

Access to Mass Storage Volumes can be shared by all JES3 system processors physically connected to the same 3850.

Virtual units may be partitioned (fenced) for use by specific job class groups or dependent job networks.

Data reuse is encouraged (without access to 3850 controller tables).

JES3 algorithms attempt to equalize the amount of staging/destaging activity across Staging Drive Groups.

Multiple 3850s can be supported in a JES3 loosely coupled processor configuration, where each 3850 is attached to a separate host (as previously announced, one operating system can only be attached to one MSS).

**DEALLOCATION OF DATA RESOURCES:** During job execution, MDS or DYNAL is notified, as each step completes, to deallocate resources that are not required by subsequent steps of the job (early resource release). Data resources may also be returned in the midst of job step execution via the dynamic deallocation subsystem interface. Tape volumes used by a job can be optionally made available to other jobs at the end of volume. Finally, any resources still held at job end are released at that time. In all cases, returned resources immediately become available for assignment to other jobs.

**JOB SCHEDULING:** JES3 functions as a resource manager and job scheduler. The scheduling and selection of jobs for execution are major functions of the job entry subsystem. JES3 provides a unique set of these functions that are especially designed for a loosely coupled environment. These functions are generalized main scheduling, which determines which jobs should be scheduled to execute on a processor; deadline scheduling, increasing the priority of a job when it has been scheduled to make the best use of the available resources; and dependent job control which allows jobs to be executed in a specified order.

Selection of a job for a processor is based on the capacity of that processor to provide sufficient resources. JES3 supports pooled devices among processors to further control job/processor selection.

**GENERALIZED MAIN SCHEDULING:** Jobs are selected for execution by the generalized main scheduling (GMS) facility of JES3. Initialization parameters define the characteristics of each processor, job-selection mode criteria, and jobs categorized by class.

GMS uses the priority parameters specified at initialization to help select jobs for execution. The hierarchy of priorities is:

1. Processor priority (dynamic)
2. Job Class priority.

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

The priority aging feature allows JES3 to increase the priority of a job after it has been passed over for selection by JES3 an installation-specified number of times, because of a low priority relative to that of other jobs in the system. At an installation-specified priority barrier, JES3 will attempt to prevent lower priority jobs from capturing idle resources if they are known to be needed by a job at or above the barrier priority.

**DEADLINE SCHEDULING:** Deadline scheduling provides job scheduling algorithms that increase the probability of a job being scheduled by a specific time. The job's selection priority may be dynamically incremented as the job approaches its deadline for entering execution.

The deadline scheduling feature allows the installation to specify a time of day by which the job should be scheduled. If the job is not scheduled by this time, JES3 will increase the priority of the job at user-defined intervals until it is scheduled.

**DEPENDENT JOB CONTROL:** Dependent Job Control (DJC) allows jobs to be executed in a specific order. DJC is a function within the JES3 system that manages jobs that are dependent upon each other. Job dependencies may occur because of data dependencies; they may be defined so as to achieve better device utilization; or they may be defined so as to manage job streams.

**CONSOLES SUPPORTED - JES3 IN MVS/XA ENVIRONMENT:** The following consoles are supported by JES3 in an MVS/XA environment:

**Input/Output Consoles**

2250 mdl 3  
 3277 mdl 2  
 3278 mdls 2, -2A, -3, -4, -5  
 3279 mdls 2A, -2B, -3A, -3B

**Output only Consoles**

1403  
 3203 mdl 5  
 3211  
 3284 mdls 1, -2, -3  
 3286 mdls 1, -2  
 3287 (Supported as a 3284 mdl 3)  
 3288 mdl 2  
 3289 mdls 1, -2  
 4245 Printer mdl 1

**Remote Console**

2740

**RAS TOOLS - SERVICE AIDS**

**GENERALIZED TRACE FACILITY (GTF):** GTF is a component of MVS/SP V2. It is a service aid program that assists users in performing problem determination and diagnosis by tracing system events, user events, or both.

GTF is a system service that can be optionally started from an operator console. It executes as a system task in its own address space. When GTF is started, the user has the option of tracing internally in the GTF region or externally to a data set on an auxiliary device. The GTF output is trace records of any combination of:

- System events
- Specific incidences of one type of system event
- Defined events

The EDIT control statement of the AMDPRDMP service aid program provides the user with a selective data reduction capability for the trace data set and formats GTF trace records from a storage dump produced by STAND ALONE DUMP or the SYS1.DUMP data set. It runs as a problem program and can be invoked via JCL.

**SYSTEM TRACE:** The System Trace supported in MVS/SP V2 assists in the determination of system problems by providing an on-going record in main storage of significant software events. This trace replaces the System Trace available in earlier systems. The new trace utilizes the trace facilities available on the IBM processors operating in S/370 Extended Architecture mode. There are three types of entries in the trace table:

- Branch tracing (e.g., successful BALR, BASR, and BASSM instructions).
- Address Space ID tracing (execution of PROGRAM CALL, PROGRAM TRANSFER and SET SECONDARY ASID).
- Explicit software-initiated tracing of significant software events such as normal system interrupt and dispatch events (through execution of the TRACE instruction which creates an entry in the trace table).

The new system trace table consists of a queue of trace buffers per processor. These queues of trace buffers are maintained in a separate address space.

The MVS/SP V2 support consists of routines to initialize, manage and format the trace table. Support is also provided for the new tracing instruction to place explicit entries in the trace table. The TRACE ST operator command provides operational control of tracing. Through

this command, the operator can start or stop tracing, specify trace table size, and activate the branch tracing option.

Turning the tracing on or off activates or deactivates explicit and ASID tracing. Branch tracing can be activated only if tracing is already on.

New facilities are provided to merge and format the trace table entries during dump formatting. The TRACE control statement of the AMDPRDMP service aid program provides the user with a selective data reduction capability.

**AMASPZAP:** This service aid program assists authorized personnel to:

- Inspect and modify instructions and data in any load module that exists as a member of a partitioned data set.
- Inspect and modify data in a specific data record that exists in a direct access data set.
- Dump an entire data set, a specific member of a partitioned data set, or any portion of a data set residing on a direct access device.

**AMDSADMP:** This service aid is a macro instruction that allows the user to generate a stand-alone dump program that is specifically tailored to his needs. AMDSADMP can generate two types of dump programs: One high-speed, the other low-speed. The high-speed version can write the control registers, contents of real storage, and selected portions of paged out storage onto a tape volume in machine readable format. The low-speed version can write the control registers and the contents of real storage to a printer or tape volume in unblocked, printable format.

**AMDPRDMP:** This service aid program formats and prints dump data sets produced by AMDSADMP and other system programs. The dump data sets may contain dumped real or virtual storage.

Selective printing and formatting of the dump data sets is completely controlled by the user of AMDPRDMP via control statements.

The FORMAT control statement (with no operands) will now format only the control blocks for the current address spaces and those address spaces that are in error. The readability of the output from the SUMMARY control statement has been enhanced.

The user may use this information to determine what further formatting is required and proceed to get the required formatting by selecting the proper AMDPRDMP control statements.

An interface is provided whereby the user may write formatting modules to do additional (user-tailored) formatting during AMDPRDMP execution.

**ONLINE TEST EXECUTIVE PROGRAM - (OLTEP)**

Note: OLTEP is Class 2 System Control Program (SCP). A brief introduction is included with the RAS TOOLS - SERVICE AIDS information because it is expected that OLTEP will be utilized in an MVS/XA environment. A copy of this program will be supplied with MVS/SP V2.

The Online Test Executive Program (OLTEP) is a function designed to direct the selection, loading, and execution of the Online Test sections (OLTs) within the MVS/System Product V2 environment.

OLTEP with the related OLTs is designed to allow the testing of Input/Output Hardware components of a system, concurrent with the running of customer jobs.

The OLTEP/OLT system is designed for: Providing an interface with RETAIN/370 ... Diagnosing I/O errors ... Verifying I/O hardware repairs and Engineering Changes ... Exercising a device requiring dynamic adjustments ... Checking I/O hardware ... Preserving integrity of customer data while testing.

As a job under MVS/SP V2, it is called by standard Job Control Language and is under the control of the operating system at all times. It uses the facilities of MVS/SP V2 to accomplish the testing and competes with other jobs in the system for use of these facilities when running in a multiprogramming environment.

Definition of test to be run can be entered via console or non-console devices. FieldEngineering supplies the OLTs and device configuration information to the customer on magnetic tape or cards. The Field Engineer reformats and link edits the OLTs into a partitioned data set so that they can be used under the operating system. Device configuration information is required for each device to be tested by OLTEP/OLTs.

The OLTEP interface to RETAIN/370 provides the ability to transfer Diagnostic Test results to the RETAIN/370 center and allows the RETAIN/370 center to modify Diagnostic Test requests and options. The RETAIN/370 interface is provided in OLTEP via the console.

OLTEP must normally be executed as a V=R job. The Logout Analysis program operates in virtual storage. Since use of OLTEP is now restricted by APF, all OLTEP programs must be online in protected system libraries.

OLTEP must normally be executed in a minimum of 76K bytes. The logout analysis program will operate in the paged virtual storage.

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

MVS/System Product Version 2 Release 1.1 is designed to operate on IBM processors operating in IBM S/370 Extended Architecture mode.

**SOFTWARE REQUIREMENTS**

MVS/System Product Version 2 Release 1.1 is designed to be installed on an MVS Release 3.8-based system. MVS/System Product Version 2 Release 1.0 is a prerequisite and the Data Facility Product (DFP) (5665-284) Release 1.1 is a co-requisite. (DFP Release 1.0 is a prerequisite for DFP Release 1.1.)

See the section "Installation Considerations" for additional information.

**PLANNING INFORMATION**

**MIGRATION**

In order to facilitate the migration to MVS/XA, IBM has authorized the use of the components and macros (migration aids) listed below on a processor running MVS/370 in a location\* where MVS/SP Version 2 and DFP are licensed. Use of these migration aids is permitted on another processor running MVS/SP Version 1 Releases 3.0, 3.1, 3.2, or 3.3 in the location for a period of 18 months after shipment from IBM of the first MVS/SP Version 2 and DFP program products for that location.

- Linkage editor provided with DFP
- MVS/SP Version 2 IPCS
- MVS/SP Version 2 AMDPRDMP
- MVS/XA SYS1.MACLIB

Procedures for adding this linkage editor to an MVS/370 system will be provided in the DFP program directory. A jobstream will be provided with MVS/SP Version 2 Release 1.0 to create a library with IPCS and AMDPRDMP modules for use with MVS/370 systems.

These procedures will also update the MVS/SP Version 2 control data set and ensure that service applied by SMP to the MVS/SP Version 2 libraries will be applied to the libraries created for use with the MVS/370 system. Therefore, maintenance will be synchronized.

**PRODUCT CLASSIFICATION**

This product contains "restricted availability" material. On receipt of the product, material marked "Restricted information of IBM" must be kept in accordance with the terms and conditions outlined in the IBM Program Product license agreement.

**COMPATIBILITY AND CO-EXISTENCE**

Compatibility has been maintained between MVS/SP V2 and MVS/SP V1 R3 for user-written programs. With minor exceptions, programs that use published external interfaces<sup>1</sup> will continue to execute on MVS/SP V2. Details are included in the section titled "Source/Object Compatibility".

JCL and user data set formats are completely compatible between MVS/SP V2 and MVS/SP V1 R3. In addition, most of the operator messages and commands are unchanged.

MVS/SP V1 R3 SYSGEN decks and I/O Configuration Program (IOCP) decks can be used unchanged with MVS/SP V2. To take advantage of new functions in MVS/SP V2 however, some changes may be desirable.

Any installation performance specification (IPS) that is compatible with MVS/SP V1 R3 can also be used unchanged with MVS/SP V2. As always, the IPS should be reviewed to ensure that optimum tuning is achieved. Some changes to take advantage of new functions in MVS/SP V2 may be desirable.

Programs that use system-generated records (e.g., LOGREC, GTF, SMF records) should be evaluated for compatibility. New record types have been defined for LOGREC, GTF and SMF, and in some cases record formats have changed.

If the installation chooses to use new SMF data for accounting, the installation may have to change accounting procedures after MVS/SP V2 is installed. Installation procedures that account for virtual storage usage may need to be changed; some system control blocks that reside in the private area have been moved to extended virtual storage, and therefore, most programs will reflect a corresponding change in private area, virtual storage size. SMF collects additional information on virtual

**Note 1:** In the context of this information, published external interfaces refers to information in the following IBM SRLs:

*OS/VS2 MVS JCL (GC28-0692) OS/VS2 Supervisor Services and Macros (GC28-1114) ... OS/VS2 TSO Command Language Reference (GC28-0646) ... OS/VS2 Guide to Writing a Command Processor or Terminal Monitor Program (GC28-0648) ... OS/VS2 Data Management Macro Instructions (GC26-3873) ... OS/VS2 Access Method Services (GC26-3841) ... OS/VS Virtual Storage Access Method (VSAM) Programmers Guide (GC26-3838).*

storage usage both above and below 16 megabytes. Installations may want to take this information into account as users begin to implement programs that use storage above 16 megabytes.

**PROGRAM COMPATIBILITY USING 24-BIT ADDRESSING MODE AND 31-BIT ADDRESSING MODE:** Compatibility for MVS/370 problem programs is maintained in MVS/SP V2 by using the dual addressing mode capability of the S/370 Extended Architecture, which allows programs to run in either 24-bit addressing mode or 31-bit addressing mode. In 24-bit addressing mode, S/370 addressing architecture is applied. Only the low-order 24 bits of a word are used to address storage; the high-order eight bits are ignored. In 31-bit addressing mode, all but the high order bit of a word are used to address storage. For some instructions the high order bit of a word is used to indicate and save addressing mode.

In the absence of any address mode specification, MVS/SP V2 will default programs to 24-bit addressing mode. Programs will be loaded into the assigned address space in the area that is addressable with 24-bit addresses.

**SOURCE/OBJECT COMPATIBILITY**

**PROBLEM-STATE PROGRAMS** that execute on MVS/SP V1 R3 will continue to execute on MVS/SP V2 with the following exceptions:

- The SVC 33 interface has been modified for MVS/SP V2. PTFs are available on MVS/SP V1 and OS/VS2 MVS Release 3.8 for the IOHALT macro which generates the SVC 33 interface. With this PTF, the SVC 33 interface for MVS/SP V1 and OS/V2 MVS Release 3.8 is made compatible with MVS/SP V2, and programs may be re-assembled prior to migration to MVS/SP V2.
- The STOP,SYNCH option of the STATUS macro is no longer supported.
- With MVS/SP V2, when a program completes, any SPIE environments created by the program are deleted. This may create an incompatibility for MVS/SP V1 R3 programs which depend on the SPIE environment remaining in effect. Details will be supplied at general availability.

Programs that interrogate system control blocks or depend on internal system structure may require modifications. Detailed information concerning changes can be found in the *MVS/Extended Architecture Conversion Notebook (GC28-1143)*.

**SOURCE CODE COMPATIBILITY** is maintained between MVS/SP V1 R3 and MVS/SP V2 for published external interfaces. There are a set of macros which have two levels of expansion, an MVS/SP V1 R3 level and an MVS/SP V2 level. Detailed information concerning this can be found in the *MVS/Extended Architecture Conversion Notebook (GC28-1143)*.

**DEVICE SUPPORT:** The devices supported by MVS/SP V2 are the same as those supported by MVS/SP V1 R3.0 with the exception that MVS/SP V2 does not support the following devices. For completeness, the following list includes devices not supported because they cannot be attached to the IBM processors operating in S/370 Extended Architecture mode.

Device	Control Unit
• Disk, Fixed Head Storage Module:	
2305 model I Fixed Head Storage Module	2775
2314 Disk Storage	2314, 2844
2319 Disk Storage	2314
• Magnetic Tape:	
2401 Magnetic Tape	2803, 2804
2402 Magnetic Tape	2803, 2804
2403 Magnetic Tape	2803, 2804
2404 Magnetic Tape	2803, 2804
2420 Magnetic Tape	2803
3410/3411 Magnetic Tape	
• Card I/O and Printers:	
1053 mdl 4	2848
1443 N01 Printer	
2520 Card Reader/Punch	
• Cartridge Readers:	
2495 Magnetic Tape Cartridge Reader	
• Transmission Controllers:	
2702 Transmission Control	
2703 Transmission Control	
2715 Transmission Control	
• OCR/MICR:	
1287 Optical Reader	
1288 Optical Page Reader	
1419 MICR Reader/Sorter	
3886 Optical Character Reader	
3895 Document Reader/Inscriber	

PROGRAM PRODUCTS

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

- **Consoles:**
  - 1052-7 Console-Printer/Keyboard (2150 Control Unit)
  - 2150 Console
  - 2250 mdl 1
  - 3210 Console-Printer/Keyboard
  - 3213 Console-Printer
  - 3215 Console-Printer/Keyboard
- **Systems:**
  - 1060 Data Communications System 1061
  - 2790 Data Communications System (local) 2715
  - 3670 Brokerage Branch Office System
- **Other:**
  - 2816 Tape Switch Unit 2803
  - 3540 Diskette Input/Output unit
  - 7770 Audio Response Unit

**CO-EXISTENCE OF MVS/SP V2 AND MVS/SP V1  
IN MULTI-SYSTEM ENVIRONMENTS**

IBM anticipates that many customers will have both MVS/370 and MVS/XA systems in the same data center. Therefore, co-existence in a loosely coupled environment between these systems is important. The following considerations apply.

- **JES2**

Coexistence in a Multi-Access Spool environment can only occur between processors using the same level of the JES2 component. The level of JES2 shipped in MVS/SP-JES2 1.3.0, 1.3.1, and 1.3.2 and MVS/SP-JES2 2.1.0 is the same level, and will work in both an MVS/370 and an MVS/XA environment. Also, the level of JES2 shipped with MVS/SP-JES2 1.3.3 and MVS/SP-JES2 2.1.1 is the same level, and will work in both an MVS/370 and an MVS/XA environment.
- **JES3**

Coexistence in a loosely-coupled JES3 complex can only occur between processors using the same level of the JES3 component. The level of JES3 shipped in MVS/SP-JES3 1.3.1, 1.3.2, 1.3.3, and MVS/SP-JES3 2.1.0 and 2.1.1 is the same level and will work in both an MVS/370 and MVS/XA environment.
- **Data sharing with Global Resource Serialization**

The Global Resource Serialization component of MVS/SP 2.1.1 is both upward and downward compatible with respect to data sharing. That is, data may be shared between systems running MVS/SP 2.1.1 and systems running either MVS/SP 2.1.0, or MVS/SP Version 1 Release 3 at all Modification Levels.

The Reserve/DEQ (dequeue) functions may also be used between MVS/370 and MVS/XA systems.

- **MSS**

The MSS may be shared between MVS/370 and MVS/XA. MSSE with the MVS/XA Facility is required on the MVS/XA system.

**VIRTUAL STORAGE CONSIDERATIONS**

MVS/SP V2 provides a base for eliminating virtual storage constraint. By moving system programs and data areas above 16 megabytes MVS/SP V2 makes more system or private area virtual storage below 16 megabytes available to other subsystems and new applications, or for current application growth. System programs and data areas have been moved from the nucleus, PLPA, SQA and LSQA. In addition, as users start to implement programs which utilize 31-bit virtual addresses, those programs will not be constrained by the 16 megabyte virtual storage limit.

With MVS/SP 2.1.0, the base control program (BCP) is providing the following reductions in the use of virtual storage below 16 megabytes:

- A significant amount of nucleus code and portions of PLPA are moved above 16 megabytes, yielding a projected savings of approximately 1.3-1.6 megabytes.
- Additional savings of 4K bytes per megabyte of configured real storage are realized by relocating the page frame table above the first 16 megabytes of virtual storage. For example, on a 32 megabyte system, 128K bytes of virtual storage savings will be realized.
- Further savings are achieved by moving many control blocks and data areas residing in SQA and LSQA to areas above 16 megabytes. The amount of savings realized in this area is heavily dependent on the installation's environment and is therefore variable.

MVS/SP 2.1.1 Approximately 400K bytes of system modules and data areas have been moved from the virtual storage area below 16 megabytes, to the area above the first 16 megabytes.

This constraint relief was achieved by modifying the Allocation component and portions of the Scheduler Work Area manager to

execute in the address range above 16 megabytes. In addition, the creation of a new SMF address space has allowed removal of the SMF buffers from common storage making additional virtual storage below 16 megabytes available to system and user applications. For each SMF buffer defined by the installation, 4,096 bytes are removed from Common storage and reside in the private area of the new SMF address space.

The virtual storage constraint relief in MVS/SP 2.1.1 is in addition to that in MVS/SP 2.1.0.

The total amount of virtual storage savings below 16 megabytes that an installation may realize is dependent upon many environmental factors, such as hardware configuration, type of workload, and other software products installed. Therefore, no assurance can be given that an individual installation will achieve the projected savings or a specified minimum amount of savings.

The segment boundary between the common area and the private area is a megabyte boundary on MVS/XA. This causes a 'rounding' of the common area to a full megabyte. For example, if the nucleus, LPA, SQA, and CSA areas require 8.5 megabytes below 16 megabytes, MVS/SP V2 will set aside an additional half-megabyte in the common area in order to 'round-up' this area to a full megabyte boundary, (i.e., 9 megabytes). It is therefore important that the installation take care when selecting sizes for LPA, SQA, and CSA at system initialization, so as to optimize the use of virtual storage. The virtual storage savings enumerated above do not take this common area rounding into consideration.

**INSTALLATION CONSIDERATIONS**

**MVS/SP 2.1.1**

MVS/SP 2.1.1 must be installed, with its co-requisite licensed program, Data Facility Product (DFP) Release 1.1 (5665-284), on distribution libraries which are at MVS/SP 2.1.0 level.

The following items are required for installation and maintenance:

- System Maintenance Program (SMP) -- either:
  - System Maintenance Program (SMP) Release 4. The maintenance level of this program which is current at the time of availability must be installed, or,
  - System Maintenance Program/Extended (SMP/E) (5668-949) licensed program.
- Assembler H Version 2 licensed program.
- The Linkage Editor which is available with the Data Facility Product licensed program must be used to perform SYSGEN and to apply maintenance.

A SYSGEN is not required for MVS/SP 2.1.1. Review the description of the co-requisite licensed program (MVS/XA DFP 1.1) for cases where a SYSGEN is required.

**MVS/SP 2.1.1 - JES2 Installation Considerations:** The JES2 component of MVS/SP-JES2 2.1.1 is functionally equivalent to the JES2 component of MVS/SP-JES2 1.3.3. Customers currently at that level of JES2 need not re-install it. However, if the customer wishes to remain at that level of JES2 in an MVS/XA environment, the MVS/SP 2.1.1 level of the Base Control Program must be installed.

MVS/SP-JES2 2.1.1 requires a JES2 cold start.

The Base Control Program in MVS/SP 2.1.1 is compatible with the level of JES2 which was shipped with MVS/SP-JES2 2.1.0 and MVS/SP-JES2 1.3.0. Thus, customers at that level of JES2 may install the new function in the Base Control Program of MVS/SP 2.1.1, without changing their JES2 component.

**MVS/SP 2.1.1 - JES3 Installation Considerations:** The JES3 component of MVS/SP-JES3 2.1.1 is functionally equivalent to the JES3 component of MVS/SP-JES3 2.1.0. (The same level of JES3 was also shipped with MVS/SP-JES3 1.3.1, 1.3.2, and 1.3.3). Customers currently at that level of JES3 need not re-install it. Thus, customers may install the new function in the Base Control Program of MVS/SP 2.1.1, without changing their JES3 component. This level of JES3 component is the only level which operates in an MVS/SP V2 environment.

**MVS/SP 2.1.0**

MVS/SP V2 must be installed, with its co-requisite product Data Facility Product (DFP) Release 1.0 (5665-284) licensed program on distribution libraries which are at a minimum at OS/VS2 MVS Release 3.8 level.

The Input/Output Configuration Program (IOCP) must be executed and a SYSGEN must be performed to obtain an operational MVS/XA system.

The distribution libraries on which the installation is performed may be the user's current OS/VS2 MVS Release 3.8 distribution libraries, or the latest version of OS/VS2 MVS Release 3.8 obtainable from PID.

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

Installation, SYSGEN, and subsequent maintenance may be performed under the control of a supported MVS/370 Release or MVS/SP V2 System.

Assembler H Version 2 must be installed on the operational system that will control the installation, SYSGEN and subsequent maintenance of MVS/SP V2. See information above concerning programs required for installation and maintenance.

In addition, if installation, SYSGEN and maintenance are performed under the control of MVS/370, the SYSGEN must be performed by a system with the linkage editor available with DFP installed.

MVS/SP V2 replaces and, therefore, completely deletes the BCP portion of OS/VS2 MVS Release 3.8. The CDS and ACDS for the BCP is zeroed and therefore any of the following offerings that were installed will also be deleted from the installation's distribution libraries.

- MVS Processor Support 2 selectable unit (5752-VS2)
- MVS/System Extensions program product (5740-XE1)
- MVS/System Product Version 1 (5740-XY5 and 5740-XYN) (BCP Component)
- TSO Command Package (Selectable Unit 11) (5740-XT6)
- TSO Extensions for MVS/370 (5665-285)
- Measurement Facility 1 (MF1)
- Display Exception Monitoring Facility (DEMF)

MVS/SP V2 contains all of the TSO functions available in OS/VS2 MVS Release 3.8 with the exception of TSO TEST. The TSO Extensions for MVS/XA must be installed to obtain TSO TEST functions. Significant modifications have been made to TSO TEST to allow the testing of problem state programs which execute and reference data areas using 31-bit addresses.

**MVS/SP 2.1.0 - JES2 Installation Considerations:** The JES2 component supplied with MVS/SP 2.1.0 is functionally equivalent to the JES2 component supplied with MVS/SP 1.3.0.

**MVS/SP 2.1.0 - JES3 Installation Considerations:** The JES3 component supplied with MVS/SP 2.1.0 is functionally equivalent to the JES3 component supplied with MVS/SP 1.3.1.

**SYSTEM CONFIGURATION CONSIDERATIONS**

MVS/SP V2 executes in environments which provide:

- IBM processor operating in S/370 Extended Architecture mode.
- Main storage requirement - the following areas of main storage are required (each item is a separate (additional) requirement):
  - A 256K block of contiguous error free area so that NIP can be loaded (and complete its execution).
  - 8K contiguous error free area for the DAT-off Nucleus.
  - Two contiguous error free frames (4K each) for each segment table.
  - I/O measurements require a block containing 32 bytes for each generated tape and DASD device and for each additional device being measured by RMF. The optional Channel Measurement Block (CMB) system parameter specifies which device classes, in addition to tape and DASD, RMF is to measure. Execution may continue with possibly degraded system performance if the space is not available for at least the tape and DASD entries.
- Software configuration: Data Facility Product (DFP) is a corequisite.
- Minimum I/O configuration: In addition to requirements for operational maintainability of the IBM processors operating in S/370 Extended Architecture mode (see below) and sufficient I/O to satisfy user application requirements, the following is required:
  - Consoles - A full-capability console device (in addition to the system console) is needed to satisfy the requirements of the control program. Supported console device(s) are identified in the Multiple Console Support description earlier in this section.
  - DASD - Six 3330/3333 DASD spindles. This requirement may be satisfied by substituting 3340, 3350, 3375, or 3380 spindles where appropriate.
    - A SYSIN device (card reader or tape).
    - A SYSOUT printer (printer or tape).
    - A SYSOUT punch (punch or tape).
    - A 9-track 1600 bpi or 6250 bpi tape drive. Distribution of MVS/SP V2, component releases, and PTFs are made on a 9-track 1600 bpi tape or 6250 bpi tape; therefore, a 9-track tape on the system (or access to another system meeting the minimum configuration requirements and having a 9-track tape at the customer installation is required for system generation and maintenance).
- If ACF/TCAM, ACF/VTAM, or BTAM/SP is specified, at least one transmission control unit or communications controller is required

for operation of remote terminals (ACF/VTAM requires a 3704/3705-1/3705-II in network control mode).

**FEATURE SUPPORT**

**FEATURES SUPPORTED, IBM PROCESSORS OPERATING IN SYSTEM/370 EXTENDED ARCHITECTURE MODE:** The following features are supported. Other features, not listed, have no specific programming support; their existence is ignored by the control program. Attempts to use the system with unsupported features may cause unpredictable results. For brevity this list does not include those basic features or control units which are required to connect a supported device.

Features supported (may be model dependent):

- Real storage:
  - 8,388,608 bytes
  - 16,777,216 bytes
  - 25,165,824 bytes
  - 33,554,432 bytes
  - 50,331,648 bytes
  - 67,108,864 bytes
- Channels:
  - 6, 8, 12, 16, 24 or 48 channels
  - Channel-to-Channel Adapter (on 3082 and 4381)
    - First, feature #1850
    - Second (#1850 required), feature #1851
    - Third, feature #1852
    - Fourth (#1852 required), feature #1853
- Required Consoles:
  - Integrated Service Support Console. (The integrated Service Support Console is a part of the IBM processors operating in S/370 Extended Architecture mode.
  - 3278 Display Console mdl 2A as a system console.
  - 3279 Display Console mdl 2C as a system console.
  - A full-capability console device (in addition to the system console) is needed to satisfy the requirements of the control program. Supported console device(s) are identified in the Multiple Console Support description earlier in this section.
- Requirements for Operational Maintainability of the IBM processors operating in S/370 Extended Architecture mode. See the Machine pages for a complete statement of the requirements.

**Features Supported, I/O Devices:** The following I/O Device Features are supported when these devices are attached locally:

- 1052 Printer - Keyboard (Note 1)
- 1403 Printer (mdls 2, 7, N1):
  - Supported: #8640 - Universal Character Set  
#8641 - Universal Character Set
- 2250 Display Unit (mdl 3)
  - Required: #2840 Display Control (mdl 2)
- 2305 Fixed Head Storage (mdl 2):
  - Required: #2835 Storage Control
- 2501 Card Reader (mdls B1, B2):
  - Supported: #1531 - Card Image
- 2540 Card Read Punch (mdl 1):
  - Supported: #1531 - Card Image
- 2821 Control Unit (mdls 1, 2, 3, 5, 6):
  - Supported: #1990 - Column Binary (for problem program use only)  
#8637-8639 - Universal Character Set Adapter
- 3203 Printer (mdl 5)
- 3211 Printer (mdl 1):
  - Required: 3811 Printer Control Unit
  - Supported: #5554 - 18 Additional Print Positions
- 3251 Display Station
  - Required: IBM 3255 Display Control  
IBM 3258 Control Unit
- 3275 Display Station (mdls 1, 2) (Note 1)
- 3276 Display Station (mdls 1, 2) (Note 1)
- 3277 Display Station (mdls 1, 2) (Note 2)
  - Supported: #6350 - Selector Light-Pen  
Program Function Keys (Dependent on specified keyboard)  
#1090 - Audible Alarm  
#4999 - Operator Identification Card Reader  
#4690 - Keyboard Numeric Lock

PROGRAM PRODUCTS

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

3278 Display Station (mdls 1, 2, 2A, 3, 4, 5) (Note 2)  
Supported: Features equivalent to 3277. (See above).  
#5781, 5782 - Programmed Symbols (mdls 1, 2, 3, 4, 5).

3279 Display Station (mdls 2A, 2B, 3A, 3B) (Note 2)  
Supported: Features equivalent to 3277. (See above).  
#5781, 5782 - Programmed Symbols (mdls 2B, 3B).

3284 Printer (mdls 1, 2)

3286 Printer (mdls 1, 2)

3288 Printer (mdl 2) (supported as a 3286-2)

3330 Disk Storage (mdls 1, 2, 11):  
Required: 3333 Disk Storage and Control, or 3830 Storage Control, or 3880 Storage Control (mdls 1, 2 or D11)

3333 Disk Storage and Control (mdls 1, 11):  
Required: 3830 Storage Control, or 3880 Storage Control (mdl 1, 2 or D11)  
Supported: #8150 - String Switch

3340 Direct Access Storage (mdls A2, B1, B2):  
Required: 3340 mdl A2 and 3830 Storage Control, or 3880 Storage Control (mdl 1 or 2)  
Supported: #6201, 6202 - Rotational Position Sensing  
#8150 - String Switch

3344 Direct Access Storage (mdls B2, B2F)  
Required: 3340 mdl A2

3350 Direct Access Storage Facility (mdls A2, A2F, B2, B2F, C2, C2F):  
Required: 3830 Storage Control, or 3880 Storage Control (mdls 1, 2 or D11)  
Supported: #8150 - String Switch

3375 Direct Access Storage (mdls A1, B1, D1)  
Supported: #8150 - String Switch  
Required: 3880 Storage Control mdl 1 or 2

3380 Direct Access Storage (mdls A4, AA4, and B4):  
Required: 3880 Storage Control mdl 2, 3, B13 or D13

3420 Magnetic Tape Unit (mdls 3, 5, 7):  
Supported: #3550 - Dual Density  
#6407 - 7-track  
#6631 - Single Density

3420 Magnetic Tape Unit (mdls 4, 6, 8):  
Supported: #6420 - 6250 Density  
#6425 - 6250/1600 Density

3505 Card Reader (mdls B1, B2):  
Supported: #5450 - Optical Mark Read  
#6555 - Selective Stacker

3525 Card Punch (mdls P1, P2, P3):  
Supported: #1533 - Card Read  
#5272 - Multiple Card Print  
#8338 - Two-Line Card Print

3800 Printing Subsystem (mdl 1):  
Supported: #1490 - Burster-Trimmed-Stacker  
#5401 - 127 Character Generation Storage Positions  
#8170 - Two-Channel Switch

3803 Tape Control (mdl 1):  
Supported: #1792 - Two-Control Switch  
#1793 - Three-Control Switch  
#1794 - Four-Control Switch  
#3551 - Dual Density  
#6408 - Seven-Track  
#9071 - Communicator 1-2  
#9073 - Communicator 3-4

3803 Tape Control (mdl 2):  
Supported: #1792 - Two-Control Switch  
#1793 - Three-Control Switch  
#1794 - Four-Control Switch  
#5310 - Nine-Track NRZI  
#6320 - Seven-Track NRZI  
#8100 - Two-Channel Switch  
#9071 - Communicator 1-2  
#9073 - Communicator 3-4

3811 Printer Control Unit (mdls 1, 2):  
Supported: #5553 - Additional (18) Print Positions

3830 Storage Control (mdl 2):  
Supported: #8170 - Two-Channel Switch  
#8171 - Two-Channel Switch  
Additional

3830 Storage Control (mdl 3):  
Supported: #8170 - Two-Channel Switch  
#8171 - Two-Channel Switch,  
Additional

3851 Mass Storage Facility (mdls A1, A2, A3, A4, B1, B2, B3, B4) (Note 3)  
Supported: #8171, 8172 - Two-Channel switch, additional  
#4901, 4902 - MSC Port

3880 Storage Control (mdls 1, 2, 3)  
Supported: #8170 - Two-Channel Switch Pair  
#8171 - Two-Channel Switch Pair, Additional  
#8172 - Eight-Channel Switch feature (requires #8170 and #8171)  
#6550 - Speed Matching Buffer for 3380  
#6560 - Speed Matching Buffer for 3375

3880 Storage Control (mdls B13, D13)  
Supported: #8170 - Two-Channel Switch Pair  
#8171 - Two-Channel Switch Pair, Additional

3880 Storage Control (mdl D11)  
Supported: #8170 - Two-Channel Switch Pair  
#8171 - Two-Channel Switch Pair, Additional

3890 Document Processor (mdls A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B6):  
Supported: #5111 - Microfilming  
#4666 - Item Number/Endorsing

3890 Document Processor (mdls E3, E4, E5, E6, F3, F4, F5, F6):  
Supported: #4667 - Item Number/Endorsing

Note 1: These devices are supported by one or more of the following licensed programs:

ACF/VTAM, ACF/TCAM, BTAM/SP

(Refer to description of those licensed programs to determine the features supported).

Note 2: These devices are supported as operator consoles and by one or more of the following licensed programs:

ACF/VTAM, ACF/TCAM, BTAM/SP

(Refer to description of those licensed programs to determine the features supported).

Note 3: The Licensed Program Mass Storage Systems Extension (MSSE) with the MVS/XA Facility is a prerequisite for the attachment of the 3850 Mass Storage System to an IBM 3081 Processor operating in S/370 Extended Architecture mode.

**DATA MANAGEMENT CONSIDERATIONS**

In MVS/XA, most data management functions are provided by licensed programs which are not part of MVS/SP V2. Examples of data management support include:

- Data Facility Product (DFP) (5665-284) licensed program.
- Advanced Communication Function/Virtual Telecommunications Access Method (ACF/VTAM) Version 2 (5662-280) licensed program.
- Advanced Communication Function/Telecommunications Access Method (ACF/TCAM) Version 1 Release 4 (5735-RC3) licensed program.
- Basic Telecommunications Access Method/System Product (BTAM/SP) (5665-279) licensed program.
- Execute Channel Program (EXCP) support which is contained within MVS/SP V2.
- Specialized access methods which are user-supplied or provided with a licensed program.

For those items mentioned above which are licensed programs, the Program Products section should be reviewed for additional information.



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PP 5665-291.20

Nov 83

PROGRAM PRODUCTS

**MVS/SP-JES2 V2.1, MVS/SP-JES3 V2.1 (cont'd)**

GENERAL DOCUMENTATION  
(available from Mechanicsburg)

*MVS/System Product Version 2 General Information Manual  
(GC28-1118) ... MVS/Extended Architecture Conversion Notebook  
(GC28-1143).*

**RPQS ACCEPTED:** No

**MVS SYSTEM INTEGRITY APPLIES:** Yes



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PP 5665-294.1  
Jun 83

PROGRAM PRODUCTS

**LIBRARY/MVS  
RELEASE 1  
5665-294**

**PURPOSE**

Library/MVS is a companion data base to the dialog-oriented program product Information/Library which provides search and retrieval functions for this data base.

Library/MVS contains MVS system reference and program logic information. This information reflects the structure of the publications and consists of titles, abstracts, tables of contents, headings, indexes and full text for selected manuals (such as *OS/VS Message Library: VS2 System Messages*).

For further information refer to Information/Library, Program Number 5665-277.

**MVS SYSTEM INTEGRITY APPLIES: Yes**

**RPQs ACCEPTED: No**



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PP 5665-294.2

Jun 83

PROGRAM PRODUCTS

**LIBRARY/MVS  
RELEASE 2 Modification Level 0  
5665-294**

**PURPOSE**

Library/MVS is a companion data base to the dialog-oriented program product Information/Library which provides search and retrieval functions for this data base.

Library/MVS contains MVS and MVS/XA system reference and program logic information. This information reflects the structure of the publications and consists of titles, abstracts, tables of contents, headings, indexes and full text for certain manuals (such as *Messages and Codes* manuals).

For further information refer to Information/Library, Program Number 5665-277.

**MVS SYSTEM INTEGRITY APPLIES: Yes**

**RPQs ACCEPTED: No**

## MVS/370 DATA FACILITY PRODUCT

### RELEASE 1

5665-295

#### PURPOSE

MVS/370 Data Facility Product (DFP), a program product similar to the Data Facility Product previously announced for the MVS/XA environment, is now announced for MVS/370. MVS/370 DFP is a new program product containing new functions along with data management, device support, program library management, and utility functions for the OS/VS2 MVS Release 3.8 environment with MVS/System Product Version 1 Release 3 installed.

In addition to new functions, MVS/370 DFP incorporates the functions previously available to OS/VS2 MVS users via the following program products:

- Data Facility Device Support (DFDS) Release 1 Modification Levels 1 through 6 (5740-AM7).
- Sequential Access Method - Extended (SAM-E) Release 1 (5740-AM3).
- Data Facility Extended Function (DFEF) Release 1 (5740-XYQ).
- Offline IBM 3800 Utility program product (5748-UT2).
- Access Method Services Cryptographic Option (5740-AM8).

MVS/370 DFP will also include prerequisite program service and 3800 mdl 1 enhancements.

MVS/370 DFP program product includes the following new functions:

- Tape labels and tape file structure support for ISO 1001-1979, ANSI X3.27-1978 and Federal Information Processing Standard (FIPS) 79.
- VSAM global resource serialization.
- Tape OPEN/EOV installation exits.
- Aids for migration to MVS/XA:
  - Linkage editor.
  - AMBLIST.

#### DESCRIPTION

**Tape Support for ISO/ANSI/FIPS Version 3:** This support includes the organization, format and processing of labels designed according to the specifications of the following industry standards as understood by IBM as of March 1983:

- ISO 1001-1979, level 4.
- ANSI X3.27-1978, level 4.
- Federal Information Processing Standard (FIPS) 79.

**Extended Access Control:** If RACF is not active for tape, volume and data set access control is available for ISO/ANSI/FIPS Version 3 tape volumes, as provided for in ISO/ANSI/FIPS Version 3. When RACF is active for tape, RACF volume access control prevails. Authorization for ISO/ANSI/FIPS tape accessibility is controlled by the volume/file installation exits or by RACF installation exits.

**Label Validation:** ISO/ANSI/FIPS Version 3 tape labels will be validated. User-controlled validation may be accomplished through the provisions of an installation exit.

**Generation Data Groups:** A generation data set will be accommodated on an ISO/ANSI/FIPS Version 3 volume.

**Spanned Record Format:** Spanned Records will be supported on an ISO/ANSI/FIPS Version 3 volume.

**Extended Logical Record Interface:** The logical record interface (LRI) for spanned records has been extended to accommodate up to a 16 megabyte logical record for ISO/ANSI/FIPS Version 3 labeled files. The actual length of logical records to be processed is dependent on the amount of virtual storage that can be acquired.

**Volume Initialization:** The IEHINITT utility will create a Version 3 volume header label (VOL1) for ISO/ANSI/FIPS volume initialization.

**Tape Open/EOV Installation Exit:** When extending to another tape volume, a DCB exit allows a user program to indicate that a specific volume is to be mounted instead of a scratch volume. If a specific volume is to be mounted, the user program returns the volume serial number. Another DCB exit allows an authorized user program to indicate acceptance or rejection of the tape.

**Performance:** With identical hardware and software configurations and MVS/SP Version 1 Release 3.0 environment, MVS/370 DFP does not show a significant change in performance when compared to the same environment with DFDS Release 1 Modification Levels 1 through 6, DFEF Release 1, SAM-E, Offline IBM 3800 Utility and Access Method Services Cryptographic Option installed.

#### DATA MANAGEMENT

Data management controls operations associated with input/output devices, such as allocation of space on volumes, storing, naming, and cataloging data sets, and movement of data between real and auxiliary storage.

**IMPROVED VTOC ACCESS** via an INDEX to the VTOC: Indexed VTOCs are supported by MVS/370 DFP. The support is functionally equivalent to the support introduced to OS/VS2 MVS Release 3.8 users with the Data Facility Device Support (DFDS) program product, and is available in MVS/XA Data Facility Product program product (5665-284) (MVS/XA DFP).

The VTOC is composed of unblocked records with DASD keys and is accessed primarily in two ways: Via DADSM routines to perform global DASD space management functions such as allocating and scratching data sets, and via EXCP and the sequential access method (SAM) for reading and writing DSCBs, or portions of the VTOC.

VTOC access is improved by using an index structure for the VTOC, and by providing a common VTOC access facility (CVAF) to support the index structure. This structure includes space maps which replace the Format 5 DSCBs of the OS/VS2 MVS VTOC and are used to manage VTOC and VTOC index space.

Following are some key characteristics of volumes with a VTOC index:

- The VTOC index is optional on any MVS/370 DFP-supported DASD. For additional information, see "Migration".
- Volumes with and without the VTOC index can coexist on the same system and are supported by the DADSM routines in a manner transparent to the user.
- The VTOC can still be accessed via EXCP and SAM, except that data identifying a volume's available space has been moved from the Format 5 DSCB to space maps in the index. Users are encouraged to use CVAF for all access to the VTOC on volumes both with and without the VTOC index. See "Indexed VTOC Compatibility".
- If CVAF detects an error in the index structure, CVAF marks the index as invalid, and existing DADSM routines restore the VTOC to non-indexed format so that the volume can be used while the index error is being analyzed. The user's programs will not be aware of the error, the volume continues to be available for use, and the operator is notified.
- The Device Support Facility, a Class 2 System Control Program, may be used:
  - To create a VTOC with or without an index when a volume is initialized.
  - To build an index over an existing volume's VTOC.
  - To rebuild the index as desired.
  - To convert the VTOC to non-indexed for running on certain systems, see "Migration".
- The VTOC index can be either RACF- or password-protected, in which case a user must be RACF-authorized or must supply a password if the index is to be scratched, renamed, or opened for output. The VTOC can be RACF-protected, in which case the user must be RACF-authorized to open the VTOC for output.

**INTEGRATED CATALOG FACILITY:** The integrated catalog facility program included in MVS/370 DFP is a functional replacement for VSAM master catalogs, VSAM user catalogs, and OS control volumes. It was introduced to the OS/VS2 MVS Release 3.8 users with the Data Facility Extended Function program product, and is available in MVS/XA Data Facility Product.

The integrated catalog facility defines two catalog data sets: The basic catalog structure data set and the VSAM volume data set. These data sets replace the VSAM or CVOL catalog data sets.

The basic catalog structure contains volume information for both VSAM and non-VSAM data sets. The basic catalog structure may be located on any volume and multiple basic catalog structure data sets may be defined on a single volume.

A VSAM volume data set contains the data set characteristics for VSAM format data that resides on a given volume. There is one VSAM volume data set on each volume that contains VSAM format data controlled by the integrated catalog facility.

The integrated catalog facility program is designed to reduce the potential of damaging the catalog and limits the scope of damage in the event of system failure during catalog processing.

The integrated catalog facility program also validity checks critical data during catalog processing.

VSAM catalog ownership of volumes is eliminated for data sets cataloged by the integrated catalog facility. Data sets on any volume may be cataloged in any basic catalog structure and multiple basic catalog structure data sets may be defined on a single volume.

Users of the Resource Access Control Facility (RACF) are restricted from protecting identically-named VSAM data sets which are cataloged in separate basic catalog structures residing on the same volume.

## MVS/370 DFP R1 (cont'd)

**Backup and Recovery Facilities:** The catalog backup and recovery facilities allow the user to define simple and consistent recovery procedures. The integrated catalog facility supports catalog recovery without the RECOVERABLE attribute of VSAM catalogs. The attributes of a VSAM data set, including its physical location on direct access storage, are maintained in a VSAM volume data set on the same volume as the VSAM data set. This allows periodic EXPORTs of the basic catalog structure, and a subsequent IMPORT in the event of failure of a basic catalog structure without concern for catalog and VSAM data set synchronization.

**VSAM Space Management:** All direct access storage space management for VSAM data sets cataloged by the integrated catalog facility is performed by the system direct access device space management (DADSM) function. Integrated catalog facility does not perform sub-allocation; hence, no data spaces are associated with an integrated catalog facility catalog and all VSAM data sets under its domain will appear as UNIQUE-like VSAM data sets. Functional equivalency to the VSAM catalog is maintained by removing the restrictions associated with the current UNIQUE data sets.

All integrated catalog facility catalog records are VSAM logical records. This allows a considerable savings of direct access storage space. For most non-VSAM data sets, only 20 percent of the space required by the current VSAM catalog will be used by the integrated catalog facility.

**DADSM Installation Exits:** Optional pre- and post-processing installation exits are provided for the allocate, extend, scratch, partial release, and rename functions of DADSM. These exits allow an installation to reject, limit, audit, or simply monitor DADSM requests involving DASD space utilization.

**System Catalog:** Either the integrated catalog facility master catalog or the VSAM master catalog may be the system catalog. Besides optionally containing pointers to integrated catalog facility and/or VSAM user catalogs, it may also contain pointers to OS control volume catalogs. JCL may be used to designate specific catalogs to be used for a job or job step.

A message at IPL time prompts the system operator for the name of an alternate system catalog, enabling the system to be IPLed in the event that the regular, or default, system catalog is unavailable.

### ACCESS METHODS

**VIRTUAL STORAGE ACCESS METHOD - VSAM:** DFP VSAM is an access method designed to operate with direct access storage devices and to support both direct and sequential processing by means of either an index key (keyed accessing) or relative byte address (addressed accessing). (Relative byte address refers to the displacement of a stored record or control interval, from the beginning of the storage space allocated to the data set to which it belongs.)

Three types of data sets are provided:

1. Key-sequenced data sets, which are ordered by a key field in the data record.
2. Entry-sequenced data sets, which are ordered by the sequence in which the records were loaded.
3. Relative record data sets, which are ordered by record number.

Keyed accessing is used to access key-sequenced or relative record data sets, and addressed accessing is used to access both key-sequenced and entry-sequenced data sets. Key-sequenced and entry-sequenced data sets may be either fixed- or variable-length records; relative record data sets contain fixed-length records only.

VSAM is composed of two major elements: A data organization which minimizes data movement and which is suitable for data base applications; and routines for creating data sets in the VSAM organization, adding and deleting records, and performing other data management functions.

The data management functions supplied by VSAM include:

- Opening data sets.
- Processing records by index key.
- Processing records by address.
- Closing data sets.
- End of volume processing.
- Cataloging VSAM data sets.
- Data set password protection.
- Data set encryption/decryption.
- Allocating space.
- Checkpoint/restart processing.

**VSAM Global Resource Serialization:** VSAM has been enhanced for users of global resource serialization. Provisions are available which allow cross-system sharing of VSAM data sets using a subset of the cross-region share option. This cross-system support provides:

1. Consistent RNAME for the enqueues issued by open, close, and end-of-volume, and
2. Enqueues to cross-system enqueues where appropriate.

**Encryption/Decryption Support:** The access method services REPRO function gives the user the ability to encrypt and decrypt data using a software version of the National Bureau of Standards Data Encryption Standard (DES). This function was introduced to the OS/VS2 MVS user with the Access Method Services Cryptographic Option licensed program (5740-AM8) and is also available in MVS/XA DFP program product (5665-284).

All data sets supported for copying by REPRO (any VSAM or ISAM data set, or any other data set that can be accessed sequentially except VSAM and integrated catalog facility catalogs) are supported as input for enciphering via REPRO ENCIPHER. The user can decrypt the sequential cipher text data set using REPRO DECIPHER.

This function of the REPRO command may use the services of the Programmed Cryptographic Facility licensed program (5740-XY5) or a functional equivalent to encipher/decipher the data by a program and provide facilities for controlling the cryptographic key.

Alternatively, this function of the REPRO command may use the services of the Cryptographic Unit Support (5740-XY6) program product to provide facilities for controlling the cryptographic key and provide an interface to the 3848 Cryptographic Unit to encipher/decipher the data.

**Implicit VERIFY:** When VSAM OPEN detects a condition requiring a VERIFY, it will automatically initiate VERIFY processing, unless the user specifies otherwise. A warning message will be issued.

**Activity Indicators:** The last-accessed date field and change data set indicators in the VTOC Format 1 data set control block (DSCB) are now maintained under control of a user exit for VSAM data sets cataloged by the integrated catalog facility.

**VSAM Data Sharing Facilities:** The following VSAM data sharing facilities introduced by DFEF, and available in MVS/XA DFP, are supported to provide the VSAM application more control of shared data:

- Exclusive control feedback. When an exclusive control conflict occurs, the address of the RPL which owns the resource, and the RBA of the control interval will be returned to the user.
- A control block update facility is available to allow an application to perform cross-system and cross-region VSAM data sharing under share option 3.
- The OS/VS2 MVS restriction which prohibits control area splits under cross-region share option 4 has been eliminated. The restriction still applies to cross-system share option 4 data sets.
- VSAM supports facilities which allow the user to invalidate VSAM data and index buffers (MRKBFR) or to cause VSAM to write a modified buffer to DASD storage (WRBFR).
- Extensions to the JRNAD exit allow the application to maintain control over data and index control intervals.

**VSAM SRB/Cross-Memory Mode Processing:** To minimize the need for a VSAM application to switch execution modes, VSAM record management allows SRB and limited cross-memory mode processing. This support includes:

- An additional user processing exit (UPAD) for request resumption (POST) when the user is operating in SRB/Cross-Memory mode.
- The elimination of SVC calls where possible, and RPL codes to indicate to the VSAM application that the request must be reissued in TCB mode.

**SEQUENTIAL ACCESS METHODS:** MVS/370 Data Facility Product uses the buffer scheduling introduced to OS/VS2 MVS with SAM-E for queued sequential access method (QSAM) processing. MVS/370 DFP, SAM-E and MVS/XA DFP use EXCPVR instead of EXCP for all basic sequential access method (BSAM) and queued sequential access method (QSAM) direct access and virtual I/O operations, except basic direct access method (BDAM) WRITE/LOAD. In the exception case, the OS/VS2 MVS Release 3.8 implementation is used. The buffer handling program modules made obsolete by this new implementation are not in MVS/370 DFP. For the OS/VS2 Release 3.8 user without SAM-E or MVS/370 DFP installed, these changes enable improved DASD data access performance by:

- Reducing channel program interpretation and translation.
- Reducing the frequency of fixing and freeing of pages.
- Reducing the path length for the SAM I/O operations per block.
- Decreasing DASD contention.
- Increasing the number of QSAM buffers transferred per I/O operation.

Under BSAM, data is sequentially organized and physical blocks of data are stored or retrieved. The READ/WRITE macro instruction causes the initiation of an input/output operation. The completion of these operations is tested by using synchronization macro instructions. Automatic translation between EBCDIC and ASCII codes is provided for magnetic tape labels and record formats.

## MVS/370 DFP R1 (cont'd)

Under QSAM, logical records are retrieved or stored as requested. The access method anticipates the need for records based on their sequential order, and normally transfers the desired records to virtual storage, ready for use, before the request for retrieval occurs. When writing data, the program normally will continue as if the record had been written immediately, although the access method routines may block it with other logical records and defer the actual writing until the output buffer has been filled. For direct access storage devices, the actual writing may be deferred until multiple buffers are filled. As with BSAM, automatic translation between EBCDIC and ASCII codes is provided for magnetic tape labels and record formats.

**BASIC PARTITIONED ACCESS METHOD - BPAM:** This access method, when used in conjunction with BSAM, is designed for efficient storage and retrieval of discrete sequences of data (members) belonging to the same data set on a direct access storage device. The data set includes a directory that relates the member name with the address where the sequence of data begins. Each member has a simple name. Members may be added to a partitioned data set as long as space is available in the directory and the data set. Other than directory manipulation, all I/O is performed by BSAM.

**BASIC DIRECT ACCESS METHOD - BDAM:** Under BDAM, records within a data set are organized on direct access volumes in any manner chosen by the programmer. Storage and retrieval of a record is by actual or relative address within the data set. This address can be that of the desired record or a starting point within the data set where a search for the record, based on a key furnished by the programmer, begins. Addresses are also used by BDAM as a starting point for searching for available space for new records.

**INDEXED SEQUENTIAL ACCESS METHODS:** Sequential and direct processing are provided by the indexed sequential access methods (ISAM). Records are maintained in control field sequence by key. A multilevel index structure is system maintained, allowing retrieval of any record by its key. Additions can be made to an existing ISAM data set without rewriting the data set.

The basic indexed sequential access method (BISAM) stores and retrieves records randomly from an indexed sequential data set. Selective reading is performed using the READ macro instruction, and specifying the key of the logical record to be retrieved. Individual records can be replaced or new records added randomly.

The queued indexed sequential access method (QISAM) is used to create an indexed sequential data set or to retrieve and update records sequentially from a data set. Synchronization of the program with the completion of input/output transfer and record blocking/deblocking are automatic. QISAM is also used to reorganize an existing data set.

**VIRTUAL I/O:** The system paging mechanism can be used to perform data set access. This is known as virtual I/O. It uses the system paging mechanism to transfer data set blocks between external page storage and real storage. The user can specify virtual I/O processing for system-named temporary data sets accessed through BDAM, BPAM, BSAM, QSAM, EXCP, and XDAP interfaces. Virtual I/O processing for system-named temporary data sets is established at system generation time.

Page-size (4K bytes) physical blocks are dynamically allocated in external page storage as a virtual I/O data set is created. These blocks are not necessarily contiguous and the virtual I/O data set may span several volumes of external page storage. The blocks are released when the data set is deleted and the space is immediately made available for other paging needs.

Implementation of virtual I/O processing is compatible with the BDAM, BPAM, BSAM, QSAM, EXCP, and XDAP macro interfaces to a DASD data set. When a request is made for accessing a virtual I/O data set, the channel programs are intercepted and interpreted and the page table entries are manipulated if necessary, so that the desired data will be paged in or out of real storage as requested. For example, the control program reads a virtual I/O data set record into a virtual address space by modifying page table entries so that the 4K byte block(s) containing the record are identified as part of the virtual address space from which the request was made. Most SAM data access is performed without channel program construction or interpretation.

Restart processing currently available for temporary data sets is provided for virtual I/O data sets. Checkpoint and automatic step restart are provided for job failures. Checkpoint, and step and job restart are provided through the applicable Job Entry Subsystem and automatic step restart is provided for system restart processing.

Some of the advantages of virtual I/O are:

- Centralized direct access storage device management.
- Elimination of channel program translation and page fixing requirements.
- Use of the I/O balancing of the paging mechanism.
- Elimination of normal I/O device allocation and DADSM overhead for temporary data sets.

- Compatibility at the object code and JCL level.

**Shared DASD:** A pool of direct access storage devices may be shared by IBM processors in either 370 mode or Extended Architecture mode. Devices supported are 2314/2319, 3330/3333, 3340, 3344, 3350, 3375, and 3380; two processors may share a pool of 2305 fixed head storage devices. Direct access storage devices and fixed head storage devices supported are subject to their attachability to any specific IBM processor. The catalog, user program libraries, and user data sets may be accessed by any processor. Advantages are: Reduced file maintenance, improved operational flexibility, and reduced disk space requirements.

VSAM user catalogs may be shared among OS/VS1, SVS, OS/VS2 MVS Release 3.8, MVS/370 DFP, and MVS/XA DFP. OS control volume catalogs may be shared among the above plus the OS/MFT and OS/MVT systems. While VSAM user catalogs may be shared, reference to specific entry types (e.g., GDG) created by OS/VS2 MVS Release 3.8, MVS/370 DFP, or MVS/XA DFP may be accessed only by those three systems. The master catalog cannot be shared.

In an environment where an integrated catalog facility catalog is shared by multiple host systems, DFEF, MVS/XA DFP, or MVS/370 DFP must be installed on all systems that can access the shared catalog.

In an environment where an indexed VTOC is shared by multiple host systems, the Data Facility Device Support (DFDS), MVS/XA DFP or MVS/370 DFP must be installed on each system that can access the shared VTOC.

Program libraries and other system or user data sets may be shared on a read-only basis. The system does not automatically provide exclusive control of records, or prevent concurrent update or extensions to these data sets. Such data sets should be shared on a read-only basis until safeguards are instituted by each installation. Exclusive access for all other data sets can be controlled by using the RESERVE and DEQ macro instructions.

### CHECKPOINT/RESTART

If a job step is terminated before successful completion, checkpoint/restart can make it possible to resume execution from the beginning of the step or from a place within the step. Either way, the restart can be made to occur automatically when the failure occurs.

The CHKPT macro instruction is coded in the user's program at a checkpoint to be taken. A checkpoint is the point at which information about the status of a job step is recorded so that the job step can be restarted later at that point if necessary.

Checkpoint/restart includes a checkpoint routine and several restart routines.

The checkpoint routine gathers and records on a checkpoint data set enough information about the status of the job step and its related control blocks to allow a restart from the place where the checkpoint is taken.

The restart routines can be invoked when a job step is resubmitted for restart, or they can be invoked automatically when a failure occurs. The functions performed by restart routines depend upon the type of restart requested.

If the restart is to be made from the beginning of a job step, for deferred restart only, the RESTART parameter of the JOB statement must contain the name of the step to be restarted, and routines of the initiating task simply bypass preceding steps and start processing with the named step.

If a step is to be restarted from the beginning automatically, the RD parameter may be used; then restart processing begins during step termination. If RD is not used and the checkpoint DD statement is in the JOB, the job starts automatically at the last checkpoint taken. The step termination routine of job management invokes routines to verify that a restart can be performed and requests the operator to authorize the restart.

If a step is to be restarted from a place where a checkpoint was taken and the job is resubmitted, the RESTART parameter of the JOB statement must identify the step and checkpoint identifier and a SYSCHK DD statement must describe the checkpoint data set.

If a step is to be restarted automatically from a place where a checkpoint was taken, the step termination routine invokes routines to ensure that all data sets for the step are kept.

In MVS/System Product-JES2 Version 1 Release 3 (5740-XYS) or MVS/System Product-JES3 Version 1 Release 3 (5740-XYN), restarted jobs are processed by the job entry subsystem, JES, which returns them to its job execution queue for subsequent initiation based upon priority and resource availability.

### SYSTEM SUPPORT PROGRAMS

**LINKAGE EDITOR:** The linkage editor available with MVS/370 DFP combines separately compiled or assembled object modules into one or more load modules in a format suitable for loading by the control program and for subsequent execution. It also combines previously

PROGRAM PRODUCTS

**MVS/370 DFP R1 (cont'd)**

edited load modules with each other or with object modules. The linkage editor available with MVS/370 DFP does not execute in overlay. This increases the virtual storage requirements by 32K bytes.

Although linking or combining of program modules is its primary function, the linkage editor also:

- Provides CSECT ordering and page boundary alignment facilities to allow the users to improve paging characteristics of their programs.
- Incorporates modules from data sets other than those in its primary input, either automatically or upon request.
- Aids program modification by replacing and deleting control sections as directed by linkage editor control statements.
- Defines the storage requirements for the common control sections generated by the assembler and by FORTRAN compilers, and the static external areas generated by PL/I compilers.
- Provides processing options and logs diagnostic error messages.
- Maintains an audit trail of compilation, linkage editing dates, and levels and modifications on a CSECT basis within a load module via the identification record.
- Provides a service aid feature to allow for expansion of modules to provide maintenance space.
- Processes a control card and parameter permitting the user to supply his authorization level for the authorized program facility (APF).

The linkage editor has a facility which will provide the user a means to prepare the installation's load and object modules for migration to MVS/XA:

- Inserts relocation dictionary (RLD) record and relocation dictionary/control (RLD/CTL) record block counts into program library members.
- AMODE/RMODE information is preserved.

**PROGRAM FETCH:** Modules that were placed in a load library by the linkage editor may be read into virtual storage.

**LOADER:** The loader combines the basic editing and loading functions of the linkage editor and program fetch in one job step. It loads object modules provided by the compilers and load modules produced by the linkage editor directly into virtual storage.

**SYSTEM UTILITIES**

These programs are used to maintain system control data at an organizational or system level to operate in pageable storage. The following functions are performed by the system utility programs:

**IEHPRGM:** Modifies system control data and maintains data sets at an organization level, via scratch, rename, catalog data, etc.

**IEHMOVE:** Moves or copies logical collections of data.

**IEHLIST:** Lists system control data such as directory entries of partitioned data sets and VTOC entries.

**IEHINITT:** Writes volume label sets in EBCDIC, BCD, or ASCII code on magnetic tapes. The IEHINITT included in MVS/370 DFP will initialize volume labels to conform to the ANSI X3.27-1978 standard.

**IEHATLAS:** Locates and assigns an alternate track to replace a defective track and copies usage records from the defective track to an alternate track.

**IFHSTATR:** Selects, formats, and writes information from Type 21 (error statistics by volume) SMF records. In MVS/370 DFP, IFHSTATR is run against the output of the IFASMFDP currently available in MVS/System Product - JES2 Version 1 Release 3 (5740-XYS) or MVS/System Product - JES3 Version 1 Release 3 (5740-XYN).

**Offline 3800:** The offline 3800 Printing Subsystem mdl 1 user is provided with the same functional capability as is available to the online 3800 mdl 1 user. The program executes in an online environment to create control information and place it on magnetic tape. The magnetic tape can then be used to set up the 3800 mdl 1 for the printing of user data.

**DATA SET UTILITIES**

These programs reorganize, change, or compare data at the data set and/or record level, and are required for the proper generation and maintenance of OS/VS2 MVS Release 3.8 and MVS/370 Data Facility Product. The following general functions are performed by these utilities for non-VSAM data sets:

**IEBCOPY:** Copies, compresses, merges, loads, and unloads partitioned data sets.

**IEBGENER:** Copies a sequential data set or members of a partitioned data set, or converts a data set from sequential to partitioned organization.

**IEBTPCH:** Prints or punches records residing in a sequential or partitioned data set.

**IEBUPDTE:** Updates a symbolic library.

**IEBEDIT:** Produces an edited input job stream data set from a master input job stream data set.

**IEBDG:** Can create output data sets with either internally generated test data or externally supplied input. These data sets can be sequential, indexed sequential, or partitioned.

**IEBCOMPR:** Compares two identically organized sequential or partitioned data sets at the logical record level.

**IEBISAM:** Can copy, print, reorganize, load, or unload an indexed sequential data set.

**IEBIMAGE:** Provides means for the 3800 user to create or modify and to store in SYS1.IMAGELIB forms control buffer records, copy modification records, graphic character modification modules, library character sets, and character arrangement tables. Input to the utility consists of simple control statements. Users can specify for FCB records, forms sizes, number of lines at each vertical spacing, and line positions for simulated channel control punches. For copy modification, control statements include the text and its position within each copy of the pages of a data set. Existing copy modification records can also be modified. Control statements for graphic character modification modules and library character sets provide means for combining and naming groups of graphic characters, including any characters already in SYS1.IMAGELIB, and to assist in storing in the system new graphic characters of the user's own design. Character arrangement tables can be created or modified to print using different character sets, to include graphic character modifications and library character sets, and to assign data codes to graphics or to change existing assignments.

**INDEPENDENT UTILITY:** The independent utility ICAPRTBL does not operate with the OS/VS2 MVS system control program or MVS/370 DFP program product, but supports those programs by performing stand-alone buffer loading for the 3211 or 3203 mdl 5 Printer. This independent utility does not support the 3066 Console.

**SERVICE PROGRAM**

**ACCESS METHOD SERVICES:** The access method services multi-function service program is used with VSAM data sets for the following:

- Define a VSAM data set or catalog.
- Delete a VSAM data set or catalog.
- Define an integrated catalog facility catalog.
- Delete an integrated catalog facility catalog.
- Convert a sequential or an indexed sequential data set to VSAM format.
- List VSAM or integrated catalog facility catalog entries or records of a data set.
- Copy a data set for reorganization.
- Create a backup copy of a data set.
- Make a data set portable from one operating system to another.
- Define and delete aliases for catalog names and non-VSAM data set names.
- Support generation data groups (GDGs) in non-VSAM data sets.
- Define and format paging data sets.
- Convert OS (CVOL) catalog or VSAM catalog to an integrated catalog facility catalog.
- Move or copy a VSAM catalog or integrated catalog facility catalog.
- Create pointers in the master catalog to the OS control volume catalogs.
- Reorganize catalogs:
  - Move catalogs to different device types.
  - Merge two integrated catalog facility catalogs into a single integrated catalog facility catalog.
  - Split a single integrated catalog facility catalog into two or more integrated catalog facility catalogs.
- Validate the content, format, and consistency of the integrated catalog facility catalogs and data sets.

Access method services is also used to:

- List the counters and status of the 3880 Storage Control mdl 11 and mdl 13.
- Cause data to be read into cache of the 3880-13.
- Allow or inhibit caching for the 3880-13 or attached device.

## PROGRAM PRODUCTS

**MVS/370 DFP R1 (cont'd)**

It can be invoked through an input job stream containing an access method services command, by a processing program that passes it a command statement, or from a time-sharing terminal.

**SERVICE AID**

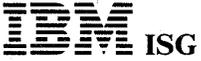
**AMBLIST:** This linkage editor service aid program produces various formatted listings which may be used for system serviceability and diagnostic purposes. Depending on options specified on AMBLIST control statements, the following listings may be produced:

- Formatted load module listings.
- Formatted object module listings.
- Maps and cross-reference listings of the system nucleus for the S/370 users and the DAT-on nucleus for the MVS/XA users.
- Listings of the data stored in the CSECT Identification records of load modules.
- Load module map and cross-reference listing showing addresses relocated relative to a user-supplied address.
- Load module summary data including entry point address, APF access code, module attributes, and the contents of the module's system status Index.
- Program modifications to a load module library.

The minimum virtual storage requirement for AMBLIST is 64K bytes.

**SYSTEM GENERATION**

System generation is the process of preparing a specially tailored operating system to match the machine configuration and operating system options selected by the user. This process employs the user's current operational operating system, either OS/VS2 MVS Release 3.8 with or without MVS/System Product Version 1 Release 3 and MVS/370 DFP and requires the program products specified in the "Specified Operating Environment".



PROGRAM PRODUCTS

MVS/370 DFP R1 (cont'd)

MVS/370 DFP DEVICE SUPPORT CHART

I/O Unit Support: The following units, up to a maximum of 1,917 devices, are supported by MVS/370 DFP for the indicated function:

Input/Output Units	Input Job Stream	In/Out Work Queue	System Output	Primary SYSRES	Program Libraries	C	G	S	I,P,D,A
1275 Optical Reader								X18	
1287 Optical Reader								X19	
1288 Optical Page Reader								X18	
1403 Printer			X1			X2		X1	
1419 Magnetic Character Reader								X18	
1443-N1 Printer						X2		X	
2305-1 Fixed Head Storage (Notes 4, 5, 20)	X	X7		X	X			X	X
2305-2 Fixed Head Storage (Notes 4, 5)	X	X7		X	X			X	X
2314 Direct Access Storage Facility (Notes 5, 8, 25)	X	X		X	X			X	X
2401 Magnetic Tape Unit	X		X					X	
2402 Magnetic Tape Unit	X		X					X	
2403 Magnetic Tape Unit and Control	X		X					X	
2420 Magnetic Tape Unit	X		X					X	
2501 Card Reader	X					X2		X	
2520 Card Read Punch	X10		X10,11			X2		X10	
2520 Card Punch			X11			X2		X	
2540 Card Read Punch	X12		X11,12			X2		X	
3036 Console						X3			
3066 System Console						X3			
3158 Console Function						X3			
3203-5 Printer			X			X2		X	
3210 Console Printer-Keyboard						X			
3211 Printer			X			X2		X	
3213 Console Printer						X			
3215 Console Printer-Keyboard						X			
3251 Display Station (Note 26)						X3	X		
3275 Display Station	X					X3			
3277 Display Station	X					X3			
3278 (supported as a 3277)	X					X3			

PROGRAM PRODUCTS

MVS/370 DFP R1 (cont'd)

Input/Output Units	Input Job Stream	In/Out Work Queue	System Output	Primary SYSRES	Program Libraries	C	G	S	I,P,D,A
3279 Color Display Station (Note 24)	X					X3			
3284 Printer						X2			
3286 Printer						X2			
3288 Line Printer (supported as a 3286-2)						X2			
3330 Disk Storage (Notes 5, 8)	X	X		X	X			X	X
3333 Disk Storage and Control (Notes 5, 8)	X	X		X	X			X	X
3340 Direct Access Storage Facility (Notes 5, 6, 8)	X	X		X	X			X	X
3344 Direct Access Storage (Notes 5, 8)	X	X		X	X			X	X
3350 Direct Access Storage (Notes 5, 8)	X	X		X	X			X	X
3375 Direct Access Storage (Notes 5, 8, 9)	X	X		X	X			X	X
3380 Direct Access Storage (Notes 5, 8, 9)	X	X		X	X			X	X
3410 Magnetic Tape Unit	X		X					X	
3411 Magnetic Tape Unit and Control	X		X					X	
3420 Magnetic Tape Unit	X		X					X	
3505 Card Reader	X					X2		X	
3525 Card Punch	X10		X10,11			X2		X	
3800 Printing Subsystem mdl 1			X					X	
3800 Printing Subsystem mdl 3 (Note 27)			X					X	
3838 Array Processor (Note 28)	X								
3851 Mass Storage Facility (Notes 14, 15, 17)	X				X16			X	X
3886 Optical Character Reader								X18	
3890 Document Processor								X13	

**MVS/370 DFP Device Support:** The MVS/370 DFP device support chart shows all devices supported by MVS/370 DFP for systems functions and/or non-TP access methods. The chart shows for each device the relevant functions supported.

For telecommunications devices see:

- VTAM
  - OS/VS2 MVS VTAM 2.0
  - ACF/VTAM Version 1 licensed program (5735-RC2)
  - ACF/VTAM Version 2 licensed program (5665-280)
- TCAM
  - ACF/TCAM Version 1 licensed program (5735-RC1)
  - ACF/TCAM Version 2 licensed program (5735-RC3)
- BTAM
  - OS/VS2 MVS BTAM
  - BTAM/SP licensed program (5665-279)

Devices that are not shown in this chart have no specific programming support under MVS/370 DFP.

**Notes:**

1. The Selective Tape Listing feature is not supported.
2. A console must consist of a printer-keyboard, or a card reader and printer to simulate the actions of a printer-keyboard (composite console).
3. DIDOCS supported by MVS/System Product-JES2 Version 1 Release 3 (5740-XYS) or MVS/System Product-JES3 Version 1 Release 3 (5740-XYN) licensed program.
4. Multiple requesting supported.
5. File scan not supported.
6. Rotational position sensing support is an optional feature on 3340.

7. Not supported by MVS/System Product-JES3 Version 1 Release 3 (5740-XYN) licensed program.
8. For message queues under OS/VS2 MVS TCAM.
9. For message queues under TCAM, requires ACF/TCAM Version 2 Release 3 licensed program (5735-RC3).
10. Supported for read or punch, but not simultaneously.
11. For use with the OS/VS2 MVS output writer; not for system messages.
12. Punch-feed-read feature is not supported.
13. QSAM (device-dependent only).
14. Support shown is for 3330s or 3333s as staging devices. If real 3330/3333s are included as part of 3851, see Note 15.
15. With 3330/3333 as staging device, rotational position sensing is supported.
16. User program libraries only.
17. The 3851 is supported by OS/VS2 MVS Release 3.8 or Mass Storage Systems Extensions (5740-XYG) licensed program.
18. BSAM (device-dependent only).
19. QSAM (device-dependent only) for journal tapes; BSAM (device-dependent only) for cut-form documents.
20. Supported on mdls 165II, 168, and the 3033 Processors only.
21. The 3540 is supported by the diskette copy programming support of OS/VS2 MVS Release 3.8. SYSIN/SYSOUT support is provided by the diskette reader program and diskette writer program of either MVS/System Product - JES2 Version 1 Release 3 (5740-XYS) or MVS/System Product - JES3 Version 1 Release 3 (5740-XYN) licensed program.
22. ANSI/ISO tape labeling not supported.
23. A utility (IEBTCRIN) is provided by MVS/370 DFP to read data from the 2495 and create a sequentially organized data set.

## PROGRAM PRODUCTS

**MVS/370 DFP R1 (cont'd)**

24. DIDOCS support of up to four colors by MVS/System Product - JES2 Version 1 Release 3.1 (5740-XYS) or MVS/System Product - JES3 Version 1 Release 3.1 (5740-XYN) licensed program.
25. Rotational position sensing is not supported.
26. Must be SYSGENed as a 2250-3.
27. Supported in compatibility mode only.
28. Requires Vector Processor Subsystem (VPSS) (5744-CK1).

**Legend:**

- C = Console
- G = Graphic programming support
- S = Sequential access method
- I = Indexed sequential access method
- P = Basic partitioned access method
- D = Basic direct access method
- A = Virtual storage access method
- X = Function supported

**CUSTOMER RESPONSIBILITIES**

Users need to order and install MVS/370 DFP and one of the prerequisites: MVS/System Product - JES2 Version 1 Release 3.0 (5740-XYS) or MVS/System Product - JES3 Version 1 Release 3.0 (5740-XYN) for execution, and their program distribution libraries for the assemblies required for system generation (SYSGEN).

Installations may need to order and install later levels or releases of either of the two prerequisites for specific device support or function desired.

Additionally, users of either OS/VS2 MVS IEHDASDR or the Direct Access Storage Dump Restore licensed program need to order and install Data Facility Data Set Services (DFDSS) (5740-UT3) or a functional equivalent to provide direct access storage device dump and restore functions. If the customer is planning to install DFDSS, it is recommended that this be done well before MVS/370 DFP is installed, to back up disk files to tape using the format acceptable to DFDSS for restoration.

For further details, see "Software Requirements".

**INSTALLATION CONSIDERATIONS**

MVS/370 DFP is based on the modules and macros contained in OS/VS2 MVS Release 3.8 identified by the System Modification Program (SMP) indices DM, DS, ST, PM, and UT, which were provided with OS/VS2 MVS System Control Program Release 3.8 and with the five program products whose functions have been incorporated in MVS/370 DFP. During installation, these modules, macros and their System Modification Program (SMP) Control Data Set (CDS) entries are replaced by MVS/370 DFP and identified as FMID HDQ1102. Since not all functions are replaced, the user should review the "Compatibility" section.

Installation of MVS/370 DFP requires System Modification Program (SMP) Release 4 with PTF URO3129 applied.

MVS/370 DFP includes the functions in the following program products and no attempt should be made to apply them to an OS/VS2 MVS system once MVS/370 has been installed:

- Data Facility Device Support (DFDS) (5740-AM7).
- Sequential Access Method - Extended (SAM-E) (5740-AM3).
- Data Facility Extended Function (DFEF) (5740-XYQ).
- Offline 3800 Utility program product (5748-UT2).
- Access Method Services Cryptographic Option (5740-AM8).

The following programs will enhance the usage of MVS/370 Data Facility Product:

Device Support Facilities (5752-VS2 or 5747-DS1), a Class 2 System Control Program, provides such functions as direct access storage device initialization and indexed VTOC creation. Note that if Device Support Facilities is used, Release 6 is required with MVS/370 DFP.

The Direct Access Storage Device Migration Aid licensed program (5668-002) provides assistance to the user in moving data from other supported direct access storage devices to the 3375 or the 3380 Direct Access Storage device.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

MVS/370 Data Facility Product is designed to operate on any IBM processors supported by OS/VS2 MVS Release 3.8 with MVS/SP Version 1 Release 3 installed.

**SOFTWARE REQUIREMENTS**

MVS/370 Data Facility Product Release 1 requires OS/VS2 MVS Release 3.8 as an installation base, and the functions provided by either MVS/System Product-JES2 Version 1 Release 3.0 (5740-XYS) or MVS/System Product-JES3 Version 1 Release 3.0 (5740-XYN) for execution, and their program distribution libraries for the assemblies required for system generation (SYSGEN). Some functions supported by MVS/370 DFP require functions contained in later releases of MVS/System Product as described below.

The IBM 3880 Storage Control mdl 11 requires the functions provided by either MVS/System Product - JES2 Version 1 Release 3.1 (5740-XYS) or MVS/System Product - JES3 Version 1 Release 3.1 (5740-XYN).

The tape labels and tape file structure support for ISO 1001-1979, ANSI X3.27-1978 and FIPS-1979 requires the functions provided by either MVS/System Product - JES2 Version 1 Release 3.2 (5740-XYS) or MVS/System Product - JES3 Version 1 Release 3.2 (5740-XYN) with the JES3 ANSI Tape Support feature (FMID JJS2351) installed.

The access method services REPRO encryption/decryption function requires the functions provided by one of the following:

- Programmed Cryptographic Facility licensed program (5740-XY5)
- Cryptographic Unit Support licensed program (5740-XY6) and its prerequisites

Either System Modification Program Release 4 (with PTF URO3129) or System Modification Program Extended (SMP/E) program product (5668-949) is required for installation and subsequent maintenance of MVS/370 DFP.

**COMPATIBILITY**

**Upward Compatibility of User Programs:** This refers to the capability of user programs that use published external interfaces, do not run authorized, and which execute with OS/VS2 MVS Release 3.8 to perform the same function in the MVS/370 environment. Although this level of compatibility is true in most cases, the user should review this section in its entirety.

**Indexed VTOC Compatibility:** Both indexed and non-indexed VTOCs are supported by MVS/370 DFP. The support is functionally equivalent to the support introduced to OS/VS2 MVS users with the Data Facility Device Support (DFDS) licensed program.

Programs that currently access the VTOC through documented DADSM interfaces will continue to operate without change on volumes with a VTOC index. Programs that access the VTOC via EXCP or SAM will continue to operate without change on volumes with a VTOC index with one exception: Programs that are dependent on the information in the Format 4 or 5 DSCB(s) must be modified to use the common VTOC access facility (CVAF) function to obtain the same information from the VTOC index.

**OS/VS2 Program Management Compatibility:** Object and load modules acceptable to the OS/VS2 MVS Release 3.8 DFP linkage editor are also acceptable to the linkage editor available with MVS/370 DFP. The linkage editor available with MVS/370 DFP will require 32K more virtual storage than is used by the OS/VS2 MVS Release 3.8 linkage editor.

**OS/VS2 MVS programs not available with MVS/370 DFP:** Four OS/VS2 MVS Release 3.8 programs will not be available on installation of MVS/370 DFP. The programs and suggested alternatives for specified functions are listed below:

**IBCDASDI:** Disk initialization functions are currently available in Device Support Facilities.

**IBCDMPRS:** The stand-alone disk restore functions are currently available in the Data Facility Data Set Services (DFDSS) licensed program. The stand-alone disk dump functions are no longer available or supported.

**IEHDASDR:**

- Disk initialization functions are currently available in Device Support Facilities.
- Dump/restore functions are currently available in DFDSS.

However, DFDSS does not support the dump format produced by IEHDASDR. Users may order and install Data Facility Data Set Services to create backup tapes in an acceptable format.

**Analysis Program-1 (AP-1):** The functions to aid in the analysis of DASD error situations are available in Device Support Facilities.

**Note:** The Direct Access Storage Dump Restore (5740-UT1) licensed program creates tape in two formats, neither of which is accepted by DFDSS. Any tape created by the Direct Access Storage Dump Restore program product or IEHDASDR, that must be used to restore data, may be restored by the originating IBM program.

**MVS/370 DFP R1 (cont'd)****MIGRATION**

**Indexed VTOC Migration:** Coexistence with systems that do not support the VTOC index is a major feature of the VTOC index design.

- Any volume with or without a VTOC index that is currently usable on OS/VS2 MVS Release 3.8, MVS/XA, or OS/VS1 may be moved to the MVS/370 DFP environment and used as-is.
- Device Support Facilities may be used to initialize a VTOC index on these volumes whenever desired, except on volumes whose VTOC does not begin on record 1 of a track (for example, a DOS 'stacked pack').
- A volume with a VTOC index can be moved to and from the following systems which do not support the VTOC index:
  - OS Release 21.8
  - OS/VS2 SVS
  - VSE Advanced Functions
  - OS/VS1, without DFDS (5740-AM6) installed.
  - OS/VS2 MVS, without either MVS/370 DFP (5665-295) or DFDS (5740-AM7) installed.

In general, if the VTOC is modified on any of these systems, the VTOC index will be invalidated and the VTOC converted to the non-indexed format, either via existing facilities on these systems, or upon return to a system that supports the VTOC index. The user must then re-initialize the index with Device Support Facilities. However, to ensure in all cases that the VTOC index is valid, it is recommended that the user re-initialize the index with Device Support Facilities upon return to a system that supports the VTOC index.

- Volumes with the VTOC index that must be used on systems other than those listed above should be converted to the non-indexed VTOC format via Device Support Facilities prior to use on the other system.
- The VTOC index is designed for easy user migration. User job streams, including JCL and IEHPRGM control statements, are fully compatible with indexed and non-indexed volumes. EXCP programs that are converted to use CVAF will operate on both types of volumes. Thus, the installation may gradually convert volumes to the indexed format.

**INTEGRATED CATALOG FACILITY MIGRATION:** The MVS/370 DFP integrated catalog facility program and catalog may be used to replace and will coexist with all currently available catalog functions and facilities. Access method services CVNTCAT function will convert an existing VSAM user catalog or OS (CVOL) catalog to an integrated catalog facility catalog. Individual catalogs may be converted without requiring the conversion of any other catalog. DFEF users that have previously converted, or are in the process of converting, to integrated catalog facility catalogs will not need to repeat that conversion when migrating to MVS/370 DFP.

**ISO/ANSI/FIPS VERSION 3 RESTRICTIONS and MIGRATION CONSIDERATIONS:** The following restrictions may be over-ridden by manipulation in the installation exits provided by ISO/ANSI/FIPS Version 3 tapes, but such action will be the responsibility of the user:

- ISO/ANSI/FIPS Version 1 volumes are supported for input only.
- Record format 'U' (undefined) is not supported for ISO/ANSI/FIPS Version 3.
- The block size on an ISO/ANSI/FIPS Version 3 volume cannot exceed 2,048 bytes.
- Open for MOD (Output), EXTEND, OUTINX or INOUT is not allowed for ISO/ANSI/FIPS Version 3 tapes.
- Only one generation of a Generation Data Group may exist on a volume.

The MVS/370 DFP system utility IEHINITT must be used to initialize tapes to be used with ISO/ANSI/FIPS Version 3 support.

Checkpoints cannot be taken within a job step that has an ISO/ANSI/FIPS Version 3 tape that is open.

**VSAM GLOBAL RESOURCE SERIALIZATION:** In order for the changes in the VSAM component of MVS/370 DFP Release 1 to allow the sharing of data sets in a global resource serialization complex (ring), each system in the global resource serialization complex must contain the VSAM global resource serialization support.

The installation must not use global resource serialization to convert RESERVEs to ENQs for catalogs until VSAM global resource serialization support has been installed on all processors in the complex. Since the VSAM global resource serialization support in MVS/370 DFP is functionally equivalent to that provided in MVS/XA DFP Release 1.1 program product (5665-284), processors in the global resource serialization complex may use either program product. For specific details, see *OS/VS2 MVS Planning: Global Resource Serialization* (GC28-1062).

**RPQ's ACCEPTED:** No

**MVS SYSTEM INTEGRITY APPLIES:** Yes



**CHARACTER CONVERSION AID**  
**5665-299****PURPOSE**

The Character Conversion Aid program product provides support for the IBM 3800 model 3 Printing Subsystem. This conversion aid is designed to reduce the effort required to convert graphic characters designed for the IBM 3800 model 1 to the new pel density (240 x 240 pels per square inch) required for the 3800 model 3. The primary use is for converting graphic characters created by customers, since all IBM-supplied 3800 model 1 character sets will be provided by IBM in the new print density.

**DESCRIPTION**

The Character Conversion Aid is an interactive program operating under MVS/TSO. VS/APL and GDDM (Graphical Data Display Manager) are required to execute the conversion program. The program is menu-driven from a 3277, 3278 or 3279 Display which is supported by GDDM.

This conversion aid is used in conjunction with the 3800 model 3 support provided in Data Facility Device Support Release 1.6 to provide graphic characters in the format required by the 3800 model 3 for printing in Compatibility mode.

The conversion aid provides the following functions:

- Retrieval and storage of 3800 model 1 library character sets (LCS), and graphic modification modules (GRAPHMOD) data sets in an internal library as a character group.
- Ability to convert character groups to the 3800 model 3 pel density, and the ability to edit, create, copy, rename and delete characters and character groups.
- Ability to produce input for the IEBIMAGE utility to create characters in the new pel density.
- Library services to import objects into a user-defined library, route output to user-defined destinations, and print the online help screens.
- Online help screens to assist users in the proper use of the program.

The conversion process produces 'new' characters which may require further refinement. These corrections can be done interactively at the display using the Character Conversion Aid.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 3277, 3278 or 3279 Display and appropriate Control Unit.

**SOFTWARE REQUIREMENTS**

The Character Conversion Aid is available only on MVS/TSO systems and requires MVS Release 3.8. Also required are the following program products:

- VS/APL Release 4 (5748-AP1).
- Graphical Data Display Manager (GDDM), Release 2 (5748-XXH).

**Planning Information:** Users planning to install the Character Conversion Aid program product must also install or have installed the VS/APL Release 4 and GDDM Release 2 program products. The output of the conversion aid must be processed by the enhanced IEBIMAGE utility which is part of the Data Facility Device Support Release 1.6.

The Character Conversion Aid program product will install on an OS/VS2 (MVS) Release 3.8 system by using the System Modification Program (SMP4).

**DOCUMENTATION**

(available from Mechanicsburg)

*Character Conversion Aid Tent Card (S320-8025) ... Character Conversion Aid Diagnosis Guide and Reference (SY35-0052).*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs where the installation of this licensed program causes an exposure to the system integrity of MVS. This licensed program is intended to run authorized. Refer to Programming Announcement Statement of MVS Integrity dated October 21, 1981 for additional information.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**MVS/BULK DATA TRANSFER  
5665-302**

**PURPOSE**

MVS/Bulk Data Transfer (MVS/BDT) is a program product that enables an installation that is part of a Systems Network Architecture (SNA) network to copy data sets to or from another installation in the network. Data is transferred directly from system to system without having to copy it to an intermediate spool.

**HIGHLIGHTS**

MVS/BDT has the following features:

- Provides the ability to copy data sets from one MVS node in an SNA network to another.
- Data Transfer types include sequential and partitioned data sets. PDSs may be whole data sets, single members, multiple members, or all of a PDS excluding selected members.
- Data transfer checkpointing which allows an interrupted transfer to be rescheduled and resumed from the most recent checkpoint.
- MVS/BDT executes in its own address space which provides isolation for better overall system availability.
- MVS/BDT uses MVS multi-tasking to exploit MP, AP, and dyadic machines. Since each file transfer request is a separate task, each runs independent of the others.
- Data transfer requests can be initiated from TSO terminals, MVS MCS consoles, JES3 consoles or from batch jobs.
- Users are kept informed of the progress of their transfer requests through status messages and through command inquiry.
- Assignment of scheduling priorities to data transfer requests allows user control over the order in which data transfers are executed.
- A command set which allows system operators to monitor and manage the flow of work to and from their nodes.
- Frequently used data transfer requests may be stored in a library and reused as needed. This feature eliminates the need to recode these requests each time they are used.
- Users may specify that some requests are dependent on other requests completing before they may be scheduled for execution. This function is called MVS/BDT Dependent Job Control and is useful for production work scheduling.
- Protection against loss of data transfer requests is provided by saving the request in a direct access storage queue from which it can be automatically recovered.
- Data set disposition, record attributes, and blocking are all under user control.
- The Teleprocessing support is via ACF/VTAM SNA and features the following:
  - Concurrent file transfers, so that between two nodes, a number of file transfer requests run simultaneously. A fencing facility permits allocation of one portion of the session for sending and another for receiving.
  - Negotiable bind, a feature that can resolve minor differences in communication parameters between nodes so as not to prevent SNA sessions from being established.
  - Password Validation, which requires nodes to exchange passwords before a SNA session may be established.
  - An automatic session restart option which enables MVS/BDT to restart abnormally terminated sessions automatically.
  - Data compression options optimized for text and for numeric data.
  - Full-duplex protocols exploit the full bandwidth of the communications channel.
  - Buffer pooling reduces the usage of private virtual storage.
  - Through SNA VTAM Class of Service, data may be routed over crypto teleprocessing links.
  - Any physical links supported by VTAM are supported by MVS/BDT.
- Installations are provided with extensive management tools in addition to the operator commands, such as:
  - SMF accounting records are provided for each file transfer. Additionally, an exit to allow monitoring or tailoring of the information is provided.
  - A BDT subsystem log records all messages.
  - Authorization exits to control usage of MVS/BDT.
  - User exits for tailoring MVS/BDT.
  - Initialization parameters for tuning MVS/BDT.

- MVS/BDT includes features to enhance its availability and serviceability, such as:

- Executing in its own address space which provides isolation for better overall system availability.
- Having extensive ESTAE routines which reinstate failing tasks when possible.
- Providing formatted ABEND dumps.
- Being able to provide, in main storage, a trace of BDT internal events.
- Providing a diagnostic log of problems encountered during initialization processing.

**DESCRIPTION**

MVS/Bulk Data Transfer (MVS/BDT) is an authorized program which runs on MVS/SP Version 1 Release 3.1 and Version 2 Release 1 in its own address space. MVS/BDT transmits and receives data sets to and from other MVS/BDT nodes. The data transmitted by MVS/BDT may be either sequential data sets or partitioned data sets, in addition to commands and messages.

Data is transmitted directly from the sending data set to the receiving data set without any intervening spooling. This characteristic is very important in that it allows large data files to be transmitted without using the JES spool.

The transmission uses a full-duplex SNA protocol which allows a checkpoint/restart capability for large files. The protocol also provides a 'pacing window' so that the receiving BDT can provide a delayed response to the sending BDT for each message buffer. The checkpoint feature and the pacing capability are designed to take advantage of full-duplex, wideband and satellite capacities.

Transaction requests may be entered by the MVS operator (MCS Console), the JES2 operator (MCS Console), the JES3 Operator (JES3 Console), a TSO user or by a batch job. The unit of work submitted by the operator or end-user is called a 'transaction'. A transaction defines a 'from' and a 'to' data set at a 'from' and 'to' MVS/BDT node. The transactions are stored on a BDT work queue and are scheduled by one of the two MVS/BDT nodes involved.

MVS/BDT nodes are assumed to have 'any-to-any' connectivity to each other. No Store-and-Forward is provided.

MVS/BDT is designed to be as JES-independent as possible. For example, all MVS/BDT input commands, transaction requests, and the resulting system responses are identical, regardless of the type of JES in use at any node involved in processing the request.

**CUSTOMER RESPONSIBILITIES**

The customer must order and install MVS/BDT and must also have installed one of the MVS/System Product releases specified in the "Software Requirements" section.

**Installation Requirements:** MVS/BDT is installed using System Modification Program Release 4 (SMP4) or System Modification Program Extended (SMP/E).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

MVS/BDT Release 1 is designed to operate on any IBM Processor that is supported by MVS/System Product Version 1 Release 3.1 or MVS/System Product Version 2 Release 1.1.

**SOFTWARE REQUIREMENTS**

**Base Control Program Considerations:**

- MVS/BDT requires the Base Control Program component of MVS/SP Version 1 to be at Release 3.1 level or later, and Version 2 to be at Release 1.1 level.
- Additional required support for MVS/BDT in the Base Control Program is provided by the MVS/System Product TCB Expansion feature (FMID JBB1337, JIP2337) and by Program Temporary Fixes (PTFs) to MVS/SP Version 1 Release 3.1, 3.2 and 3.3, and by PTFs to MVS/SP Version 2 Release 1.1.

**JES2 Considerations:**

- MVS/BDT requires the JES2 component of MVS/SP Version 1 or Version 2 to be at Release 3.0 or later.

**JES3 Considerations:**

- MVS/BDT requires the JES3 component of MVS/SP Version 1 or Version 2 to be at Release level 3.1 with the JES3 MVS/BDT Support feature (FMID JJS2350) installed.

**PROGRAM PRODUCTS****MVS/Bulk Data Transfer (cont'd)****VTAM Considerations:**

- MVS/BDT requires either ACF/VTAM Version 1 Release 3 with the Multisystem Networking feature (MSNF) or ACF/VTAM Version 2 Release 1.

**CONVERSION** (not applicable)**DATA SECURITY**

MVS/BDT provides support for external security management through transaction and command authorization exits, session passwords, and logging facilities. User management is responsible for evaluating, selecting, applying and implementing such features and for the appropriate administrative and application controls.

**DOCUMENTATION**  
(available from Mechanicsburg)*General Information Manual (GC28-1313).***MVS SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where the installation of MVS/Bulk Data Transfer (5665-302) causes an exposure to the system integrity of MVS.

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**5665-309 - MVS FINANCIAL MANAGEMENT SYSTEM R1**

**PURPOSE**

MVS Financial Management System offers a framework for creating financial systems to be used in various accounting applications such as general ledger, cost control, budgeting, reporting and consolidation.

**HIGHLIGHTS**

MVS Financial Accounting System provides facilities for creation of accounting systems in the following application areas:

- Financial Accounting and Reporting
- General Ledger
- Management and Responsibility Accounting
- Budgeting
- Cost Accounting
- Project Accounting
- Consolidation Reporting

**DESCRIPTION**

**Introduction:** The licensed program offerings in the finance and accounting area can be divided into three major groups:

- **OPERATIONAL**, which cover applications such as order entry, invoicing, accounts payable and accounts receivable.
- **TACTICAL**, covering general ledger, budgeting, cost and project accounting and consolidation
- **STRATEGIC**, which includes various tools for planning and decision evaluation.

**Application Areas:** MVS Financial Management System is designed to provide a framework for creating financial systems to be used in the following application areas:

- **FINANCIAL ACCOUNTING and REPORTING**, incorporating **GENERAL LEDGER** (nominal ledger), profit and loss statement, balance sheet, financial adjustment, reserves, provisions, control accounts, and journals.
- **MANAGEMENT and RESPONSIBILITY ACCOUNTING**, incorporating revenue as well as costs, and profitability analysis by various cost centers and product types.
- **BUDGETING** with a distribution function to allocate a department budget to single accounts and with seasonal curve functions to distribute the budget over periods in the year within the account.
- **COST ACCOUNTING**, incorporating productivity analysis, determination of fixed and variable costs, variance analysis, and costing by product types and market place. It is within its application area complementary to **IBM COSTING**.
- **PROJECT ACCOUNTING**, incorporating project costs to date, as well as accruals and repayments allocated over future periods, budgets and budget revisions.
- **CONSOLIDATION REPORTS**, incorporating the structuring and merging of information over several divisions or companies within a group, very often from the base of completely different charts of accounts.
- In addition to the areas mentioned in the points above, various forms of statistical analysis, multilevel reporting, daily, weekly, and to-date, by product type, region, market location, etc. are also included. (That is, information which is already present in base accounts, but needs to be restructured and presented in a different format.)

These application areas are supported by an integrated system that:

- Gathers, processes, and consolidates financial data; ensures data integrity, audit trails, and data retention for analysis
- Maintains ledgers and prepares financial statements.
- Can provide cost accounting and reporting for products and/or responsibility centers.
- Assists in the creation of long- and short-range budgets, and stores current year budgets for performance comparisons.
- Prepares and maintains accounting, financial, statistical, and management data over many years.
- Supports auditing facilities and security functions.
- Provides controlled access to and display of data.
- Can be modified and can grow with the organization.
- In line with the above introduction, the MVS Financial Management System provides published interfaces to and complements the IBM program products **Interactive Financial System 1 (IFS 1 - 5668-967)**, and **Planning, Control and Decision Evaluation System (PLANCODE/S - 5740-XX9 and PLANCODE/I - 5840-XX8)**.

**System Overview:** MVS Financial Management System consists of three main components:

- The **Multiple Ledger System (MLS)**, which is a batch component, used for building up and maintaining a set of data bases containing financial information.
- The **Financial Management Display System (FDS)**, which provides functions for requesting and displaying reports and for creating input transactions via a display terminal. It also allows for graphic display of certain reports using the **Interactive Chart Utility (ICU)** component of **GDDM**.
- The **Business Output/Tailoring System (BOS)**, which is used for creating reports, and tailoring the standard functions where user-defined enhancements are required. The **Business Output/Tailoring System** is a tool that requires programmers' assistance.

**Specific Functions:** Within each of these application areas, MVS Financial Management System provides specific functions such as the following:

- **OVERHEAD RECOVERY**, being the reallocation of fixed and indirect costs, possibly several times in the course of absorption. MVS Financial Management System provides a **Calculation, Pricing, and Redistribution** function to handle just this problem.
- **FOREIGN CURRENCY** requires that certain accounts be expressed in different currencies. MVS Financial Management System enables the user to define a special table containing conversion factors which may be used for converting values from one currency to another for presentation in printed output.
- Different **CHARTS of ACCOUNTS** can be handled by MVS Financial Management System, which enables the user to achieve faster corporate consolidation because all divisions and subsidiaries can be handled by the same system, even if their chart of accounts' structure is different. There are several facilities in MVS Financial Management System that simplify the restructuring of any specific chart of accounts that may arise due to changes of company or government accounting policy.
- **VARIABLE ACCOUNTING PERIODS** are often required, depending on the type of application. MVS Financial Management System is designed to operate with a 12- or 13-period fiscal year (representing monthly periods made up according to calendar months, four- and five-weekly accounting months, or even periods, split across different days of the week). However, weekly or quarterly periods may be accommodated.
- Generating **MULTIPLE TRANSACTIONS** from certain selected transactions simplifies data entry, such that copies of each individual transaction may be modified and directed to different accounts.
- **AUDIT CHECKS and BALANCES** are provided by Financial Management System through a comprehensive series of standard reports, which enable the user to trace postings right through from source to incorporation in the final account.
- Timely reports for decision making may be generated by the user and displayed on a terminal screen or printed on paper. The user can structure and group data for meaningful management analysis.

As well as the facilities mentioned above, MVS Financial Management System can accommodate those specific problems users might encounter in such areas as accounting for fixed assets and depreciation, changes in government policy regarding accounting for profit and loss, and handling various forms of accruals and repayments. The keyword that applies to MVS Financial Management System is the flexibility it provides to users for tailoring and enhancing the accounting system to meet their specific requirements when and as they arise. For example, customization facilities are provided including audit trails to enable the enhancement of standard functions, such as:

- Transforming input from other data processing systems into transactions for MVS Financial Management System.
- Generating output, including reports and records for other data processing applications.
- Processing user-defined information for inclusion into data bases.

**CUSTOMER RESPONSIBILITIES**

The following list provides an overview of major tasks necessary to accomplish a smooth product implementation for the MVS Financial Management System.

**Planning**

1. Define suitable initial application (pilot application).
2. Select members of the project group.
3. Accounting personnel, project leader, and systems analyst attend the Functions workshop.
4. Draw up preliminary project plan (time and resources).

PROGRAM PRODUCTS

**MVS Financial Management System (cont'd)**

5. Install Financial Management System and get acquainted with the sample problem.
6. Project leader, systems analyst and application programmer attend the BOS workshop.

**Design**

7. Specify requirements for printed reports.
8. Decide on chart of accounts structure (account number layouts).
9. Outline format of input data and relationships to feeder systems.
10. Determine segment layouts and space requirements for data bases.
11. Plan test environment and procedures.
12. System analyst and application programmer attend the BOS Advanced workshop.

**Implementation**

13. Start documenting the application design.
14. Draw up detailed project plan (time and resources).
15. Set up control information, chart of accounts.
16. Plan production environment and procedures (MLS and FDS).
17. Use BOS to:
  - Program/tailor output reports.
  - Convert data from existing feeder systems.
  - Modify standard functions, add new functions.
  - Tailor error handling routines.
18. Establish data entry procedures (including PREVDATA panels).
19. Develop framework for FDS and hoc report requests (PREVREQ panels).
20. Complete testing and plan switch-over to normal operation.
21. Educate users and complete system documentation.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This IBM program product is designed to operate on the following IBM machines: IBM S/370 mdls 148, 158, 168, 303X, 308X and on 4300 Processors if operating in an MVS environment.

For the MVS Financial Management System sample problem, the F program (which is the largest), can be run in 1,000K bytes. A typical installation, however, might require 1,200K bytes of virtual storage. MVS Financial Management System itself does not require any fixed real storage.

The Display System (FDS) can use any of the following (or equivalent) terminals if equipped with at least 12 Program Function Keys:

- IBM 3276 Control Unit Display Station mdls 2, 3, 4, 12, 13, or 14.
- IBM 3277 Display Station mdl 2.
- IBM 3278 Display Station mdls 2, 3, 4 or 5.
- IBM 3279 Color Display Station mdls 2A, 2B, 3A or 3B.
- IBM 3178 Display Station.
- IBM 3290 Information Panel.

**SOFTWARE REQUIREMENTS**

MVS Financial Management System executes under:

- MVS/SP-JES2 Version 1 Release 3 (5740-XY5).
- MVS/SP-JES3 Version 1 Release 3 (5740-XYN).

MVS Financial Management System also executes under MVS/XA:

- MVS/SP-JES2 Version 2 (5740-XC6).
- MVS/SP-JES3 Version 2 (5665-291).

As prerequisites for above MVS/SP products, MVS Release 3.8 with Processor Support 2 must be installed.

The following products or necessary upgrades as specified by MVS/XA are required:

- IMS/VS-DB Version 1 Release 2 (5740-XX2).
- OS/VS Sort/Merge Release 5 (5740-SM1).
- OS/VS COBOL Library Release 2 (5740-LM1).

- If FDS is to be used, then one of the following alternatives is required:

- The TSO function of MVS, or
- CICS/OS/VS Version 1 Release 6 (5740-XX1) and MVS/370 Data Facility Product Release 1 (5665-295). When interfacing with CICS/OS/VS, the Command Level Interface is used.

- If the graphic display capability of FDS is to be used, the Graphical Data Display Manager Release 3 (5748-XXH) with the Presentation Graphic Feature with Interactive Chart Utility must be installed. In an MVS/XA environment, GDDM Release 3 requires MVS/SP Version 2 Release 1.1.

- System Modification Program Release 4 (SMP4) is needed for the installation of MVS Financial Management System.

Subsequent releases and modification levels are supported unless otherwise stated.

**CONVERSION**

**Migrating from the IFP/FDP Version of Financial Management System (5785-NAC):** Migrating from the IFP version of Financial Management System to the program product MVS Financial Management System (still using TSO for the display system FDS) will be a small effort as the main design is kept consistent within the two products.

The migration activities are:

- Recompile BOS tailoring programs.
- Use a utility if saved report requests (PREVREQ) or data entry panels (PREVDATA) need to be brought over to the new system.

**Migrating from VSE/Financial Management System (5666-263):** Migrating from the VSE Financial Management System is of interest for customers who are moving all their activities from VSE to MVS. These customers are assumed to continue using CICS for the display system (FDS).

Also, these customers will benefit from the fact that the main design is kept consistent within the two products. Examples of this are described in the previous section.

In addition to normal migration activities when going from VSE to MVS, the only identified special migration activity is to recompile BOS tailoring programs.

**SECURITY/INTEGRITY**

General data security is provided by the use of DL/I data bases. This can be further extended if RACF (5740-XXH) is installed. In addition, specific functions are provided by MVS Financial Management System in the area of Security and Integrity:

- To get access to information about a company in the data bases from an online terminal, the user must be authorized for that company.
- Functions exist for input data validation, and tools are provided so the customer can extend these functions.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual* (GH19-6274).

The following documents will be available at program availability:

*Multiple Ledger System User's Guide* (GH19-6276) ... *Licensed Program Specifications* (GH19-6275) ... *Financial Management Display System User's Guide* (SH19-6277) ... *The Business Output/Tailoring System Programmer's Guide* (SH19-6278)

**SYSTEM INTEGRITY**

IBM will accept APARs where the installation of MVS Financial Management System introduces an exposure to the system integrity of OS/VS2 (MVS). MVS Financial Management System is intended to run unauthorized. Refer to Programming Announcement dated October 27, 1981.

**RPOs ACCEPTED: No**

PROGRAM PRODUCTS

**REPORT MANAGEMENT AND DISTRIBUTION SYSTEM  
RELEASE 1.0 (5665-310)**

**PURPOSE**

The Report Management and Distribution System is a series of programs which provide the MVS user with a system to store, protect, view and print system output on demand. This system gives the user the potential for reducing operational costs, decreasing report turnaround time and increasing report handling productivity.

**HIGHLIGHTS**

- Stores user-designated SYSOUT datasets
- Controls user access to stored datasets
- Provides terminal viewing of stored datasets through IMS, TSO or CICS
- Permits demand printing of a stored dataset
- Provides indexing or decollate capability
- Provides report owner review of output prior to release
- Provides Extended Support for the 6670 Information Distributor
- Supports the 3290 Information Panel

**DESCRIPTION**

**STORES SYSOUT DATASETS:** User-designated SYSOUT datasets are stored by an MVS external writer. Unique report identifiers are established and used in managing data retrieval.

**CONTROLS USER ACCESS:** RACF or VSAM cluster passwords can be used to control access to a report or group of reports. When RACF is used, users are not aware of the existence of reports they are not authorized to view. SMF records are generated to provide a detailed audit trail of report creation and deletion, viewing and printing. A user exit is provided for an interface to a user-supplied security system.

**PROVIDES TERMINAL ACCESS:** Access to the stored report images is provided via TSO, CICS and/or IMS to the IBM 3270-type display terminals including the 3178 model C2 and the 3290 Information Panel. The following panels are currently available: Signon panel (IMS and CICS only), primary option panel, index panel, versions panel, display panel, and print panels. Predefined PF keys are available to aid the user in the manipulation of data being viewed. These viewing functions include paging forward and backward, scanning, and reformatting. (Actual stored data is never reformatted.) Help panels are also provided.

At initial availability, the 3290 Information Panel will be supported by the Report Management and Distribution System under TSO. CICS support will be available during the third quarter of 1983 and IMS support during the fourth quarter of 1983.

**PERMITS DEMAND PRINTING:** Viewers of a report can request printing of a report or portions of a report on a 328X network printer, system printer or the 6670 Information Distributor. Restrictions can be placed on a report to limit the capability of a user printing the report. These restrictions include the control of page ranges to be printed and other print parameters.

**INDEXING:** Reports may be logically subdivided into control levels based on user-defined fields. Utilizing this concept the archiver dynamically supplies an index indicating, like a table of contents, where the control fields change. The index is stored as additional pages at the end of the report. The user may then view this index to facilitate access to a desired portion of the report.

**DECOLLATING:** Another use of the control level concept allows selective access to logical portions of a report. The report continues to exist in its entirety, controlled by a designated owner. Other users only have access to their portions of the report for viewing and printing.

**REPORT REVIEW/RELEASE:** This feature provides the capability for the owner of a report to review the report prior to releasing it for printing or viewing by other users.

**EXTENDED SUPPORT FOR THE 6670 INFORMATION DISTRIBUTOR:** This support provides:

- The capability on the Report Management and Distribution System Viewer's 6670 Print Panel to select options by 'filling in the blanks.'
- The capability to request the printing to the 6670 of a report or reports, or a list of stored reports, or a list of the stored versions of a report.
- The capability to signon to the system directly from an SNA 6670.
- The capability to request distribution to the SNA 6670 of all reports not yet transmitted which the user is authorized to access or to request a single available report be transmitted to multiple SNA 6670s.

**SUPPORT FOR THE 3290 INFORMATION PANEL:** The productivity of report viewing on the Report Management and Distribution System and report readability is increased with the use of the 3290 Information Panel. The capabilities of the 3290 Information Panel work with the functions of the Report Management and Distribution System to:

- Display a report page up to 160 columns across and 59 lines in depth, eliminating the need to scroll the report page.

- Provide help information in a scrollable partition along side of the report page being viewed if the report is 132 columns or less.
- Use the 3290 Multiple Interactive Screens Function to display reports on one half of the screen while using the other half of the screen to view another report, or logon to a different application or system.
- Use the 3290 Multiple Copy Function to save portions of the report on another part of the screen while continuing to view the report.

**CUSTOMER RESPONSIBILITIES**

**INSTALLATION:** The customer is responsible for installation. The process of installation and verification is estimated to take no more than two days. The basic steps involved are installing the libraries from the distribution tape, updating the installation's VTAM Definition Libraries to recognize the system's online application program, updating the MVS program properties table and archiving the sample reports. Additionally, for IMS, an IMS system generation and MFS generation are required and for CICS, a CICS generation is required.

**EXITS:** To allow flexibility for an installation to tailor the Report Management and Distribution System the following exit points have been supplied: initialization, termination, security, SMF logging, archive page GET/PUT, and print. Exit code is provided at the RACF security and SMF logging exit points and may be used or overridden as desired. The customer must supply any code necessary to make use of the other exit points.

**AUDITABILITY AND CONTROL:** An IBM-supplied user exit is available in the Report Management and Distribution System to provide the capability to do SMF logging. SMF records can be generated to provide a detailed audit trail of report archiving, viewing, and printing.

**SPECIFIED OPERATING ENVIRONMENT**

The operating environment for the Report Management and Distribution System is described in terms of a host processor, user terminals, printers and programming systems.

**HARDWARE REQUIREMENTS**

The Report Management and Distribution System is designed to operate with an IBM host processor that supports MVS. The IBM 3270 terminals (3277 model 2; 3278 models 2, 3, 4, and 5; and 3279 models 2 and 3) with Program Function keys, an IBM 3178 model C2 or an IBM 3290 Information Panel are required for online viewing of a report. VTAM network 328X or system JES printers(s) or the IBM 6670 Information Distributor are required to print a report. The 6670 is supported via JES as a point-to-point BSC Nonprogrammable Workstation RJE terminal or via IDWS as multipoint SNA.

**SOFTWARE REQUIREMENTS**

The Report Management and Distribution System operates with the following IBM products: MVS 3.7 or later (including MVS/XA 24-bit addressing mode) with SU 32 (System Security Support) if desired; JES2 or JES3; ACF/VTAM (5735-RC2) Version 1, Release 3, or ACF/VTAM (5665-280) Version 2; OS/VS VSAM; SP/VS (5668-009) or ISPF (5668-960); IMS/DC (5740-XX2) or CICS (5740-XX1); VTAM DSPRINT (5798-CPF) if printing to a VTAM cluster printer in the TSO environment is used, and IDWS (5740-AMA) for distribution to the SNA 6670.

**CONVERSION**

If an installation is currently using FCO (File Cabinet Option) (5798-CPY and DCG), an FCO to Report Management and Distribution System utility is available to convert the FCO directory to a Report Management and Distribution System directory. The utility can also move FCO archived reports onto the Report Management and Distribution System. Current FCO users may take the option to convert only their directories and view new versions of reports under the Report Management and Distribution System.

**SECURITY/INTEGRITY**

Customer management is responsible for the selection, application, and adequacy of security controls for their environment. RACF security or VSAM password protection for the reports is available.

**PERFORMANCE and PHYSICAL RESOURCE CONSIDERATIONS**

Actual performance of the Report Management and Distribution System Viewer may vary due to many factors such as system size and load, available storage and TSO, IMS, or CICS tuning. Data Streams used for display of the Report Management and Distribution System report data are blank compressed to keep the transmission time to a minimum.

The system can move varying large quantities of report data to and from storage. It is possible only to estimate the system load by monitoring activity. In an MVS/SP environment, the Hierarchical Storage Manager program product (5740-XRB) can be used to automate much of the storage management. If archived reports are to be defined to virtual (MSS) DASD, it is recommended for performance reasons that the directory be placed on real DASD.



PROGRAM PRODUCTS

**Report Management and Distribution System R1 (cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*Licensed Program Specifications (GC30-9562) ... General Information Manual (GC30-3191).*

Available at time of general availability of the Program Product:

*User's Guide (SC30-3192) ... User's Reference Summary (SC30-3197) ... Template for 3270 Display Terminals (SX27-3547) ... Archive Administrator's Guide (SC30-3196) ... Archive Administrator's Reference Summary (SC30-3176) ... Installation and Operations Guide (SC30-3193) ... 3290 Information Panel Support (SC30-3195) ... Two Inch-Three Ring Binder (SX27-3541).*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs where the installation of the Report Management and Distribution System introduces an exposure to the system integrity of MVS. Refer to Programming Announcement dated October 21, 1981. Certain Components of this system are intended to run authorized.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index





PROGRAM PRODUCTS

**3270-PC FILE TRANSFER PROGRAM  
5665-311**

**PURPOSE**

The 3270-PC File Transfer Program provides a 5150/5160 Personal Computer 3278/79 Emulation Adapter-featured computer, or a 3270-Personal Computer with the capability to transfer files to or from the host system to the workstation. This program product may be installed in MVS/TSO.

**HIGHLIGHTS**

The 3270-PC File Transfer Program allows files to be transferred from the host to the workstation for off-line data manipulation, updating, or correction or for the transfer and storage of local data in the host system.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for installing the proper program in the host system.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE/SOFTWARE REQUIREMENTS**

Either:

- IBM 3270 Personal Computer, 3270-PC Control Program, and IBM PC DOS 2.0 or,
- IBM Personal Computer 3278/79 Emulation Adapter in a 5150/5160 Personal Computer, Personal Computer 3278/79 Emulation Control Program, and IBM PC DOS 2.0.

**PACKAGING**

Each program product resides on a mini-reel.

**ORDERING INSTRUCTIONS:**

When ordering PP 5665-311 for MVS/TSO, specify either **#9029** for 9-track 1600 bpi Magnetic Tape or **#9031** for 9-track 6250 bpi Magnetic Tape.



PROGRAM PRODUCTS

**5665-948 - IBM BASIC (MVS/SP V1 and MVS/XA)  
5668-996 - IBM BASIC (VM/SP CMS)**

**PURPOSE**

IBM BASIC provides a problem-solving capability under VM/SP-CMS and under MVS/SP in both the interactive and batch environment. The BASIC language is easy to learn and easy to use. Its simplicity has broad appeal to non-computer professionals (business analysts, engineers, scientists, students, etc.), as well as to the professional programmer. The language is widely used as a problem solving tool across a broad range of business and scientific-oriented applications.

**SPECIAL SALES INFORMATION**

IBM BASIC is designed for new as well as existing users of BASIC. Such users of other BASIC products (including the VS BASIC program product 5748-XX1) will find that IBM BASIC offers advantages as an alternative to their current products.

**HIGHLIGHTS**

- Interactive source program development and debugging with line-by-line syntax checking.
- Extensive online HELP facilities.
- Object program execution in either batch mode or interactive mode.
- Variables can be given descriptive names which may be up to 40 characters long.
- The number of statements in a program is limited only by available storage.
- Control of the display screen is available for use in applications.

**DESCRIPTION**

**BASIC LANGUAGE STANDARDS:** IBM BASIC is designed according to the specifications of the following industry standards, as understood and interpreted by IBM in July 1982:

- American National Standard (ANS) Minimal BASIC, ANSI X3.60-1978.
- European Computer Manufacturers Association Standard for Minimal BASIC ECMA-55 Minimal BASIC, January 1978.
- International Organization for Standardization proposed standard ISO Minimal BASIC DP ISO-6373.

These standards are technically equivalent. ANSI and ECMA have recently completed the specification of an enhanced BASIC. IBM BASIC contains a number of the proposed enhancements. In addition, IBM BASIC has many features from other BASIC products of IBM which are not contained in the above standard.

**FEATURES of IBM BASIC**

- The easy-to-use interactive facilities permit the user to interactively edit and dynamically debug a program at the terminal. Each statement is checked for syntax as it is entered.
- A comprehensive CALL statement is included:
  - Can call other BASIC source programs contained within the same workspace.
  - Can call precompiled subroutines.
  - Can call programs written in other languages (COBOL, VS FORTRAN and PL/I) are explicitly supported.
  - Can call the Graphical Data Display Manager (GDDM) Release 2 or later with its Presentation Graphics feature to provide access to a whole host of Graphics and full screen control functions.
  - Can call the host system to execute its subset commands.
- The HELP command gives users interactive assistance in learning or using IBM BASIC.
- Use of the Discontiguous Shared Segment feature of VM/SP, so that a single copy of IBM BASIC (or a single copy of a compiled IBM BASIC program) can be shared by many users.
- Screen scrolling.
- An application program in BASIC can fully control a display screen, in order to improve end-user communication.
- An extensive range of intrinsic functions is included for arithmetic and character operations.
- Structured programming aids.
- User-defined functions.
- VSAM support through the BASIC language for:
  - Sequential Data Sets (ESDS)
  - Relative Record Data Sets (RRDS)
  - Indexed Data Sets (KSDS)

- Saving and loading of source programs using either VSAM data sets (ESDS) or host system files.
- Input/output facilities that provide great flexibility in accessing input data and in formatting output data.
- Alternate collating sequence support (ASCII or EBCDIC).
- Extensive data manipulation capabilities, including arithmetic operations on variables and arrays with high precision.
- Immediate execution of BASIC commands and certain BASIC statements.
- Support for host system sequential and direct files.
- Symbolic alphanumeric statement labels are permitted.
- Identifiers and labels may be up to 40 characters long.
- Versatile character string handling, enabling the user to define character variables of different lengths, to concatenate groups of character data items, and to locate and extract substrings.
- Comprehensive array handling operations for both numeric and character arrays of up to seven dimensions.
- Implicit data typing.
- No arbitrary limit to the number of statements in a program. It is only limited by the size of the virtual address space.
- Many unusual conditions and errors can be handled specifically by an application using IBM BASIC statements.
- IBM BASIC and all generated code (except for one 'root' module in the VM/SP CMS product) is reentrant and can reside in shared storage.
- A Federal Information Processing Standard (FIPS) flagger will indicate the use of BASIC extensions that are not within the standard.

**CUSTOMER RESPONSIBILITIES and INSTALLATION**

To install IBM BASIC, the user:

- Chooses the options and system parameters as described in *IBM BASIC/MVS: Installation and Customization (SC26-4105)* and in *IBM BASIC/VM: Installation and Customization (SC26-4025)*.
- Executes the defined procedures provided for installation.
- Uses the installation verification procedures to test for successful installation.

Each customer installation, operating with or maintaining IBM BASIC, must have a working knowledge of the MVS/SP or VM/CMS systems.

It is the customer's responsibility to make the changes in the customer's existing BASIC programs necessary to run under IBM BASIC. It is also the customer's responsibility to ensure type compatibility when exchanging data with programs written in other languages while using IBM BASIC.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**By IBM BASIC/MVS:** IBM BASIC/MVS Release 1 operates on all IBM processors supported by MVS/SP Version 1 Release 3 or by MVS/XA, or by subsequent releases unless otherwise announced.

For IBM BASIC/MVS, a minimum of approximately 372K bytes of virtual storage is required if the 'space' installation option is chosen, or 552K bytes if the 'speed' installation option is chosen, in order to operate BASIC/MVS. This required virtual storage may be provided in shared storage (LPA). In addition, for each user, the virtual storage required to compose and execute a normal 200-line BASIC program is approximately 40K bytes. In addition, MVS/SP needs space within the user's virtual address space.

The direct-access storage space required for IBM BASIC/MVS is independent of the device type. It ranges from 4,380 to 6,800 blocks of 1,000 bytes each, depending on which installation alternatives are chosen.

**By IBM BASIC/VM:** IBM BASIC/VM Release 1 operates on all IBM processors supported by VM/SP Release 1 or by subsequent releases, unless otherwise announced. A minimum of approximately 365K bytes of virtual storage is required if the 'space' option is chosen, or 545K bytes if the 'speed' option is chosen to operate IBM BASIC/VM. This required virtual storage may be provided in shared storage. In addition, for each user, the virtual storage required to compose and execute a normal 200-line BASIC program will be approximately 40K bytes. In addition, VM/SP-CMS needs space within the user's virtual machine.

The direct access storage space required for IBM BASIC/VM residence is independent of the device type. It ranges from 2,080 to 4,500 blocks of 1,000 bytes each, depending on which installation alternatives are chosen.



## PROGRAM PRODUCTS

**IBM BASIC (cont'd)**

The processor must include the decimal and floating-point instruction sets.

By **IBM BASIC Object Program Execution**: Storage requirements are dependent upon the facilities and functions used in the source program. The decimal and floating-point instruction sets are required. The timer feature is required if the **TIME** built-in function is used, or if the time for processing is required, or if the **RANDOMIZE** keyword is used to alter the random number sequence.

User programs utilize IBM input/output devices as supported by the host systems.

**SOFTWARE REQUIREMENTS**

**General**: IBM BASIC/MVS operates under MVS/SP Version 1 Release 3 and MVS/SP Version 2 Release 1, and under subsequent releases unless otherwise announced.

IBM BASIC/VM operates under the CMS component of VM/SP Release 1 and under subsequent releases unless otherwise announced. If VSAM files are used, the licensed program VSE/VSAM Release 2 (5746-AM2) is required.

**Execution**: A copy of IBM BASIC must be installed on each machine where the IBM BASIC object programs are to be executed.

**COMPATIBILITY**

There are incompatibilities between the language and data supported by VS BASIC (5748-XX1) and IBM BASIC. These incompatibilities are significant differences in both syntax and semantics.

However, IBM BASIC is in the same syntactic family with the System/23, System/34, System/36 and the RM BASIC (5797-BCX) BASIC language.

**CONVERSION and MIGRATION**

IBM BASIC is designed to translate and run successfully all valid BASIC source programs conforming to the ANS Minimal BASIC Standard.

A Federal Information Processing Standard (FIPS) flagger is provided to verify conformance to FIPS Publication 68, and to indicate the use of BASIC extensions that are not within the standard.

**DATA SECURITY**

IBM BASIC is intended to run under MVS/SP or VM/SP-CMS and is subject to their controls. Customers must employ these controls to provide for user-to-user and user-to-system isolation, and to control data sharing among users. Customers are responsible for the selection, implementation, and adequacy of these controls. In establishing controls, it should be recognized that end-users can issue host system commands.

**PERFORMANCE**

Because the environment in which IBM BASIC Release 1 operates can be virtual, real storage requirements are largely a function of performance desired.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM BASIC General Information (GC26-4023) ... IBM BASIC/MVS: Licensed Program Specifications (GC26-4110) ... IBM BASIC/VM: Licensed Program Specifications (GC26-4024) ... IBM BASIC/MVS: Installation and Customization (SC26-4105) ... IBM BASIC/VM: Installation and Customization (SC26-4025) ... IBM BASIC Application Programming: Language Reference (GC26-4026) ... IBM BASIC Application Programming: Guide (SC26-4027) ... IBM BASIC/MVS Application Programming: System Services (SC26-4106) ... IBM BASIC/VM Application Programming: System Services (SC26-4028) ... IBM BASIC Application Programming: Reference Summary (SX26-3736) ... IBM BASIC/MVS Diagnosis: Guide (SY26-3942) ... IBM BASIC/VM Diagnosis: Guide (SY26-3905).*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs where the installation of the IBM BASIC/MVS licensed program introduces an exposure to the system integrity of MVS.

Refer to Programming Announcement dated October 21, 1981. This program is intended to run 'unauthorized'.

**RPOs ACCEPTED**: No

PROGRAM PRODUCTS

**INFORMATION/SYSTEM VERSION 2  
MVS/TSO (5665-952)**

**PURPOSE**

Information/System Version 2 is a licensed program that assists a user in managing a data processing installation by providing an online, interactive facility for collecting, managing, displaying and reporting information frequently needed. Information/System is the base product that provides the mechanism for loading, searching, reviewing and reporting user data. Its functions and utilities are used by the optional companion licensed programs Information/Management Version 2 and Information/MVS or Information/VM-VSE.

Information/System Version 2 is intended to replace Information/System Version 1 (5735-OZS) for the MVS environment. Additional function and usability enhancements have been included in Version 2.

**HIGHLIGHTS**

- Information/System runs with the Interactive System Productivity Facility (ISPF) and utilizes many of its functions, such as split-screen and PF key tailoring. In addition, the Information/System user interface has been enhanced to resemble the ISPF user interface. In most cases, Information/System operation is identical to or closely resembles that of ISPF, e.g., command function and format, selection and deletion of items on a list, and screen scrolling.
- A new report tailoring facility makes it possible to modify, add, and delete data fields on standard and new user-developed reports to satisfy the unique data reporting requirements of a data processing installation. Complex reporting requirements may be addressed by user exits and the ability to make all Information/System and Information/Management data available to external reporting programs.
 

Reports, previously a part of Information/Management, are now available with Information/System. The Version 1 customized report facility will continue to be supported so that current customized reports will run under Version 2. Any further customization of reports should be done through the new report tailoring facility. Restrictions in the Version 1 customized report (e.g., freeform text) have been removed in the new report tailoring facility.
- The report tailoring facility has also been enhanced:
  - To allow reports to be initiated by batch jobs.
  - To allow the data base to be updated while reports are being generated.
  - To allow data from records not contained in the user's search results list to be included in reports.
- Performance enhancements have been made. See details in the "Performance" section.
- The response chaining facility has been enhanced:
  - To allow some commands, such as Report, to be imbedded within stored response chains (SRCs).
  - To store SRCs in the Information/System data base, thereby making SRC records available to Information/System facilities such as searching, reporting, deleting, and authorization (see below).
  - To simplify the changing of existing SRCs within Information/System.
  - To allow immediate response chain (IRC) execution with the Information/System invocation.
  - To remove the Version 1 restriction on SRC resumption after returning from freeform text selection.
 

The response chaining facility, including SRCs, was previously a part of Information/Management. It is now a part of Information/System, and is available to all its companion products.
- The privileged class facility has been enhanced:
  - To authorize the display of Information/System records.
  - To separate authorization for record create and update.
  - To provide authorization for SRC records.
 

The privilege class facility, previously a part of Information/Management, is now a part of Information/System and is available to all its companion products.
- Variable-length panels, such as search results list and freeform text are enhanced to automatically expand to fill the number of lines available on the physical screen.
- Version 1 currently 'date stamps' entries made to the freeform text and history portions of a record. With Version 2, this function is expanded to include a 'time stamp' and 'userid stamp' as well.

This facility, previously a part of Information/Management, is now a part of Information/System and is available to all its companion products.

- A listing of prefix words (known to the Information/System Version 1 - Information/MVS user as keywords) and corresponding data fields is available online.
- Read/write access to Information/System data sets by multiple systems is provided by the global resource serialization facility of MVS/SP Version 1 Release 2 or later.
- Profiles, controlled by Information/System, enable users to personalize various default values, change them within a session, and preserve them across sessions. These values include such categories as print and report output destinations, scroll amounts, uppercase and lowercase data display, and positioning of command line at top or bottom of screen.
- The 'products' load modules have been restructured so that there will no longer be a need to reinstall Information/System for a later installation of Information/Management.
- The consistency between the Information/System - Information/Management and Information System - Information/MVS or Information/VM-VSE user interfaces has been enhanced by making product selection, commands, and data set allocation and deallocation procedures common across the Information/System companion products.
- Separate data bases may be created to store installation-specific information in an Information/MVS or Information/VM-VSE format. All or selected parts of the user data generated with Information/System Version 1 may be copied to the Version 2 user data format.
- New Information/System utilities are used with the Information/MVS or Information/VM-VSE product for the loading and tailoring of the data base. These new utilities allow the user to better address any potential tradeoffs he may wish to make between amount of data desired and amount of DASD space required through the following:
  - Data base tailoring is both enhanced and simplified.
  - The statistics function is revised and streamlined to provide a more meaningful set of information about the amount of data selected.
  - The tailoring and merge step of the load utility generates a VSAM space requirements report without performing an actual load function, thus allowing for more accurate allocation of DASD space.
- An installation may designate one of several alternative formats provided for expressing data fields on panels and reports.

**DESCRIPTION**

Information/System assists a user in managing a data processing installation by providing an online, interactive facility for collecting, managing, displaying and reporting information frequently needed.

Information/System without its related companion products provides a mechanism for loading, searching, reviewing and reporting user data in a manner similar to that described below for Information/MVS or Information/VM-VSE.

Its functions and utilities are also used by the optional companion licensed programs, Information/Management and Information/MVS or Information/VM-VSE.

**INFORMATION/SYSTEM with INFORMATION MANAGEMENT**

Information/System, in conjunction with Information/Management is a set of conversational applications used to help manage information about problems, changes, and component configuration information. With Information/System and Information/Management, the user may create, display, update, print and delete records that document the installation's data processing problems, changes and configuration information. These records are stored in the Information/System data base and can be searched according to the user's criteria. For example, the user may search for open problems that have been recorded for a particular location, changes scheduled for a specific date, changes for which the user is responsible, the names of personnel responsible for servicing a component, or the relationships between certain problems, changes or system components. Upon user request, a variety of standard and installation-created reports may be produced.

**INFORMATION/SYSTEM with INFORMATION/MVS or INFORMATION/VM-VSE**

Information/System, in conjunction with Information/MVS or

## Information/System V2 (cont'd)

Information/VM-VSE, provides user access to a wide range of technical information that may be used to assist in effective management of MVS, VM/370, VSE, and VS1 (with Information/MVS) or VM/370 and VSE (with Information/VM-VSE) data processing systems.

The user employs Information/System capabilities to search the data base, to browse retrieved records, and to print selected data. The information covers many aspects of the operating systems and related subsystems, licensed programs, components and documentation. A tape containing updated information is sent to the installation periodically.

Types of information in Information/MVS or Information/VM-VSE include:

- Technical newsletters, flashes, and corrective information (such as found in System Engineering Communications (SECOM)), and additional support information not generally found in other published documents. This information is provided by Support Centers.
- Corrective information in Program Temporary Fixes (PTFs), Program Level Changes (PLCs), and additional material such as that found in the Early Warning System (EWS). This information is provided by Field Engineering locations.
- A range of technical information varying from overview material found in product announcement notices to detailed documentation found in publications. This information is prepared by product development groups.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

Information/System Version 2 operates on any IBM Processor that meets the minimum specifications of the supported operating system environments described under "Software Requirements". Information/System has no dependencies on any new hardware equipment or changes.

An IBM 3270 display terminal that supports a screen of at least 24 lines by 80 characters must be available. Devices that may be used with Information/System include the following IBM display stations:

- 3275 mdls 2 and 12
- 3276 mdls 2, 3, 4, 12, 13 and 14
- 3277 mdl 2
- 3278 mdls 2, 3, 4 and 5
- 3279 all models when operated in compatibility mode

#### SOFTWARE REQUIREMENTS

Information/System Version 2 functions as an application under the Interactive System Productivity Facility (ISPF) program product with PTF numbers UZ63880 and UZ61801 installed. ISPF operates as a TSO command processor under the Time Sharing Option of OS/VS2 Release 3.8 (MVS), MVS/SP Version 1 Release 1.1, or MVS/SP Version 2 Release 1 with its corequisite Data Facility Product, and subsequent releases unless otherwise notified by IBM. The Basic Partitioned Access Method (BPAM) and the Basic Sequential Access Method (BSAM) of either OS/VS2 MVS Release 3.8, or of the Data Facility Product are required by ISPF for reading and writing data sets, and the Telecommunications Access Method (TCAM) or the Virtual Telecommunications Access Method (VTAM) is required for terminal communication. The telecommunication access methods supported are:

- TCAM 10 (available with MVS)
- ACF/TCAM Version 2 Release 2 or later (5735-RC3)
- VTAM 2 (available with MVS)
- ACF/VTAM Version 1 Release 2 or later (5735-RC2)

In the TSO/TCAM environment, if the full-screen option is not included in the message control program (MCP), a TCAM MCP generation with the full-screen option is required.

The Information/System utilities, used to load the Information/MVS or Information/VM-VSE data base, and used in the Information/System data base index rebuild procedures, require the IBM OS/VS Sort/Merge program product (5740-SM1) or a compatible sort/merge product.

For shared DASD support for Information/System Version 2, the global resource serialization facility of MVS/SP Version 1 Release 2 is required.

Information/System requires no changes to OS/VS2 MVS system storage requirements. For planning purposes, the virtual storage

required for Information/System is approximately 1,000K bytes (K equals 1,024) per user. Information/System also requires approximately 15 cylinders in SYS1.LINKLIB (3330 mdl 2-formatted tracks). In addition, approximately 5 cylinders are required for the Information/System VSAM dictionary data set, VSAM panel data set and report format table data set.

DASD storage for the data sets that constitute the Information/System data base varies with the amount of data the user enters. A data base of 1,000 entries (as might be used with Information/System only) requires approximately 20 cylinders; a data base of 10,000 entries (as might be used with Information/System and Information/Management) requires approximately 145 cylinders.

For additional information concerning storage and DASD requirements and tailoring options, refer to the *Information/System Installation* manual.

### PLANNING INFORMATION

ISPF, and therefore Version 2 of Information/System, does not run on NCCF. To obtain a level of function similar to that available with Version 1 under NCCF, Version 2 users can access Information/System Version 2 under TSO through the NCCF Terminal Access feature.

### INSTALLATION

The installation of Information/System Version 2 via SMP or SMP/E deletes Information/System Version 1. You may want to take the necessary steps to have both products available during a transition state. This can be accomplished by maintaining Information/System Version 1 on a completely separate set of backup packs, or in a set of libraries that do not interfere with the execution of Information/System Version 2. Installation procedures to run both Information/System Version 1 and Information/System Version 2 concurrently are described in the *Information/System Installation* manual.

### COMPATIBILITY

Existing functions in Information/System Version 1 for the MVS environment are available in Version 2, although the usage of some have changed; additionally, many of the functions have been enhanced. Differences between Version 1 and Version 2 are highlighted in the Version 2 publications.

Privilege class records must be recreated for Version 2 because of the enhanced authorization capability available with Version 2.

With the exception of privilege class records, users with existing Version 1 data bases can run Version 2 of Information/System without needing to make any changes to the data base. However, after using the data base with Information/System Version 2, the user can no longer use the data base with Version 1. For further information, refer to the *Information/System Installation* manual.

No SRCs are shipped with Version 2, as was done for Version 1. Version 1 SRCs will not run with Version 2.

The Information/Access feature of Information/System Version 1 Release 2 will not run with Information/System Version 2. However, it is our intent to enhance Information/Access to run with Information/System Version 2.

### MIGRATION

Migration considerations from Version 1 to Version 2 are documented in the *General Information* manual.

### DATA SECURITY

Information/System data set access can be controlled by RACF. Customers are responsible for the selection, adequacy and implementation of the necessary controls for the protection of their data.

### PERFORMANCE

Information/System is an application that executes as a problem program under ISPF. Information/System does not require any permanently assigned pages of real and virtual storage. No changes to the base system code path lengths are required. When Information/System is installed but not operational, there is no performance impact on the base system.

Information/System operates concurrently with other applications. The effect is the same as similar terminal applications in these environments. The response time for any particular operation varies with the complexity of the function, the speed of the processor or other devices, the current system load, and the data sets required to perform the function. As with other terminal applications, base system supervisor facilities may be used to establish the amount of service that any particular user receives.

**Performance Highlights:** Performance enhancements have been made in the following areas:

- The Version 1 PTF reducing the SDIDS-rebuild utility (BLGUT1) run time has been incorporated into Version 2.

## PROGRAM PRODUCTS

**Information/System V2 (cont'd)**

- The Version 1 PTFs improving response times for record file operations have been incorporated into Version 2; further improvements in response time for record file operations have been made.  
With Information/Management Version 2, the installation can specify which data entry fields are to be included in the SDIDS. With this ability, the installation can further reduce file response time if it is determined that not all fields need to be searchable.
- In addition to the Non-Shared Resource (NSR) VSAM option supported in Version 1, Version 2 supports the VSAM Local Shared Resource (LSR) option. This allows for better tuning of performance through control of both the size and number of VSAM buffers.
- With Version 2, response time for activities that update the data base can be reduced if the user selects the option that will free the data base periodically during report processing.
- The time from search until the appearance of the standard search results list, for a large number of records found, has been reduced. This response time will generally be constant and independent of the size of the data base or number of records found by the search.
- Virtual storage requirements for load modules have been segmented by product function and virtual storage is allocated only at the first use of each function. This means, for example, that virtual storage needed to support the report function will not be allocated for the user who only opens problems. In addition, an installation can specify the maximum amount of virtual storage which should be allocated by Information/System for load modules.
- Information/System supports GTF hooks which can be activated to provide an installation with a trace of performance-related information.
- Panels, stored in a partitioned data set in Version 1, are stored in a VSAM data set in Version 2. This reduces response time due to panel retrieval.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Information/System General Information (GC34-2097).*

Available at FCS: *Information System Licensed Program Specifications (GC34-2097) ... Information/System Installation (SC34-2100) ... Information/System Reference (SC34-2105) ... Information/System Messages and Codes (SC34-2106) ... Information/System Diagnosis (SC34-2119).*

**SYSTEM INTEGRITY**

IBM will accept APARs where the installation of Information/System introduces an exposure to the system integrity of OS/VS2 (MVS). Refer to Programming Announcement dated October 21, 1981. Information/System is intended to run authorized.

**RPQs ACCEPTED:** Yes

PROGRAM PRODUCTS

5665-953 - INFORMATION/MANAGEMENT V2 (MVS/TSO)

PURPOSE

Information/Management Version 2 program is used in conjunction with Information/System Version 2 to help manage information about problems, changes and component configurations. With Information/Management, the user may create, display, update, print and delete records that document the installation's data processing problems, changes and configuration information. These records are stored in the Information/System data base and can be searched according to the user's criteria. Information/Management Version 2 is intended to replace the Information/Management feature of Information/System Version 1 (5735-OZS). Additional function and usability enhancements have been included in Version 2.

HIGHLIGHTS

- A new panel modification facility (PMF) makes it possible to modify, add and delete data fields and panels to satisfy the unique data collection requirements of a data processing installation. PMF replaces the less versatile panel edit facility of the Information/Management feature of Information/System Version 1. See details in the "Panel Modification" section below.
- Performance enhancements have been made. See details in the "Performance" section.
- The privilege class facility has been enhanced:
  - To authorize the display, assignment and close of records.
  - To provide separate authorization for financial records and for PMF.
- The products' load modules have been restructured so that there will no longer be a need to reinstall Information/System for a later installation of Information/Management.
- The consistency between Information/System - Information/Management and Information/System - Information/MVS or Information/VM-VSE user interfaces has been enhanced by making product selection, commands, and data set allocation and deallocation procedures common across the Information/System companion products.

In addition to the above, the following additional enhancements, while a part of Information/System Version 2, are available to users of Information/Management Version 2:

- Information/System runs with the Interactive System Productivity Facility (ISPF) and utilizes many of its functions, such as split-screen and PF key tailoring. In addition, the Information/System user interface has been enhanced to resemble the ISPF user interface. In most cases, Information/System operation is identical to or closely resembles that of ISPF, e.g., command function and format, selection and deletion of items on a list, and screen scrolling.
- A new report tailoring facility makes it possible to modify, add and delete data fields on standard and new user-developed reports to satisfy the unique data reporting requirements of a data processing installation. Complex reporting requirements may be addressed by user exits, and the ability to make all Information/System and Information/Management data available to external reporting programs.

The Version 1 customized report facility will continue to be supported so that current customized reports will run under Version 2. Any further customization of reports should be done through the new report tailoring facility. Restrictions on the Version 1 customized report facility on what types of data can be included on a customized report (e.g., freeform text) have been removed in the new report tailoring facility.

- The report facility in Version 2 has also been enhanced:
  - To allow reports to be initiated by batch jobs.
  - To allow the data base to be updated while reports are being generated.
  - To allow data from records not contained in the user's search results list to be included in reports.
- The response chaining facility has been enhanced:
  - To allow some commands, such as Report, to be imbedded within stored response chains (SRCs).
  - To store SRCs in the Information/System data base, thereby making SRC records available to Information/System facilities such as searching, reporting, deleting and authorization (see below).
  - To simplify the changing of existing SRCs within Information/System.
  - To allow immediate response chain (IRC) execution with the Information/System invocation.

- To remove the Version 1 restriction of SRC resumption after returning from freeform text selection.

- Variable-length panels, such as search results list and freeform text are enhanced to automatically expand to fill the number of lines available on the physical screen.
- Version 1 currently 'date stamps' entries made to the freeform text and history portions of a record. With Version 2, this function is expanded to include a 'time stamp' with 'userid stamp' as well.
- A listing of prefix words (known to the Information/System Version 1 - Information/MVS user as keywords) and corresponding data fields is available online.
- Read/write access to Information/System data sets by multiple systems is provided by the global resource serialization facility of MVS/SP Version 1 Release 2 or later.
- Profiles, controlled by Information/System, enable users to personalize various default values, change them within a session, and preserve them across sessions. These values include such categories as print and report output destinations, scroll amounts, uppercase or lowercase data display, and positioning of command lines at top or bottom of screen.
- An installation may designate one of several alternative formats provided for expressing data fields on panels and reports.

DESCRIPTION

Information/Management is a licensed program that is used in conjunction with Information/System to assist the user in managing problem, change, and configuration information within a data processing installation.

Information/Management users can be system administrators, clerks, managers, internal auditors, operators, and system and application programmers, or other system or operational personnel. This diverse group uses Information/Management by means of a dialog called the prompting sequence that allows each user to apply techniques (such as response chaining) applicable to his level of expertise, his familiarity with the product, and the task he wishes to perform.

The Information/System data base retains the data that the user enters during this dialog. Upon user request, Information/Management extracts user-specified information from the data base and displays it on panels or prints it in a report.

Information/Management provides:

- An online means for recording, managing, displaying and reporting information about problems, changes and configuration data.
- An online panel modification facility, called PMF, that allows the user to satisfy the installation's requirements to tailor the collection of data by modifying, adding, and deleting data fields and panels.

Each of the facilities includes functions that help the user describe, access, and manage information about his installation.

**Problem Management:** The problem management portion of Information/Management provides information necessary to assist in efficient resolution of data processing problems. It can also provide information about the causes of problems and their effects. By using problem management to track, coordinate and report on problems, the management of an installation may obtain information that could influence decisions that would minimize the number and severity of future problems.

With Information/Management's capabilities, a user can:

- Enter initial problem information into the Information/System data base.
- Assign a problem to appropriate personnel for resolution.
- Update the problem description as additional information becomes known.
- Identify problems that have exceeded their target resolution date.
- Search for and display selected information related to a problem.
- Determine if a new problem is a duplicate of a known problem.
- Report on problems with specific characteristics.
- Close a problem and record resolution information.
- Relate problems, changes and system components.
- Maintain the history of a problem (e.g., who is working on it, actions taken, current status).
- Summarize and categorize the major causes of problems and the effects.

**Change Management:** The change management portion of Information/Management can help the user coordinate enhancements and fixes to software and hardware components, data processing procedures, application programs and other facilities of the data

PROGRAM PRODUCTS

**Information/Management V2 (cont'd)**

processing installation. The purpose is to provide data processing management with the information that will enable them to make better decisions about the frequency, timing and types of changes planned for the systems environment, in order to minimize disruption of service. It can also assist in the consistent preparation and screening of all proposed changes, which may minimize the number and severity of faulty changes that would result in service disruptions.

With Information/Management's capabilities, a user can:

- Request a change.
- Define related activities.
- Record information about implementation plans for changes and related activities.
- Update a change description as additional information becomes known.
- Search for and display selected information related to a change request.
- Register approval or disapproval of a change.
- Report on changes with specific characteristics.
- Record a change as complete.
- Relate changes, problems, and system components.
- Maintain the history of a change (e.g., success, failure, timeliness).
- Produce a comprehensive picture of all planned changes for a specified period, date, component or location.

Using these capabilities, data processing personnel can monitor individual or collective change status and ascertain whether changes are being approved, rejected, and implemented on schedule. Also, it may be easier to identify potential conflicts when multiple changes are scheduled for the same time period. The improvement of overall change administration through the use of change management can contribute to a more stable data processing environment.

**Configuration Management:** The configuration management portion of Information/Management helps the user maintain a single, up-to-date inventory of system and network components.

With Information/Management capabilities, a user can:

- Maintain information about the inventory of hardware and software components.
- Maintain financial information pertaining to these components.
- Identify the connections between these components.
- Record the assignment of components to responsible contacts.
- Update configuration data as changes are implemented.
- Search for and display selected configuration data.
- Display paths between two components in a system to assist, for example, in network problem determination.
- Report on specified configuration information.

When a failing component has been identified, configuration information can be of value in efforts to institute bypass and recovery procedures and, thus, quickly restore service to the user. System configuration information is also valuable in determining the source of problems, monitoring system status, and allocating system resources.

**Panel Modification:** The panel modification facility (PMF) makes it possible to adapt Information/Management panels to the unique data collection needs of a data processing installation. Through PMF, the user is given the ability to:

- Modify field names.
- Rearrange field sequence.
- Add new fields.
- Delete unused fields.
- Condense needed fields onto a minimum number of panels.
- Modify menu selection panels to reflect data entry panels used.
- Specify field validation criteria.
- Specify required and journalled fields.
- Specify fields to be displayed on the search results list panel.
- Specify the field on which the search results list is to be sorted.
- Specify fields to be extracted from referenced records, as records are created and updated.
- Specify authorization at the field and panel levels.
- Expand the number of users which can be assigned to a privilege class.

- Tailor the width of certain panels (such as text panels, search results panels, and data entry panels).
- Personalize help and tutorial panels.

Panels tailored with PMF can more fully satisfy the unique requirements of the data processing installation in the areas of data content, screen format, and terminology.

As with other Information/Management user-system interactions, the person modifying the panels is prompted step-by-step, panel-by-panel, and responds to a sequence of instructions by selecting options and inserting information. The user creates and updates panels by using a combination of direct entries, cursor movements, and screen commands.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Information/Management Version 2 operates on any IBM Processor that meets the minimum specifications of the supported operating system environments described under "Software Requirements". Information/Management has no dependencies on any new hardware equipment or changes.

An IBM 3270 display terminal that supports a screen of at least 24 lines by 80 characters must be available. Devices that may be used with Information/Management include the following IBM display stations:

- 3275 mdls 2 or 12
- 3276 mdls 2, 3, 4, 12, 13 and 14
- 3277 mdl 2
- 3278 mdls 2, 3, 4 and 5
- 3279 all models when operated in compatibility mode

**SOFTWARE REQUIREMENTS**

Information/System Version 2 is the base product required by Information/Management Version 2. Information/Management Version 2 functions as an application under the Interactive System Productivity Facility (ISPF) program product with PTF numbers UZ63880 and UZ61801 installed. ISPF operates as a TSO command processor under the Time Sharing Option of OS/VS2 (MVS) Release 3.8, MVS/SP Version 1 Release 1.1, or MVS/SP Version 2 Release 1 with its corequisite Data Facility Product, and subsequent releases unless otherwise notified by IBM. The Basic Partitioned Access Method (BPAM) and the Basic Sequential Access Method (BSAM) of either OS/VS2 (MVS) Release 3.8 or of the Data Facility Product are required by ISPF for reading and writing data sets, and the Telecommunications Access Method (TCAM) or the Virtual Telecommunications Access Method (VTAM) is required for terminal communications. The telecommunications access methods supported are:

- TCAM 10 (available with MVS)
- ACF/TCAM Version 2 Release 2 or later (5735-RC3)
- VTAM 2 (available with MVS)
- ACF/VTAM Version 1 Release 2 or later (5735-RC2)

In the TSO/TCAM environment, if the full-screen option is not included in the message control program (MCP), a TCAM MCP generation with the full-screen option is required.

Information/System and Information/Management require no changes to OS/VS2 MVS system storage requirements. For planning purposes, the virtual storage required for Information/System is approximately 1,000K bytes (K equals 1,024) per user. Information/System also requires approximately 15 cylinders in SYS1.LINKLIB (3330 mdl 2 formatted tracks). In addition, approximately 5 cylinders are required for the Information/System VSAM dictionary data set, VSAM panel data set and report format table data set.

In addition to that required by Information/System, the virtual storage required for Information/Management is approximately 50K bytes per user for problem, change and configuration functions, and an additional 450K bytes per user for PMF functions. The additional DASD storage required by Information/Management libraries is approximately 4 cylinders in SYS1.LINKLIB, and an additional 23 cylinders for the VSAM dictionary data set, VSAM panel data set and report format table data set.

DASD storage for the data sets that constitute the Information/System data base varies with the amount of data the user enters. A data base of 1,000 entries (as might be used with Information/System only) requires approximately 20 cylinders; a data base of 10,000 entries (as might be used with Information/System and Information/Management) requires approximately 145 cylinders.

For additional information concerning storage and DASD requirements and tailoring options, refer to the *Information/System Installation manual*.

PROGRAM PRODUCTS

**Information/Management V2 (cont'd)**

**PLANNING INFORMATION**

Version 2 of Information/Management does not run on NCCF. To obtain a level of function similar to that available with Version 1 under NCCF, (including the transfer of data from NPDA to Information/Management), Version 2 users can access Information/Management Version 2 under TSO through the NCCF Terminal Access feature.

The transfer of NPDA data to Information/Management will continue to operate as it does in the Information/Management feature of Information/System Version 1. NPDA will continue to invoke, in the NCCF address space, a small subset of Information/Management modules whose only function is to enter NPDA information into the Information/System data base.

**INSTALLATION**

The installation of Information/Management Version 2 via SMP or SMP/E deletes the Information/Management feature of Information/System Version 1. You may want to take the necessary steps to have both products available during a transition stage. This can be accomplished by maintaining the Information/Management feature of Information/System Version 1 on a completely separate set of backup packs, or in a set of libraries that do not interfere with the execution of Information/Management Version 2. Installation procedures to run both the Information/Management feature of Information/System Version 1 and Information/Management Version 2 concurrently are described in the *Information/System Installation* manual.

**COMPATIBILITY**

Existing functions in the Information/Management feature of Information/System Version 1 are available in Version 2, although the usage of some have changed; additionally, many of the functions have been enhanced. Differences between Version 1 and Version 2 are highlighted in the Version 2 publications.

Privilege class records must be recreated for Version 2 because of the enhanced authorization capability available with Version 2.

With the exception of privilege class records, users with existing Version 1 data bases can run Version 2 of Information/System without needing to make any changes to the data base. However, after using the data base with Information/System Version 2, the user can no longer use the data base with Version 1. For further information, refer to the *Information/System Installation* manual.

**MIGRATION**

Migration considerations from the Information/Management feature of Information/System Version 1 to Information/Management Version 2 are documented in the *General Information* manual.

**AUDITABILITY**

Information/System and Information/Management, when used with an adequate set of management controls and standards, will assist the user in establishing problem management, change control, and configuration management procedures. Internal auditors will find these features to be of particular interest.

**DATA SECURITY**

Access to Information/System data sets used by Information/Management can be controlled by RACF. Customers are responsible for the selection, adequacy and implementation of the necessary controls for the protection of their data.

**PERFORMANCE**

Information/Management is an application that executes as a problem program under ISPF. Information/Management does not require any permanently assigned pages of real or virtual storage. No changes to the base system code path lengths are required. When Information/Management is installed but not operational, there is no performance impact on the base system.

Information/Management executes concurrently with other applications. The effect is the same as similar terminal applications in these environments. The response time for any particular operation varies with the complexity of the function, the speed of the processor or other devices, the current system load, and the data sets required to perform the function. As with other terminal applications, base system supervisor facilities may be used to establish the amount of service that any particular user receives.

**Performance Highlights:** Performance enhancements have been made in the following areas:

- The Version 1 PTF reducing the SDIDS-rebuild utility (BLGUT1) run time has been incorporated into Version 2.
- The Version 1 PTFs improving response times for record file operations have been incorporated into Version 2; further improvements in response time for record file operations have been made.

With Information/Management Version 2, the installation can specify which data entry fields are to be included in the SDIDS.

With this ability, the installation can further reduce file response time if it is determined that not all fields need to be searchable.

- In addition to the Non-Shared Resource (NSR) VSAM option supported in Version 1, Version 2 supports the VSAM Local Shared Response (LSR) option. This allows for better tuning of performance through control of both the size and number of VSAM buffers.
- With Version 2, response time for activities that update the data base can be reduced if the user selects the option that will free the data base periodically during report processing.
- CPU utilization and run time have been reduced for certain reports.
- The time from search until the appearance of the standard search results list, for a large number of records found, has been reduced. This response time will generally be constant and independent of the size of the data base or number of records found by the search.
- Virtual storage requirements for load modules have been segmented by product function, and virtual storage is allocated only at the first use of each function. This means, for example, that virtual storage needed to support the report function will not be allocated for the user who only opens problems. In addition, an installation can specify the maximum amount of virtual storage which should be allocated by Information/System for load modules.
- Information/System supports GTF hooks which can be activated to provide an installation with a trace of performance-related information.
- Panels, stored in a partitioned data set in Version 1, are stored in a VSAM data set in Version 2. This reduces response time due to panel retrieval.

**DOCUMENTATION**

(available from Mechanicsburg)

*Information/System General Information* (GC34-2097).

Available at FCS: *Information/Management Licensed Program Specifications* (GC34-2098) ... *Information/System Installation* (SC34-2100) ... *Information/Management Customization* (SC34-2101) ... *Information/System Reference* (SC34-2105) ... *Information/Management Problem Management Guide* (SC34-2102) ... *Information/Management Change Management Guide* (SC34-2104) ... *Information/Management Configuration Guide* (SC34-2104) ... *Information/System Messages and Codes* (SC34-2106) ... *Information/System Diagnosis* (SC34-2119) ... *Information/Management Panel Modification* (SC34-2118).

**SYSTEM INTEGRITY**

IBM will accept APARs where the installation of Information/System introduces an exposure to the system integrity of OS/VS2 (MVS). Refer to Programming Announcement dated October 21, 1981. Information/System is intended to run authorized.

PROGRAM PRODUCTS

**INFORMATION/MVS  
5665-955**

**PURPOSE**

The Information/MVS program is a consolidated collection of IBM technical data of interest to data processing staffs responsible for planning, installing, supporting and tuning IBM systems, subsystems and components appropriate to the MVS, VM/370, VSE and VS1 environments. When used in conjunction with Information/System (5665-952), it provides processing personnel with keyword access to a wide range of selected technical information regarding IBM products.

**SPECIAL SALES INFORMATION**

See the pages for Information/System (5735-OZS).

**HIGHLIGHTS OF INFORMATION/SYSTEM with INFORMATION/MVS**

- Interactive retrieval facility for keyword searches of the data.
- Designed for ease-of-use.
- Load program to load the Information/MVS product into the user system.
- Capability to insert user data.
- Ability to optionally print selected screens or entries.

**DESCRIPTION OF INFORMATION/SYSTEM**

Information/System in conjunction with Information/MVS is a productivity tool designed for use by data processing personnel supporting an MVS, VM/370, VSE or VS1 environment. It consists of an interactive information retrieval facility designed to provide access to the Information/MVS files via previously assigned keywords, and of the appropriate programs for loading the data base.

Design objectives of Information/System and the companion Information/MVS product are to:

- Make the data available to the user online and on the user's system.
- Simplify and speed keyword searches of information.
- Integrate IBM technical information from many sources.
- Broaden the amount of technical information available to users.
- Keep the information up to date by addition of new data and by purging the out-of-date material.
- Enable users to add information to Information/MVS.

The Information/System interactive retrieval facility provides the user with a set of commands to access the data provided by Information/MVS through display terminals. The retrieval facility provides a keyword search function through which the user can search documents by specifying one or more previously assigned keywords connected by Boolean operators ("and", "or", "not"). The search can include all the document types or can be restricted to selected types (e.g., EWS, PTF cover letters). The user can display the complete stored text of the documents or the titles only.

The user also has the option to search all of Information/MVS or to limit the search only to any new entries added since the previous distribution tape.

Other functions of Information/System include:

- Sequential display of contiguous data entries of Information/MVS.
- A PRINT command to allow the user to print a section of a document or entire documents for later reference.
- A keyword glossary to expedite and facilitate the search process.
- A FIND command to locate specific words inside a pre-identified document.
- A HELP facility is built into Information/MVS to describe error conditions and to suggest corrective action.

**HIGHLIGHTS of INFORMATION/MVS**

- Online, consolidated collection of technical information from many IBM sources.
- Periodic (10 - 12 times a year) updates of the Information/MVS product to provide current information.
- Self-instruction and usage assistance information.

**DESCRIPTION OF INFORMATION/MVS**

Technical information from a number of development, system and support locations worldwide is edited, structured and incorporated into Information/MVS.

Types of information in Information/MVS include:

- Selected IBM system support center flashes, memos, question and answer logs and technical articles produced by the support organization responsible for the subject element. Selected lengthy

articles are abstracted and ordering information is included. (Occasionally, such documents are added as an additional file on the distribution tape.)

- Technical descriptions of recent IBM programming announcements.
- Service information on selected IBM software products including early warning system (EWS) data and systems engineering communications (SECOM).
- Status information on selected program products, installed user programs and field developed programs. Included is information on availability, feature numbers, optional features and documentation order numbers.
- A selection of Program Temporary Fix (PTF) cover letters and Program Level Change (PLC) information that may be used in conjunction with the EWS file to locate appropriate fixes for identified problems.
- Brief description of schedules for some of the education courses that IBM is conducting.
- An interactive HELP file designed to assist the user in making the most effective use of Information/System. A part of this file is a self-instruction tutorial for new users of the system.
- A keyword glossary giving alphabetical access to all keywords, whether abbreviated, hyphenated or misspelled by the author, which enhances the ability to find the required document.

The major products addressed by Information/MVS include:

- Systems - S/370, 4300, 8100 Information System, industry and cross-industry terminal systems, storage and printing units.
- Programming - Operating systems, compilers and assemblers, access methods, DB/DC products, emulators, job entry subsystems, utilities and interactive products.

The update of Information/MVS is distributed by the standard IBM distribution centers. The distribution tapes are available in 9-track/1600 bpi and 9-track/6250 bpi. Utility programs in Information/System merge the updates into the existing data base.

During the installation process, users have the option to:

- Insert their own data into Information/MVS.
- Select only those types of data from Information/MVS that are likely to be relevant to their environment.

All the IBM-provided Information/MVS material must be regarded as working documents intended to assist the professional data processing personnel. The information does not provide formal IBM recommendations or documentation. The information provided is intended for use by data processing personnel who are sufficiently familiar with the necessary background material to understand the topics discussed and to use the information within the proper context and with the proper safeguards.

The technical material included in Information/MVS addresses a wide variety of IBM products that are commonly used in an MVS, VM/370, VSE or VS1 installation. Although the main objective of Information/MVS is to assist the user with useful, timely and up-to-date information, there is no commitment to provide exhaustive or complete information on any product addressed.

The customer may make printed copies of limited portions of the Information/MVS product for use within the customer's organization for purposes of maintenance and improvement of the customer's data processing installation.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Storage Estimates:** Direct Access Storage Requirements for the data product varies with the amount of data selected by the user. Information/MVS requires approximately 180 to 200 megabytes of direct access storage for an untailored data base.

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No



**DISTRIBUTED OFFICE SUPPORT SYSTEM/370/VSE  
RELEASE 1  
DISOSS/VSE (5666-264)**

**PURPOSE**

Distributed Office Support System/VSE (DISOSS/VSE) program provides document-handling extensions to subsystems like the 3730 Distributed Office Communication System or the 8100 Information System available with the Distributed Office Support Facility (DOSF). It operates on a host computer, such as the S/370, 3031 Processor or the 4300 Processors, under VSE and the Customer Information Control System/Virtual Storage (CICS/DOS/VS) program product. It offers both interactive and deferred communication with the Distributed Office Support System (5740-XYK), operating in an 3730 System or an 8100 System under DOSF.

**DESCRIPTION**

Significant capabilities of the Distributed Office Support System include:

- Host document filing with indexing.
- Filed document search and retrieval.
- Filed document access protection.
- Message switching between users of the same or different IBM 3730 Systems, and between users of the same or different DOSF Systems.
- Submission of batch jobs to the host system from an IBM 3732 Text Display Station.

These functions are achieved by means of programs in the host and in each attached subsystem.

In the Distributed Office Support System, users are persons who use the IBM 3732 Text Display Station in a similar way to ordinary office equipment. They can be secretaries, typists, office clerks, editorial assistants, managers, or others who need not have knowledge of data processing.

**Filing and Retrieving:** The user can file documents created at, and stored in, the subsystem in a document library maintained by the host system. While filing a document, the user can specify filing information that indexes the document and can be used for later retrieval of the document. This filing information consists of search arguments, such as the document name, the author, recipients, and keywords describing the contents of the document. In addition, access codes can be added to help protect the document against unauthorized access.

To retrieve a filed document, users first identify it by a search request using the search arguments specified when the document was filed. Once a document has been identified, it can be restored in the subsystem, displayed on the screen of the IBM 3732, printed on the host or the subsystem, or deleted.

Filing and retrieval of documents can be performed interactively or in deferred mode. Deferred processing is particularly applicable for large documents because the operation is executed in parallel to other tasks performed at the terminal.

**Message Switching:** The message-switching capability allows the user to send messages to other users in the system, for example, to inform them that a document has been filed and is available for retrieval.

**Job Submission:** The job submission capability allows the user to send predefined VSE jobs to the host system for batch execution.

This capability can also be used to submit a document from the subsystem to the host along with the job. A user-written program can place this document into a data set for subsequent host-application processing.

Additionally, with some user-written conversion, this document can be imported into the Document Library Facility, Program Number 5748-XXE, and then processed by the Document Composition Facility, Program Number 5748-XX9. This approach can be used to provide advanced composition functions, such as multiple columns, footnote placement, automatic hyphenation, and spelling verification of the document.

**Installation:** The Distributed Office Support System provides convenient techniques to ease the installation of the system and the maintenance of its data sets.

**Document Security:** In a multiple-user document processing system, data security is of great interest to its users. The Distributed Office Support System is designed to provide data security based on the interaction of the following:

- Access codes
- Document ownership
- Level of document privacy

Access codes are assigned to users centrally at the host and to documents during filing. A user who needs to gain access to a filed

document must be assigned one access code that matches one access code of the document to be retrieved. The profiles of eligible users can only be changed under central control.

The owner of a document is defined as the user who issued the initial request to file this document in the host document library. The deletion of a document, for example, can only be initiated by the document owner.

The Distributed Office Support System distinguishes between two types of documents: Private documents and public documents. Private documents are accessible to their owners alone and are, therefore, not assigned any access codes. Public documents, which are recognized by the presence of access codes, can be retrieved by all authorized users.

In the Distributed Office Support System, passwords can be assigned to users to control access to the central file from any IBM 3732 Text Display Station on the same network.

These facilities for controlling access to protected resources are effective only within the context of the IBM Distributed Office Support System itself.

Access control within VSE outside the scope of the IBM Distributed Office Support System is not provided.

For applications in which sensitive data is sent over external communication facilities, user management may wish to augment these facilities with the application of cryptography. User management is responsible for the selection, implementation, and adequacy of these security features for their environment.

**Additional Functions:** The following additional functions are available with the Distributed Office Support System:

- **Host Print Facility**  
By means of this function, documents filed in the host library can be printed on a host-attached printer upon request from the IBM 3732 Text Display Station.
- **STAIRS Input Format Facility**  
Using this function, documents created at the IBM 3732 can be prepared for batch input to a STAIRS data base.

**Optional Feature:** The following optional feature is available with the Distributed Office Support System/3730, Program Number 5740-XYK, (for details refer to the Announcement Letter).

- **Direct Document Viewing Facility**  
This feature allows users to have documents in the host library displayed on their terminal screens without the need to copy the documents from the host document library to the associated subsystem permanent storage. This speeds up the process of displaying documents. This feature is to be installed with the Distributed Office Support System/3730 and is supported by the host system.

**Restrictions with IBM 8100/DOSF:** If documents are created on an IBM 8100 Information System under the Distributed Office Support Facility (DOSF), these DISOSS facilities do not support processing of document control functions which are not contained in the IBM 3730 System.

DOSF text commands which cannot be processed are the following:

- Blind Text
- Block Overstrike
- Block Underscore and Remove Underscore
- Bold Face Printing
- Line Number on Output
- Revision Indicators
- Command List Processing
- Begin Execution
- End Execution
- Intermediate Execution
- Begin Scalar Execution
- End Scalar Execution
- Execution Format
- Imbed Text File
- Start and End Imbed List

DOSOSS/VSE ignores these functions.

**HIGHLIGHTS**

**Functions**

- Filing of IBM 3730 or 8100/DOSF documents in host document library.

PROGRAM PRODUCTS

**DISOSS/VSE R1 (cont'd)**

- Searching of documents in the host document library by specification of search arguments, such as document name or search terms, authors, recipients.
  - System-controlled indexing of external (hard-copy) documents.
  - Retrieval of filed documents from host document library.
  - Message switching between users.
  - Submission of batch jobs to the host system from an IBM 3732 Text Display Station.
  - Document access protection.
  - Support of IBM 3730 or IBM 8100/DOSF archive retrieve/delete commands.
  - Printing of documents on a host-attached printer using the Host Print Facility.
  - Preparation of documents for batch input to a STAIRS data base using the STAIRS Input Format Facility.
- System Support Programs for ACF/NCP/VS, Program Number 5735-XX3.
  - Advanced Communications Function for NCP/VS (ACF/NCP/VS), Program Number 5735-XX1.
- The IBM 3705 is not necessary if ACF/VTAME is used on an IBM 4331 Processor equipped with a Communications Adapter (CA).
- Subsystem:** The IBM Distributed Office Support System/370/VSE communicates with the IBM Distributed Office Support System/3730, Program Number 5740-XYK. This program executes in either an IBM 8100 with DOSF and DPCX Release 2 and/or IBM 3730. It was announced in April, 1979 and is available from PID.
- For details on the Distributed Office Support System/3730, refer to the corresponding pages.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Design Objectives* (GH12-5056) ... *General Information Manual* (GH12-5137).

**Optional Feature:**

- Display of documents using the Direct Document Viewing Facility.

**RPQs ACCEPTED:** No

**CUSTOMER RESPONSIBILITIES**

Customers generate the Distributed Office Support System by means of a set of specification statements. These statements provide options that may be selected to tailor the system to each company's individual needs.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM Distributed Office Support System/370/VSE is designed to operate on the following IBM machines:

One IBM S/370 Model 138 or larger, or one IBM 3031, or one IBM 4331 or larger with main and external storage capacity and peripheral equipment as required for, and supported by, VSE and CICS/DOS/VS.

**SOFTWARE REQUIREMENTS**

The Distributed Office Support System/370/VSE is written in the IBM S/370 Assembler language. It is designed to operate in the following environment on the host system:

**Host System:** VSE Release 2 or subsequent releases unless otherwise specified, together with:

- VSE/Advanced Functions, Program Number 5746-XE8, Release 2 or 3 or a subsequent release unless otherwise specified.
- VSE/VSAM, Program Number 5746-AM2, Release 2 or a subsequent release unless otherwise specified.
- IBM S/370 Customer Information Control System/Virtual Storage (CICS/DOS/VS) Version 1, Program Number 5746-XX3, Release 5, together with its required associated programs, or a subsequent release unless otherwise specified.

In CICS/DOS/VS, data management is performed by the Virtual Storage Access Method (VSE/VSAM). Communication with the Distributed Office Support System/3730 uses the Full Function Logical Unit (SNA LU0 protocol). However, communication with the Document Transmission Function of the IBM 3730 (refer to the IBM 3730 documentation for details), is via the CICS/VS Data Interchange Program (DIP) and uses the Batch Data Interchange Logical Unit (SNA LU1 protocol). To identify the appropriate required and optional licensed programs for CICS/DOS/VS, refer to *CICS/VS General Information* (GC33-0066).

In addition, the following programming support must be available:

- Virtual Telecommunication Access Method (VTAM/SCP), Program Number 5747-CF1 or 5747-CG2.
- Either the Advanced Communications Function for VTAM (ACF/VTAM), Program Number 5746-RC3, or the Advanced Communications Function for VTAM Entry (ACF/VTAME), Program Number 5746-RC7. ACF/VTAM supports the IBM 3705 Communications Controller; ACF/VTAME supports the Communications Adapter (CA) in the IBM 4331 Processor.
- VSE/POWER, Program Number 5746-XE3, Release 2 or a subsequent release unless otherwise specified, including VSE/POWER Remote Job Entry, Program Number 5746-XE3, Feature #6066-6071 (required if the IBM 6670 is used as a host line printer).
- An IBM VSE Sort/Merge program product.

**IBM 3705:** One of the following is required for remotely attached subsystems:

- Advanced Communications Function for NCP/VS (ACF/NCP/VS), SCP, Program Number 5747-CH1.

**SMALL SYSTEM EXECUTIVE/VSE  
RELEASE 1 (SSX/VSE)  
5666-265**

**PURPOSE**

The licensed program Small System Executive/Virtual Storage Extended (SSX/VSE) is a VSE based pregenerated operating system which runs within a range of predefined 4321 and 4331 configurations. SSX/VSE supports batch and interactive applications. It can be used in standalone environments supporting locally and remotely attached terminals and in distributed data processing environments, i.e., interconnected to other processors in an SNA network. SSX/VSE is designed for quick installation and enhanced ease of use compared to DOS/VSE. SSX/VSE will be delivered on one tape and serviced as one product. The functional capabilities of the VSE components included in SSX/VSE are restricted to the generation parameters selected and represent as such a subset of the respective VSE components. The concept of pregeneration with a fixed set of external functions will increase the level of system stability. SSX/VSE RPG II, SSX/VSE PL/I and DL/I SSX/VSE are prompter-supported program product versions of DOS/VSE program products in an SSX/VSE environment, which have been tested under and adapted to SSX/VSE. They can be ordered with unique SSX/VSE related program product numbers, different from their DOS/VSE versions.

SSX/VSE will be especially attractive for standalone environments which do not have the skills required for VSE, namely new name accounts and establishments/departments in existing DP accounts.

Use of SSX/VSE in a networking environment requires understanding of networking procedures and considerations, which preferably should be managed at the customers central installation.

**HIGHLIGHTS**

SSX/VSE includes the following basic functions:

- Online transaction processing.
- Two batch partitions for batch production work and testing.
- Spooling for job input and output.
- Data communication support for locally and remotely (SNA) attached 3278/3279 display stations and 3287 terminal printers.
- 377X remote job entry workstation support.
- Interactive program development and system control capabilities.
- VSAM-based data management routines including automatic space management. Capability to install DL/I SSX/VSE in addition.
- A set of file handling utilities including Sort and DITTO.
- High level language support through COBOL. Capability to install SSX/VSE PL/I and SSX/VSE RPG II in addition.
- SSX/VSE operator console functions supported on ICCF terminals.
- SNA cross-domain application usage from any authorized terminal in a multi-CPU network environment.
- Remote job execution and file exchange between interconnected SNA systems.

SSX/VSE provides the following usability characteristics:

- Quick installation, reconfiguration and update of the pregenerated SSX/VSE system.
- Predefined procedures and prompts for simple installation of prompter-supported program products SSX/VSE RPG II, SSX/VSE PL/I and DL/I SSX/VSE.
- User-oriented interactive communication with the system through full screen prompters, procedures and help screens for operation and system administration tasks.
- Enhanced interactive problem analysis and problem reporting facilities.
- New task-oriented documentation with "how to" description for systems administration, operation and application development tasks.
- Creation of job control statements via prompters and dialogs SSX/VSE supports (within physical limitations) the following 4321 and 4331 hardware functions and I/O devices :
  - ECPS:VSE mode.
  - 1MB to 4MB of processor storage.
  - Up to 16 3310 drives or 4 3370 drives (2 addresses each), minimum is 2 3310 or 1 3370 (2 addresses).
  - Up to 6 8809 tape drives and/or up to 8 channel-attached 3410 and/or 3420 tape drives; minimum is 1 tape drive.
  - Integrated 3540 compatible diskette drive and up to 6 channel-attached 3540 diskettes.

- 3262 and/or 3289 printers attached to the display/printer adapter and/or up to 6 channel-attached 3203 printers; minimum is 1 system printer.
- Local 3278, 3279 and 3287 terminals attached to the display/printer adapter; minimum is one display unit with keyboard. Up to 32 additional 3278, 3279 and 3287 terminals can be channel-attached via 3274 control units.
- Up to 32 remote 3278, 3279 and 3287 terminals in SNA mode attached via 3274 or 3276 control units and SDLC lines to the communication adapter (one control unit per line).
- Up to 6 377X remote job entry workstations attached via SDLC lines to the communication adapter (one control unit per line).

**Note:** See Specified Operating Environment for hardware support details.

**DESCRIPTION**

**SSX/VSE PRODUCT DESCRIPTION**

**Summary:** SSX/VSE is an operating system designed for the IBM 4321 and IBM 4331 processors, which is:

- **Pregenerated:** SSX/VSE consists of a predefined set of software components that have been tested for combined use. Because SSX/VSE is pregenerated, it simplifies a number of tasks (such as system planning) that are associated with data processing systems.
- **Preconfigured:** SSX/VSE is designed to work with specific hardware devices in a specific range of configurations. Because SSX/VSE is preconfigured, the time spent in selecting and coordinating hardware devices is minimized.
- **Flexible:** Within SSX/VSE's predefined range of supported configurations and program products, users can:
  - Alter their system's hardware configuration by adding or replacing supported devices.
  - Install prompter supported IBM program products (SSX/VSE PL/I, SSX/VSE RPG II, and DL/I SSX/VSE) for use with the SSX/VSE system.
  - Develop their own application programs using SSX/VSE components.
  - Operate their system in either a local or a telecommunications environment.

The functional capabilities of the VSE components included in SSX/VSE are restricted to the generation parameters and are a subset of the respective VSE components. The level of functions provided in SSX/VSE will be described in *Pregeneration Specifications*, SC33-6152.

SSX/VSE has been designed for system ease of use. Besides extensive online user aids for the daily operation and system administration, support is provided for installation, application programming and problem determination. An integrated set of task oriented documentation covering the administration, operation and application development functions of SSX/VSE with "how to" descriptions is also provided.

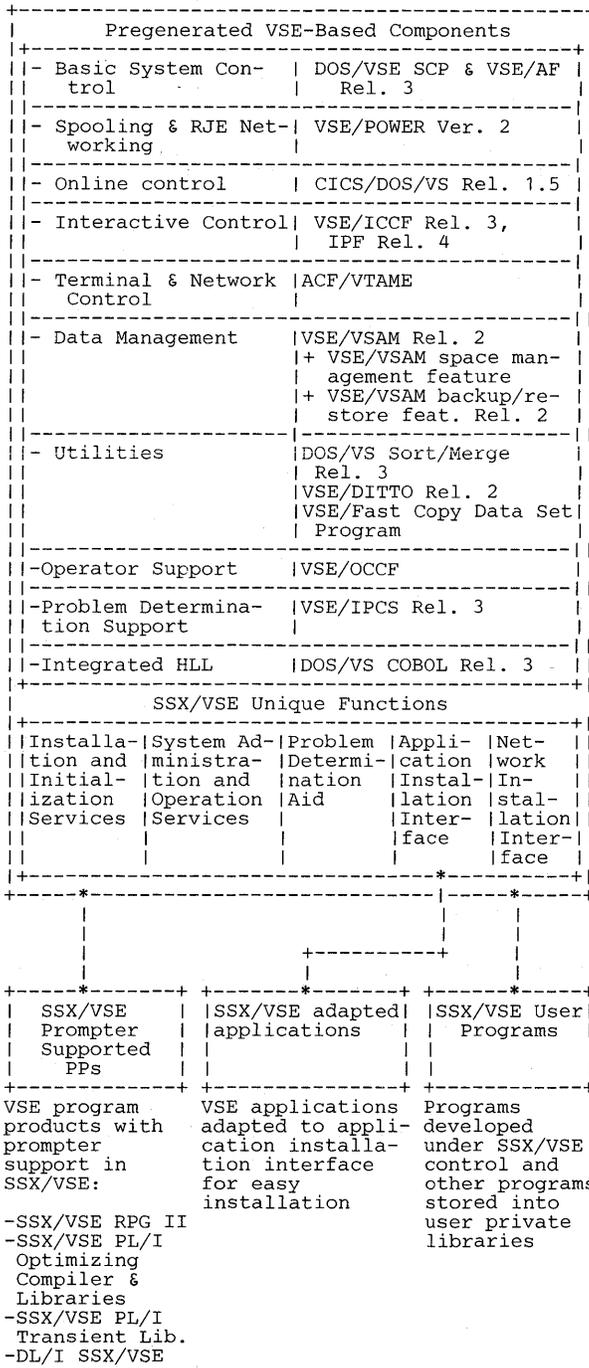
Refresh of the complete SSX/VSE system will be provided on an as-required basis. The customer can order the refresh system from a distribution center.

PROGRAM PRODUCTS

Small System Executive/VSE (cont'd)

The following graphic illustrates the SSX/VSE structure:

SSX/VSE Licensed Program

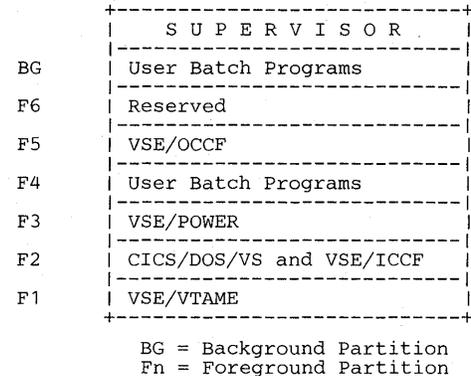


**DESCRIPTION of VSE-BASED COMPONENTS:**  
The following describes the SSX/VSE components. Application owners adapting an existing VSE application to SSX/VSE will find a description of the SSX/VSE functions and restrictions compared to the respective VSE components in the *SSX/VSE Pregeneration Specifications, SC33-6152*.

**System Control:** DOS/VSE SCP and VSE/AF-based

The SSX/VSE supervisor has been pregenerated for ECPS/VSE mode with 12MB of virtual storage. The processor storage not occupied by the supervisor is divided into partitions as shown below:

SSX/VSE main memory layout:



Two batch partitions are available for production and testing. One partition is available for online transaction programs (F2).

SSX/VSE provides the following predefined libraries utilizing the VSE/AF and VSE/ICCF library concepts:

- System libraries contain the SSX/VSE programs and procedures.
- User private libraries contain user programs and procedures developed under SSX/VSE or other VSE programs installed and tested under SSX/VSE. If more space is required, a second set of user libraries can be created.
- ICCF libraries contain batch jobs to be submitted for execution, all programs in development and data entered from a display station under ICCF control.
- Program Product libraries contain prompter supported program products (SSX/VSE RPG II, SSX/VSE PL/I and DL/I SSX/VSE).
- Application libraries contain programs which are adapted to SSX/VSE using the application installation interface. An SSX/VSE adapted application provides its own application library. The installation of more than one adapted application requires evaluation and coordination of possible usage of dynamic system parameters and therefore requires additional system skill and knowledge of the SSX/VSE system structure.

**Note:** Program Product Libraries and Application Libraries are established on demand only and require additional DASD space (see Specified Operating Environment).

**Spooling and RJE Networking: VSE/POWER Version 2-Based**

This component provides spooling for job input and output. All batch programs run under control of the spooler. The user submits a job interactively from the VSE/ICCF library. The job is queued on DASD in the reader queue for execution. After execution, the job output is queued on DASD in the list queue to be either printed on a printer or displayed on the interactive terminal.

VSE/POWER Version 2 (in conjunction with ACF/VTAME) also provides support for:

- 377X remote job entry workstations attached to SDLC lines.
- Remote job exchange and output routing with SNA Interconnected MVS JES2, VSE POWER V2, and SSX/VSE systems (POWER Networking).

File transfer capability on interconnected systems is provided in SSX/VSE in addition to the POWER networking capability. ICCF members and VSAM ESDS or KSDS files can be transferred with a block length up to 32K bytes.

**Online Control: CICS/DOS/VS-based**

This component provides a transaction-oriented, multi-application data base/data communication interface between SSX/VSE and user applications. It uses ACF/VTAME for communication with terminals. Functions provided include:

- Access to data stored in central files.
- Protection of data from double updating and access to data by unauthorised persons.
- Movement of data from terminals to the processor.
- Flow of multiple tasks (units of work) at a time.

### Small System Executive/VSE (cont'd)

- Display of status of terminals, data and programs.
- Journaling and recover/restart capability.

#### Interactive Control: VSE/ICCF and IPF-Based

This component provides:

- Interactive program development
- Batch job creation and,
- Interactive control of the SSX/VSE system

using facilities of VSE/ICCF in conjunction with the Interactive Productivity Facility (IPF) via locally and remotely attached terminals.

Programs can be written at a terminal and saved in VSE/ICCF libraries. One can view these programs and change them as necessary. Later the program can be compiled and the results of the compilation displayed. User jobs executed under SSX/VSE can be initialized interactively via control of VSE/ICCF from the ICCF libraries. Five interactive partitions are available for job creation and other system services.

System administration tasks are performed interactively by simple responses to a series of prompts provided in the form of screen panels that the user fills in. More details about interactive control of the SSX/VSE system are provided in the section 'SSX/VSE Unique Functions'.

An SSX/VSE extension allows the utilization of the following operator console functions from a display station by an authorized ICCF user.

- 1) Display the actual system activity.
- 2) Display a mirror image of the operator console.
- 3) Scrolling through the console hard copy file.
- 4) Input of most operator commands and responses to messages (reserved for system administrator only). Functions like IPL and CICS shutdown are not possible.

In conjunction with the SNA multisystem networking capability this function allows local SSX/VSE operator from a remote location (one SSX/VSE system at a time).

**Data Management:** VSE/VSAM-based including space management and backup/restore features.

The data management component allows creating, maintaining and processing of files on DASD. Furthermore, it manages the data set space automatically. Data sets defined under SSX/VSE may either have a keyed (KSDS), sequential (ESDS) or relative record number (RRDS) VSAM format. The Data Set Administration Prompts provide the functions to define, delete, print, backup and restore such data sets.

DL/I SSX/VSE can be installed on top of VSAM with the help of SSX/VSE installation prompts to allow DB/DC applications to run under control of SSX/VSE.

#### Terminal and Network Control: ACF/VTAME-based

This component controls the operation of the terminals and handles the transfer of data between the terminals and the processor. It also provides cross domain communication. It supports:

- 3278, 3279 and 3287 terminals locally-attached to the display/printer adapter.
- 3278, 3279 and 3287 terminals attached via 3274 control units (3272 version) to a byte or block multiplexer channel.
- 3278, 3279 and 3287 terminals attached to the communication adapter via SDLC lines and 3274 or 3276 control units (one control unit per line).
- 377X remote job entry terminals attached to the communication adapter via SDLC lines (one control unit per line).
- Cross domain communication to other SNA systems via SDLC lines.

**Utilities:** Based on:  
DOS/VS Sort/Merge  
VSE/DITTO  
VSE/Fast Copy Data Set Program

The SSX/VSE utilities are used to provide the basic file manipulation functions like sort, copy to DASD or tape or printer.

#### Operator Support: VSE/OCCF-based

This component has been preprogrammed in SSX/VSE to reduce and simplify the operator communication at the system console by answering certain messages automatically or suppressing messages when appropriate. It may also be used as the base for message translation.

#### Problem Determination Support: VSE/IPCS-based

This component in conjunction with specific SSX/VSE problem determination services assists in problem analysis and problem report preparation.

### Integrated High Level Language: DOS/VS COBOL

COBOL/VS is the standard high level language provided in SSX/VSE to be used for application development from an interactive ICCF workstation. SSX/VSE RPG II and SSX/VSE PL/I can be installed on top of SSX/VSE as supported program products. SSX/VSE provides prompts for installation and execution of these program products.

**DESCRIPTION OF SSX/VSE UNIQUE FUNCTIONS:** SSX/VSE provides interactive user services for:

- System installation and initialization.
- System administration and operation.
- Problem determination.

SSX/VSE provides predefined interfaces and procedures for:

- Application installation.
- Network installation.

The interactive services are provided by prompts, procedures, and programs. The prompts direct the user through system activities in user terms and submit requests to the system in system language (e.g., job control language, access method services, control cards), dialogs begin with a master menu panel which allows selecting an environment. Menu panels are organized as a hierarchy. At the lowest menu level, the user selects the function to be performed by the system.

SSX/VSE prompts are based on the IPF dialog manager. Two users can work concurrently with SSX/VSE prompts. The job stream and control procedures created during a prompter session can be saved into the ICCF libraries for repeated use.

#### SYSTEM INSTALLATION and INITIALIZATION SERVICES

**SSX/VSE system installation.** The time required to install SSX/VSE in a standalone environment depends on the hardware configuration. One or two hours are typically required. The SSX/VSE licensed program is distributed on a single magnetic tape. The first installation task is to transfer the contents of the tape to DASD. Once SSX/VSE is on DASD, prompts at the operator console guide the user in providing information regarding:

- Hardware configuration
- Type of print belt or train on the system printer
- Format of the date.

SSX/VSE automatically recognizes the standard hardware attached to the system (see "Specified Operating Environment"). Only configurations that are larger than the standard configurations need to be defined further by hardware configuration prompts.

Based on this information the installation prompter builds a job stream for system initialization which is executed automatically upon the next initial program load (IPL).

**Hardware reconfiguration support** is provided through prompts which are designed to update the current SSX/VSE system for a new hardware configuration (e.g., second printer, new terminals) with minimum effort.

**Follow-on system updates** can easily be applied by replacing a phase, module, macro, procedure, ICCF member or even the whole system library or by fixing a problem directly with a change to a phase (called ZAP). It is planned to provide refresh tapes of SSX/VSE on an as-required basis.

#### SYSTEM ADMINISTRATION and OPERATION SERVICES

**Daily operation** begins with automatic start up of the SSX/VSE system after:

- Power on of the processor and I/O devices.
- and
- Date and time specification at IPL time.

After initialization is complete, control is given to the Data Communications component and SSX is displayed at terminals (signaling that SSX/VSE is online). The user can then begin to use the system by pressing the Enter key at his display terminal. This initiates the display of the initial selection menu from which the user can select one of the displayed options.

The following SSX/VSE system administration and operation tasks are supported through selection menus and execution procedures:

- Library Maintenance Support

Prompted parameters are:

- Function to be performed (e.g., display, catalog, etc.)
- Library type.
- Program name.

Knowledge of DOS/VSE job control or library control statements is not required.

## Small System Executive/VSE (cont'd)

- Program Development Support
 

A procedure is provided allowing COBOL/VS compilations to be submitted for execution in one of the two batch partitions.
- Data Set Management Support
 

Data administration prompters allow defining, using and deleting VSAM entry sequenced (ESDS), relative record number (RRDS) and key sequenced data sets (KSDS) with or without alternate indexes. The following functions are possible without the need to know VSAM/AMS macros:

  - Define files.
  - Delete files.
  - Print files (or portions of a file).
  - List catalog entries.
  - Verify file integrity.
  - Backup files.
  - Restore files.
  - Define new VSAM space.
- CICS/VS Table Maintenance
 

Procedures are provided to extend or modify CICS tables and basic mapping support definitions to adapt them to the user needs, e.g., if a new application is added to run under SSX/VSE.
- System Operation Support
  - Initiation and termination.
  - Job creation and submission (knowledge of the VSE Job Control Language is not required).
  - System utilities like disk dump, Display Volume Table of Contents (VTOC), diskette copy, Assign Alternate Block, Backup/Restore of user libraries.
  - Back up and restore of the complete system, volumes or of individual data sets.

### Problem Determination Aid:

To aid the SSX/VSE user, a licensed service program is provided in SSX/VSE as an extension to the Interactive Problem Communication System (IPCS) function. It assists the user in the analysis of dump related problems and collects data for problem reporting. The service program creates an error analysis report which serves as a guide for user application problems, as a base for communication between the SSX/VSE user and IBM.

### Application Installation Interface

SSX/VSE provides a predefined application installation interface to allow adaptation and easy installation of programs on top of SSX/VSE.

The key characteristics of the interface are:

- Programs installed on top of SSX/VSE via this interface must adhere to a specific distribution tape layout (SSX/VSE format), which has to be prepared by the program owner.
- On the distribution tape the program owner provides installation and generation jobs to:
  - Define and restore the necessary libraries.
  - Define, initiate and load all needed data sets.
- The program owner also provides the necessary adaptations for the SSX/VSE start-up procedure and CICS tables and submits them to the SSX/VSE application activation job.

After above prerequisites are met, the program fits on SSX/VSE, and can be installed on SSX/VSE in four steps:

1. Read installation jobs into POWER queue from tape.
2. Execute installation and generation jobs.
3. Submit application activation job (which is part of SSX/VSE).
4. IPL to activate application.

The SSX/VSE application installation interface is designed to support one application on an SSX/VSE system.

The installation of more than one adapted application possibly requires coordination of system variables and therefore additional system skill and knowledge.

A complete description of the SSX/VSE functions and the application installation interface is provided in *SSX/VSE Pre-generation Specifications*, SC33-6152.

### Network Installation Interface:

SSX/VSE provides a network installation interface to allow integration of SSX/VSE into a given SNA cross domain environment.

Installing SSX/VSE in this multiple processor environment requires network definitions for the SSX/VSE node.

The SSX/VSE distribution tape contains a pre-formatted file for these network definitions. Experienced central site personnel can put this file on a disk and use an editor to specify the necessary network information. A network definition tape can then be created and given to the administrator of the SSX/VSE system.

Once the SSX/VSE system is up and running, the administrator can install the network definition tape. SSX/VSE prompters help the administrator create the appropriate job. The job is processed automatically after CICS/DOS/VS and VSE/ICCF are shut down.

The next time the system is brought up, it is automatically established as a network node.

### PROGRAMS RUNNING UNDER SSX/VSE CONTROL

#### SSX/VSE Prompter Supported Program Products

SSX/VSE prompter-supported program products are SSX/VSE versions of VSE licensed programs which have been tested under and adapted to SSX/VSE. They can be ordered with a unique program number, different from their DOS/VSE versions, and installed on SSX/VSE following the instructions in *SSX/VSE System Administration*, SC33-6145. Program service will be equivalent to SSX/VSE. Prompter-supported program products are supported by dialogs for easy installation and operation.

SSX/VSE has prompter support for the following program products:

- SSX/VSE PL/I Optimizer Compiler & Libraries (Original program number 5736-PL3 Rel. 5.1)
- SSX/VSE PL/I Transient Library (Original program number 5736-LM5 Rel. 5.1)
- SSX/VSE RPG II (Original program number 5746-RG1 Rel. 3.0)
- DL/I SSX/VSE (Original program number 5746-XX1 Rel. 1.5.5) (installation prompter support only)

For the installation of one or more SSX/VSE prompter-supported program products, a separate set of private libraries, the SSX/VSE program product libraries, must be utilized. In the case of 3310, a complete DASD drive is needed; in case of 3370, the remaining space is available for user data or private libraries.

#### SSX/VSE Adapted Applications

SSX/VSE Adapted Applications are IBM or non-IBM programs adapted to the SSX/VSE application installation interface. An 4321 or 4331 system in conjunction with SSX/VSE and an appropriately adapted application can thus be a turn-key application system, which can be used immediately after installation.

Before an adapted application program is installed, additional DASD space must be made available for it. This space is needed to store the application libraries and to allocate its data files. It resides outside of the DASD addresses reserved for the SSX/VSE system, and the predefined user and ICCF libraries.

The installation of more than one adapted application possibly requires coordination of the system variables and therefore additional system skill and knowledge.

#### SSX/VSE User Programs: SSX/VSE User Programs are:

- programs developed under SSX/VSE and
- other VSE programs stored into the SSX/VSE user private libraries (see Note).

SSX/VSE provides COBOL as the primary language for application programming. *SSX/VSE Application Development*, SC33-6148, describes how the programmer can create and activate batch and online COBOL programs. Besides COBOL, SSX/VSE PL/I (for batch and online programs) and SSX/VSE RPG II (for batch programs) can be used for application development, if the respective SSX/VSE version of the compiler has been installed into the program product library.

Program development under SSX/VSE is done interactively. The compiled programs are stored into the SSX/VSE user private libraries. After having provided the necessary updates to the CICS tables (in case of online programs), these programs can be used from CICS terminals. Files supported are VSAM entry sequential (ESDS), key sequential (KSDS) and relative record number (RRDS) files.

VSE programs other than SSX/VSE prompter supported PPs and SSX/VSE adapted applications will run on SSX/VSE if they are stored into the SSX/VSE user private libraries and if:

- Their specified operating environment matches the predefined SSX/VSE hardware and software functions.
- Any additional prerequisite software product is made available with the program.
- Installation jobs for the program and the required data are provided.
- The program has been tested successfully in conjunction with concurrently running programs.

**PROGRAM PRODUCTS**

**Small System Executive/VSE (cont'd)**

**Note:** In case of IBM program products (PP, FDP, IUP, etc.) an IBM support notice must be available. For technical information, please contact your IBM representative.

The following table summarizes the key characteristics of the programs running under SSX/VSE control:

SSX/VSE PROGRAM TYPES

PROGRAM CHARACTERISTICS	SSX/VSE PROMPTER SUPP. PP	SSX/VSE ADAPTED APPLICATIONS	USER PROGRAMS
What kind of programs?	IBM Program Products?	IBM, 3rd Party and customer programs, mainly application programs	Customer Program developed under SSX/VSE and other existing VSE programs
Who provides SSX/VSE support? (Incl. service)	IBM	Program owner (IBM in case of IBM Program)	Customer; Program owner
Where is program stored?	Program Product Libraries	Application Libraries or User Private Libraries	User private Libraries

**CUSTOMER RESPONSIBILITIES**

To successfully install and use SSX/VSE the customer must:

- Have installed a hardware configuration which is supported by SSX/VSE.
- Ensure the appropriate training of the system administrator and application programmer (when application development is done by the customer).
- Plan for installation and operation of any remote terminals.
- Plan for proper network layout in the case of multisystem networking.
- Design his application programs to satisfy his performance requirements.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

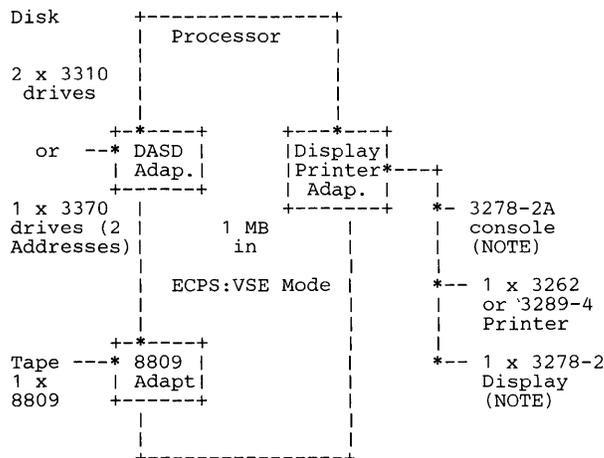
SSX/VSE is designed to operate on IBM 4321 and 4331 processors in ECPS:VSE mode and on all storage sizes offered with these processors starting with a minimum of 1MB. It supports DASD, tape, terminal, printer and diskette attachments. Card readers and card punches are not supported. A microcode modification must be installed on the processors to enable the user to select 12 megabytes of virtual storage in ECPS:VSE mode. This modification will be standard on IBM 4321 and IBM 4331 model 11. The IBM 4331 model 1 and 2 processors must have the following minimum EC levels installed:

Model 1: EC 364303 and REA 6420718

Model 2: EC 364418 and REA 6420627

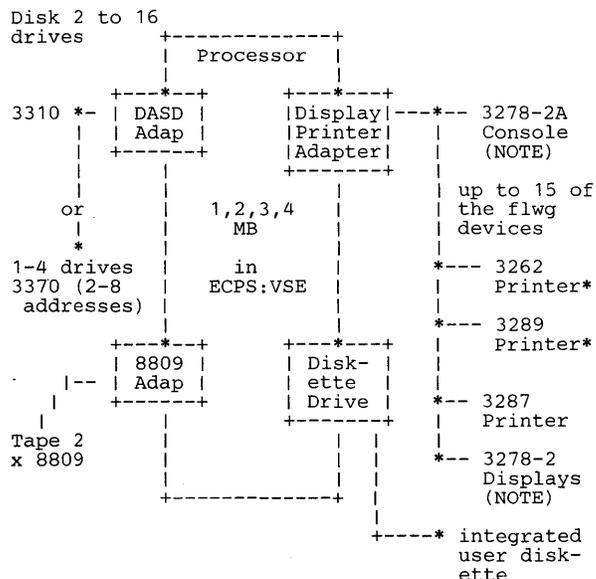
**Note:** Hardware devices not indicated are not supported by SSX/VSE.

**Minimum Configuration:** This configuration is required for installation of SSX/VSE as operational system (see also under General Configuration Considerations).



**NOTE:** See hardware Support Details regarding support of 3279 color display stations and color console.

**Standard Configuration:** This range of configurations is assumed by SSX/VSE as default hardware configuration, so that all prompts at installation time which relate to hardware configurations will be bypassed (see also General Configuration Considerations).



\* = Maximum 2

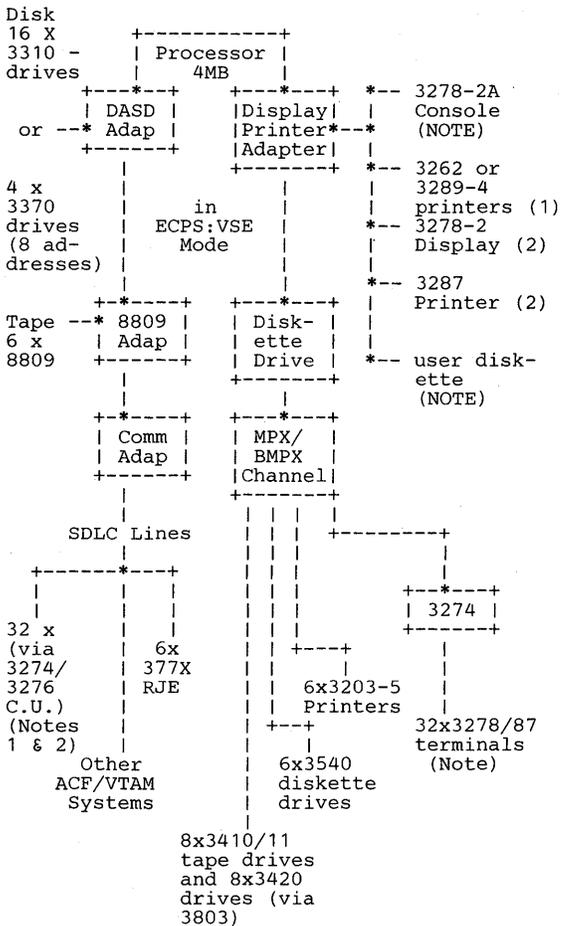
**NOTE:** See hardware Support Details regarding support of 3279 color display stations and color console.

**Maximum Configuration:** The following maximum number of I/O devices, terminals and lines are supported in SSX/VSE.

The numbers in front of the device type specify the maximum number of attachable units that SSX/VSE supports. (See also General Configuration Considerations).

**PROGRAM PRODUCTS**

**Small System Executive/VSE (cont'd)**



(1) = Maximum 2  
(2) = Maximum 15

**Notes:**

1. See Hardware Support Details regarding support of 3279 color display stations and color console.
2. Only a single terminal control unit (3274, 3276 or 377X) can be attached to one SDLC line.

**GENERAL CONFIGURATION CONSIDERATIONS**

For any SSX/VSE configuration:

- Either 3310s or 3370s are supported but not both on the same system. The IBM 3370 disk drive does not attach to the IBM 4321 processor.
- One 3370 drive (2 addresses) or two 3310 drives (one address each) are required to store SSX/VSE and the predefined user and ICCF libraries. The 3310s and the 3370s have the following approximate capacities:

Device	Megabytes per Two Addresses
3310	129
3370	570

When 3310s are used, SSX/VSE allocates approximately 5.9 MB for VSAM data space. When a 3370 is used, SSX/VSE allocates approximately 220MB for VSAM data space.

If one or more supported program products (SSX/VS PL/I, SSX/VSE RPG II, or DL/I SSX/VSE) are used with SSX/VSE, above DASD storage capacity must be increased by one 3310 address or one 3370 address. For the IBM 3370, the remaining space is available for user files or user private library extensions.

The installation of an SSX/VSE adapted application also requires additional DASD space to store the application program and to allocate its data files. This space resides outside the DASD addresses reserved for the SSX/VSE system, and the predefined SSX/VSE user and ICCF libraries.

The total amount of required DASD space depends on the size of programs and data files. SSX/VSE supports a maximum of eight 3370 DASD addresses and sixteen 3310 DASD addresses.

If the system uses 3370s, and frequent full backup is required, it is recommended to have at least one 3420 tape unit that supports 6520 bytes per inch.

SSX/VSE recognizes specific addresses or address ranges for the devices that it supports. These are shown in the following table:

Operator Console	3278-2A	01F
Display Stations	3278-2	010-01E
Printers	3279	
	3203-5	02A-02F
	3262	
	3287	010-01E
DASDs	3289-4	
	3310	240-243, 250-253 260-263 270-273 220-227
Magnetic Tape Units	3370	1B0*-1B7
	3410/11	1A0*-1A7
	3420	300*-305
	8809	009
Diskette Unit	Integrated	024-029
	3540	

Note: \* = address used for installation

**Hardware Support Details**

**Processor Features Supported:**

- DASD adapter #3201 for IBM 3310 and IBM 3370
- 8809 Magnetic tape unit adapter #4910
- Bytes Multiplexer Channel #5248
- Block Multiplexer Channel #1421
- Diskette Drive #3401
- Display/Printer Adapter Expansion #2001
- Communication Adapter #1601 and associated features.

**Processor Features Not Supported:**

- 14XX compatibility #3950
- Printer-Keyboard mode #5550
- Direct Access Storage Compatibility #7901
- 5424 Adapter #3901
- ECPS: VM/Adapter #8701
- Loop Adapter features #4830, #4831, #4840
- 3340/3344 Direct Attachment #7851
- High Speed Block Multiplexer Channel #1431
- External Signals #3898
- Second DASD Adapter #3202

**Device Support**

**Disk Drives:** IBM 3310 (mdls A1, A2, B1, B2) or IBM 3370 DASD (mdls A1, B1) are supported. Minimum disks required are two IBM 3310 drives (two addresses) or one IBM 3370 drive (two addresses). The maximum number of disk drives is either sixteen IBM 3310 drives (16 addresses) or four IBM 3370 drives (8 addresses). A mixture of IBM 3310 and IBM 3370 strings is not possible.

**Tape Drives:** The maximum number of tape drives supported is six IBM 8809 attached to the 8809 tape unit adapter, eight IBM 3410/11 models 1 - 3 channel-attached, and eight IBM 3420 models 3 - 8 channel-attached via a 3803 tape control unit. The 7-track feature is not supported. As a minimum, one tape drive is required.

**Diskette Drives:** SSX/VSE supports the integrated diskette drive as an IBM 3540. Up to six additional IBM 3540 diskette drives (six 3540 B01 or three 3540 B02) attached to a channel are supported.

**Printers:** SSX/VSE supports the printer IBM 3262 models 1 and 11, IBM 3289-4 and IBM 3203-5. All 3 printer types are supported as system printers (SYSLST). At least 1 printer is required. The maximum number of supported printers attached to the display/printer adapter is two.

In addition up to six IBM 3203-5s can be attached to a channel.

**Terminals:** SSX/VSE supports local and remote display stations and hard copy printer to the:

- Display/Printer Adapter (local)  
Up to 15 devices are allowed in addition to the operator console IBM 3278-2A or IBM 3279-C (see note below). The devices can be of the following types:
  - Display station IBM 3278-2
  - Color Display Station IBM 3279-2A, 2B (see note)
  - Terminal Printer IBM 3287-1, 2
  - Line Printer IBM 3289-4, maximum 2
  - Line Printer IBM 3262-1, 11, maximum 2

PROGRAM PRODUCTS

Small System Executive/VSE (cont'd)

- Byte or Block Multiplexer Channel (local): Up to 32 devices of the following types attached to appropriate IBM 3274 (IBM 3272 version) terminal control units are supported:
  - Display Station IBM 3278-2
  - Color Display Station 3279-2A, 2B (see note)
  - Terminal Printer IBM 3287-1, 2
- Communication Adapter (remote) via SDLC lines and appropriate IBM 3274-XXC and/or 3276-12 terminal control units (one control unit per line). Up to 32 devices of the following types are supported:
  - Display Station IBM 3278-2
  - Color Display Station IBM 3279-2A, 2B (see note)
  - Terminal Printer IBM 3287-1, 2
- Communication Adapter via SDLC lines (one control unit per line): Up to eight IBM 377X remote job entry terminals of the following types and models:

DEVICE	MODEL	ATTACHABLE DEVICES			
		Reader	Punch	Printer	Storage Devices
3771	1,2,3	3501	3521	None	None
3773	1,2,3	None	None	None	One integr. device
3774	1P,2P	2502	3521	3784	1 or 2 (diskette)
3775	1P	3501 2502	3521	None	1 or 2 (diskette)
3776	1/2	3501 2502	3521	None	1 or 2 (diskette)
3777	1	3501 2502 2502	3521 3521 3521	3203-3 3262-2 /12	1 or 2 (diskette)

As a minimum, the operator console IBM 3278-2A and one locally attached display station IBM 3278-2 or IBM 3279-2A, 2B are required.

**Note:** SSX/VSE supports the IBM 3279 color display console (model 2C) as a 3278-2A with no specific color support. The IBM 3279 display station (mdls 2A and 2B) is supported in 3278 compatibility mode, i.e., SSX/VSE has not been programmed to exploit color capabilities for prompts, helps and messages.

Applications running under SSX/VSE control which use the color display station or the color terminal printer will however be able to utilize the color capabilities according to the application program coding.

**SOFTWARE REQUIREMENTS**

Small Systems Executive/VSE is a self-contained operating system with no prerequisite software requirements.

Communication from a processor running SSX/VSE with another processor can be established via SDLC lines if the other processor has the following software products installed:

- Another SSX/VSE program product (5666-265)
- or
- ACF/VTAM with ACF/NCP and the Multisystem Networking Facility
- or
- ACF/VTAME (DOS/VSE only)

RJE connections to other SNA processors are possible via SDLC lines if the other processor has the following software products installed:

- Another SSX/VSE program product
- VSE/Advanced Functions release 3 with VSE/POWER version 2 and ACF/VTAME or ACF/VTAM release 2 with MSNF
- MVS/SP and ACF/VTAM release 2 with MSNF and JES2 SPE 1.2

SSX/VSE is shipped mainly as object code. Source code is only provided for macros whose parameters must be defined by the user in the application programs. Prompts and helps are provided as ICCF library members. A number of procedures and relocatable library members are provided for system operation.

**COMPATIBILITY and MIGRATION**

With the exception of SSX/VSE unique functions, like the file transfer function and the ICCF operator console functions, SSX/VSE is upward compatible to a DOS/VSE System which includes the VSE based products contained in SSX/VSE on the appropriate release level. No major problems are expected when migration to an extended environment is desired, since only VSAM files and (if installed) DL/I data base are supported by SSX/VSE. Jobs created by SSX/VSE prompts can be saved if ICCF libraries and executed on VSE systems.

A user moving from SSX/VSE to a full-function DOS/VSE IPO/E system and related products will require additional education regarding the base interfaces of DOS/VSE job control language and the various new options available to him, as the SSX/VSE unique prompts and helps are not available in DOS/VSE.

**SECURITY**

SSX/VSE, via ICCF and CICS/DOS/VS, provides the same level of security as provided by these products in VSE.

Customer Management is responsible for the selection, implementation and adequacy of security procedures for their applications.

**PERFORMANCE AND STORAGE CONSIDERATIONS**

**PERFORMANCE:** Generally SSX/VSE will have the same batch and interactive performance as a DOS/VSE system generated with the same program products and generation parameters on equivalent 4321 and 4331 program configurations.

**MAIN MEMORY:** SSX/VSE requires a system with a minimum of 1 megabyte of processor storage. The amount of processor storage needed for a specific customer installation depends on the number of terminals in use and the mix of concurrent work. Such a mix may contain:

- Batch program execution
- Online program development
- Simple or complex online program use
- DL/I use in batch or online programs
- Telecommunication operations

Multi-application environments (e.g., concurrent use of online processing, application development and cross domain communication) can be expected to need additional storage.

Please contact the IBM Representative for support in calculating the required processor storage for a specific SSX/VSE system.

**DASD SPACE:** SSX/VSE requires a minimum of two IBM 3310 DASD drives or 1 IBM 3370 DASD drive (2 addresses). The approximate DASD space reserved for the user (private libraries, ICCF user space and VSAM data space) in a minimum DASD configuration is as shown in the following table:

Available user space on minimum DASD configurations (approximate figures):

	2 x 3310 Drives	1 x 3370 Drives
User private libraries		
Core Image	4.3 MB	28.0 MB
Relocatable	4.3 MB	28.0 MB
Source	3.5 MB	12.5 MB
Free VSAM space (for data files)	5.0 MB	220.0 MB
ICCF user space	7.5 MB	75.0 MB

In case of IBM 3310 DASDs it is recommended to offer at least a system with three IBM 3310 DASD drives to allow for sufficient VSAM space for user data files.

**DOCUMENTATION**  
(available from Mechanicsburg)

A set of eight manuals is provided to describe the functions and interfaces available to the SSX/VSE users.

The manuals provide "how to use" information for all tasks which can be performed by the user with the SSX/VSE system. Conceptual information is kept to a minimum.



**SMALL SYSTEM EXECUTIVE/VSE  
RELEASE 2 (SSX/VSE)  
5666-265**

**PURPOSE**

The licensed program Small System Executive/Virtual Storage Extended (SSX/VSE) is a pregenerated VSE operating system which runs within a range of predefined IBM 4321, 4331 and 4341 configurations. SSX/VSE supports batch and interactive applications. It can be used in standalone environments supporting locally and remotely attached terminals and in distributed data processing environments, i.e., interconnected to other processors in an SNA network. SSX/VSE is designed for quick installation and enhanced ease-of-use compared to DOS/VSE. SSX/VSE Release 2 will be delivered on one tape and serviced as one product.

SSX/VSE is designed for easy installation and easy operation in standalone environments or distributed data processing environments.

Use of SSX/VSE in a networking environment requires understanding of networking procedures and considerations, which are recommended to be managed at the customer's central installation.

**HIGHLIGHTS**

SSX/VSE includes the following basic functions:

- Online transaction processing.
- Batch partitions for batch production work and testing.
- Spooling for job input and output.
- Data communication support for locally and remotely attached terminals.
- Remote job entry workstation support.
- Interactive program development and system control capabilities.
- VSAM-based data management routines including automatic space management. Capability to install DL/I SSX/VSE and SQL/DS in addition.
- A set of file handling utilities including Sort and DITTO.
- High-level language support through COBOL. Capability to install DOS PL/I, DOS/VS RPG II, VS/FORTRAN and RM BASIC.
- SSX/VSE operator console functions supported on local and remote ICCF terminals.
- SNA cross-domain application usage from any authorized terminal in a multi-CPU network environment.
- Remote job execution and file exchange between interconnected SNA systems; capability to also use BSC lines.
- SSX/VSE Release 2 can run as a guest system under VM/370 on processors supporting the 3310 or 3370.

SSX/VSE provides the following usability characteristics:

- Quick installation, reconfiguration and update of the pregenerated SSX/VSE system.
- Predefined procedures and prompts for simple installation of optional programs.
- User-oriented interactive communication with the system through full screen prompts, procedures and help screens for operation and system administration tasks.
- Enhanced interactive problem analysis and problem reporting facilities.
- New task-oriented documentation with 'how to' description for systems administration, operation and application development tasks.
- Creation of job control statements via prompts and dialogs.

SSX/VSE supports (within physical limitations) the following 4300 hardware functions and I/O devices:

- ECPS:VSE mode.
- Minimum of 1 megabyte processor storage.
- Up to 16 3310 drives or 8 3370 drives (2 addresses each), minimum is 2 3310 or 1 3370 (2 addresses).
- Up to 6 8809 tape drives and/or up to 8 channel-attached 3410 and/or 3420 tape drives; minimum is 1 tape drive.
- Integrated 3540 compatible diskette drive and up to 6 channel-attached 3540 diskettes.
- 3262 and/or 3289 Printers attached to the display/printer adapter and/or up to 6 channel-attached 3203, 3211, or 4245 Printers; minimum is 1 system printer.

- Capability to use Magnetic Character Reader and Optical Character (MCR/OCR) Reader devices.
- Local 3278, 3279 and 3287 terminals attached to the display/printer adapter. Additional 3278, 3279 and 3287 terminals can be channel-attached via 3274 control units. Minimum is one display unit with keyboard.
- 8775 display station attached to the local loop adapter.
- Remote 3278, 3279 and 3287 terminals in SNA mode attached via 3274 or 3276 control units and nonswitched SDLC lines to the communication adapter.
- Support of 3601, 3602 and 4701 finance communication controllers and associated devices.
- Up to 8 377X remote job entry workstations attached via switched SDLC lines and up to 8 attached via nonswitched SDLC lines to the communication adapter.
- Up to 8 terminal control units (327X, 377X, 360X, 4701) can be attached to one communication line (multipoint).
- Capability to use BSC line control for Remote Job Entry (RJE), Job Networking, File Transfer and BSC 3270 terminal support via the VTAME and POWER component.

**DESCRIPTION**

**SSX/VSE PRODUCT DESCRIPTION**

**Summary:** SSX/VSE is an operating system designed for the 4321 and 4331 processors.

SSX/VSE Release 2 also supports local configurations (without communication lines) of the 4341.

As an operating system that has no prerequisite software, SSX/VSE is:

- **Pregenerated:** SSX/VSE consists of a predefined set of software components that have been tested for combined use. Because SSX/VSE is pregenerated, it simplifies a number of tasks (such as system planning) that are associated with data processing systems.
- **Preconfigured:** SSX/VSE is designed to work with specific hardware devices in a specific range of configurations. Because SSX/VSE is preconfigured, the time spent in selecting and coordinating hardware devices is minimized.
- **Flexible:** Within SSX/VSE's predefined range of supported configurations and program products, users can:
  - Define how the processor uses storage. This includes:
    - Specifying whether the processor works with 12 or 16 megabytes of virtual storage.
    - Increasing the number of system partitions. SSX/VSE supports a maximum of 12 partitions.
  - Alter system's hardware configuration by adding or replacing supported devices.
  - Install one or more of the optional programs supported by SSX/VSE.
  - Install application programs that have been adapted for use on an SSX/VSE system. SSX/VSE provides an interface for adapting applications to run under it.
  - Develop own application programs for use on the SSX/VSE system.
  - Operate the system in either a local or a remotely controlled environment.

As an operating system SSX/VSE controls the:

- Data processing done by the systems application programs.
- Flow of data to and from the systems input and output devices.

To do this, SSX/VSE includes functions from a number of VSE program products. The level of functions provided in SSX/VSE is described in *Pregeneration Specifications* (SC33-6152).

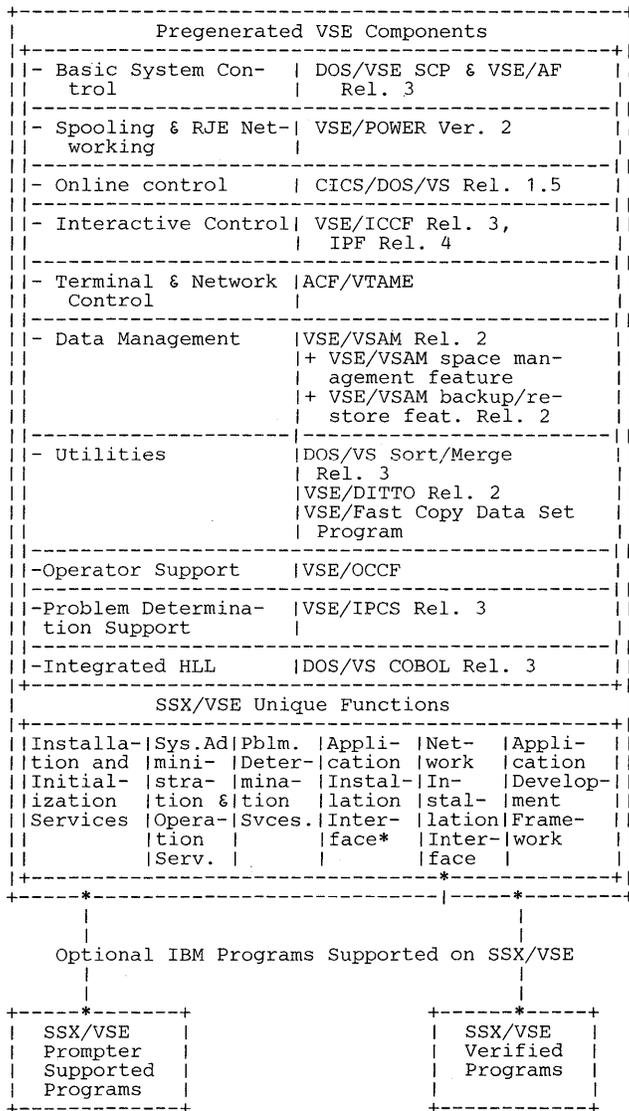
SSX/VSE has been designed for system ease-of-use. Besides extensive online user aids for the daily operation and system administration, support is provided for installation, application programming and problem determination. A set of task-oriented documentation covering the administration, operation and application development functions of SSX/VSE with 'how to' descriptions is also provided.

Refresh of the complete SSX/VSE system will be provided on an as-required basis. The customer can order the refresh system from a distribution center.

**Small System Executive/VSE (cont'd)**

The following graphic illustrates the SSX/VSE structure:

SSX/VSE Licensed Program



\* For standardized installation of adapted applications.

**DESCRIPTION of VSE COMPONENTS:**

The following describes the SSX/VSE components. Application owners adapting an existing VSE application to SSX/VSE will find a description of how to do this, as well as the SSX/VSE functions and restrictions compared to the respective VSE components in the *SSX/VSE Pregeneration Specifications* (SC33-6152).

**Basic System Control: DOS/VSE SCP and VSE/AF**

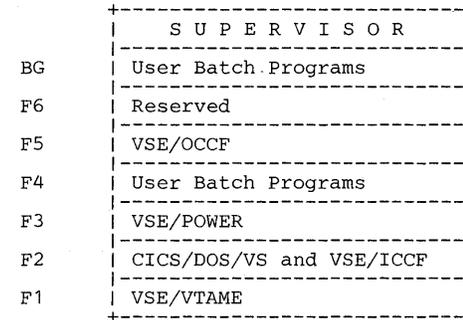
The SSX/VSE supervisor has been pregenerated for ECPS/VSE mode with 12MB of virtual storage. If required, the virtual storage size can be changed to 16MB at initial installation or later. The virtual storage not occupied by the supervisor and the shared virtual area is divided into partitions as shown below:

SSX/VSE is pregenerated with seven partitions:

- Four partitions contain SSX/VSE components. This includes partition F2 which is available for online transaction programs.
- Two partitions are available for running user batch programs.
- One partition (F6) is not active when SSX/VSE operates with 12 megabytes of virtual addressable storage. In SSX/VSE Release 2 systems that use 16 megabytes of virtual addressable storage, F6 is also available for running batch programs.

- SSX/VSE Release 2 supports a maximum of 12 partitions. *SSX/VSE Pregeneration Specifications* describes the procedure for defining the additional five partitions.

SSX/VSE partitions and their use:



BG = Background Partition  
Fn = Foreground Partition

SSX/VSE provides the following predefined libraries utilizing the VSE/AF and VSE/ICCF library concepts:

- System libraries contain the SSX/VSE programs and procedures.
- User private libraries contain user programs and procedures developed under SSX/VSE or other VSE programs installed and tested under SSX/VSE. If more space is required, a second set of user libraries can be created.
- ICCF libraries contain batch jobs to be submitted for execution, all programs in development and data entered from a display station under ICCF control.
- Feature libraries (called Program Product libraries in Release 1) contain optional programs supported on SSX/VSE.
- Application libraries contain programs which are adapted to SSX/VSE using the application installation interface. An SSX/VSE adapted application provides its own application library.

Note: Feature Libraries and Application Libraries are established on demand only and require additional DASD space.

**Spooling and RJE Networking: VSE/POWER Version 2**

This component provides spooling for job input and output. All batch programs run under control of the spooler. The user submits a job interactively from the VSE/ICCF library. The job is queued on DASD in the reader queue for execution. After execution, the job output is queued on DASD in the list queue to be either printed on a printer or displayed on an interactive terminal.

VSE/POWER Version 2 (in conjunction with ACF/VTAME) also provides support for:

- 377X remote job entry workstations attached to SDLC lines.
- Remote job exchange and output routing with SNA Interconnected MVS JES2, VSE POWER V2, and SSX/VSE systems (POWER Networking).

SSX/VSE Release 2 provides the capability to generate support for BSC line control for:

- 2770, 2780, 3741, 3770 (in 2770/3780 compatibility mode), 3780, remote job entry workstations.
- Remote job exchange and output routing with BSC interconnected MVS JES2, VSE POWER V2 or other VM/370 RSCS systems and other SSX/VSE systems generated for BSC RJE support.

File transfer capability on interconnected systems is provided in SSX/VSE in addition to the POWER networking capability. ICCF members and VSAM ESDS or KSDS files can be transferred.

**Online Control: CICS/DOS/VS**

This component provides a transaction-oriented, multi-application data base/data communication interface between the SSX/VSE system and user applications. It uses ACF/VTAME for communication with terminals. Functions provided include:

- Access to data stored in central files.
- Protection of data from double updating and access to data by unauthorized persons.
- Movement of data from terminals to the processor.
- Flow of multiple tasks (units of work) at a time.
- Display of status of terminals, data and programs.

### Small System Executive/VSE (cont'd)

- Journaling and recovery/restart capability.\*
- Capability to use CICS intersystem communication (ISC) functions.\*

\* Requires respective CICS/VSE knowledge.

All macros required to compile command level and most macro level programs are provided. An optional macro tape (no charge) containing CICS/DOS/VS macros not shipped with the base SSX/VSE system can be ordered.

#### Interactive Control: VSE/ICCF and IPF

This component provides:

- Interactive program development,
- Batch job creation and,
- Interactive control of the SSX/VSE system

using facilities of VSE/ICCF in conjunction with the Interactive Productivity Facility (IPF) via locally and remotely attached terminals.

Programs can be written at a terminal and saved in VSE/ICCF libraries. One can view these programs and change them as necessary. Later the programs can be compiled and the results of the compilation displayed. User jobs executed under SSX/VSE can be initialized interactively via control of VSE/ICCF from the ICCF libraries. Five interactive partitions are available for job creation and other system services.

System administration tasks are performed interactively by simple responses to a series of prompts provided in the form of screen panels that the user fills in. More details about interactive control of the SSX/VSE system are provided in the section 'SSX/VSE Unique Functions'.

An SSX/VSE extension allows the utilization of the following operator console functions from an authorized ICCF terminal when SSX/VSE is up and running:

- 1) Display the actual system activity.
- 2) Display a mirror image of the operator console.
- 3) Scrolling through the console hard copy file.
- 4) Input of most operator commands and responses to messages ( for authorized user only). Functions like IPL and CICS shutdown are not possible.

In conjunction with the SNA multisystem networking capability, this function allows SSX/VSE operation support from a terminal attached to a system in a remote location.

**Data Management:** VSE/VSAM, including space management and backup/restore features.

The data management component allows creating, maintaining and processing files on DASD. Furthermore, it manages the data set space automatically. Data sets defined under SSX/VSE may either have a keyed (KSDS), sequential (ESDS) or relative record number (RRDS) VSAM format. The Data Set Administration Prompters provide the functions to define, delete, print, backup and restore such data sets.

DL/I SSX/VSE can be installed on top of VSAM with the help of SSX/VSE installation prompters to allow DB/DC applications to run under control of SSX/VSE.

If a relational data base is required, SQL/DS can be installed on top of SSX/VSE with the help of SSX/VSE prompters.

#### Terminal and Network Control: ACF/VTAME

This component controls the operation of the terminals and handles the transfer of data between the terminals and the processor. It also provides cross-domain communication. It supports:

- 3278, 3279 and 3287 terminals locally-attached to the display/printer adapter of the 4321 and 4331.
- 3278, 3279 and 3287 terminals attached via 3274 control units (3272 version) to a byte or block multiplexer channel.
- 3278, 3279 and 3287 terminals attached to the communication adapter via SDLC lines and 3274 or 3276 control units.
- 8775 terminals attached to the local loop adapter.
- Finance Communication Controllers 3601, 3602 and 4701 and associated devices.
- 3278, 3279 and 3287 terminals attached to the communication adapter via BSC lines and appropriate 3274 control units (no prompter support).
- 377X remote job entry terminals attached to the communication adapter via SDLC lines.
- Cross-domain communication to other SNA systems via SDLC lines.
- Multipoint support (multidropping) of up to 8 terminal controllers of the following types to SDLC or BSC lines:

- 3274

- 3276
- 377X (multipoint via SDLC lines only)
- 3601, 3602, 4701

#### Utilities:

- DOS/VS Sort/Merge
- VSE/DITTO
- VSE/Fast Copy Data Set Program

The SSX/VSE utilities are used to provide the basic file manipulation functions like sort, and copy to DASD, tape or printer.

#### Operator Support: VSE/OCCF

This component has been preprogrammed in SSX/VSE to reduce and simplify the operator communication at the system console by answering certain messages automatically or suppressing messages when appropriate. It may also be used as the base for message translation.

If the optional program product NCCF is installed on SSX/VSE Release 2, the remote operator console function of OCCF can be used to control multiple SSX/VSE systems simultaneously from one remote terminal.

#### Problem Determination Support: VSE/IPCS

This component, in conjunction with specific SSX/VSE problem determination services, assists in problem analysis and problem report preparation.

#### Integrated High-Level Language: DOS/VS COBOL

COBOL/VS is the standard high-level language provided in SSX/VSE to be used for application development from an interactive ICCF workstation. DOS/VS RPG II, DOS PL/I, VS/FORTRAN and RM BASIC can be installed on SSX/VSE Release 2 as optional program products. SSX/VSE provides prompters for installation and execution of these optional high-level languages.

**DESCRIPTION OF SSX/VSE UNIQUE FUNCTIONS:** SSX/VSE provides interactive user services for:

- System installation and initialization.
- System administration and operation.
- Problem determination.

The interactive user services are provided by prompters, procedures, and programs. The prompters direct the user through system activities in user terms and submit requests to the system in system language (e.g., job control language, access method services, control cards). Dialogs begin with a master menu panel which allows selection of an environment. Menu panels are organized as a hierarchy. At the lowest menu level, the user selects the function to be performed by the system.

SSX/VSE prompters are based on the IPF dialog manager. Two users can work concurrently with SSX/VSE prompters. The job stream and control procedures created during a prompter session can be saved into the ICCF libraries for repeated use.

SSX/VSE also provides predefined interfaces and procedures for:

- Application installation
- Network installation
- Application development

Following is a short description of the SSX/VSE unique functions:

#### SYSTEM INSTALLATION and INITIALIZATION SERVICES

**SSX/VSE system installation.** The time required to install SSX/VSE in a standalone environment depends on the hardware configuration. One to two hours are typically required. The SSX/VSE licensed program is distributed on a single magnetic tape. The first installation task is to transfer the contents of the tape to DASD. Once SSX/VSE is on a DASD, prompters at the operator console guide the user in providing information regarding:

- Hardware configuration
- Type of print belt or train on the system printer
- Format of the date.

SSX/VSE automatically recognizes the standard hardware attached to the system (see "Specified Operating Environment"). Configurations that are larger than standard configurations need to be defined further using hardware configuration prompters.

Based on this information, the installation prompter builds a job stream for system initialization which is executed automatically upon the next initial program load (IPL).

There is no prompter support for:

- Installation of BSC lines and terminals
- Installation of MCR/OCR devices
- Invocation of up to 12 partitions
- Allocation of storage to partitions
- Extension of 3600/4700 standard generation

## Small System Executive/VSE (cont'd)

- Completing network definition skeleton
- Adding VTAM applications other than NCCF

Hardware reconfiguration support is provided for most hardware devices through prompters which are designed to update the current SSX/VSE system for a new hardware configuration (e.g., second printer, new terminals) with minimum effort.

Follow-on system updates of the SSX/VSE base system and most prompter-supported optional programs are also supported by a prompter. Thus, changes can be easily applied by replacing a phase, module, macro, procedure, ICCF member or even the whole system library, or by fixing a problem directly with a change to a phase (called ZAP). It is planned to provide refresh tapes of SSX/VSE on an as-required basis.

### SYSTEM ADMINISTRATION and OPERATION SERVICES

Daily operation begins with automatic start up of the SSX/VSE system after:

- Power on of the processor and I/O devices.
- and
- Date and time specification at IPL time.

After initialization is complete, control is given to the Data Communication component and SSX is displayed at terminals (signaling that SSX/VSE is online). The user can then begin to use the system by entering userid and password and pressing the Enter key at the display terminal. This initiates the display of the initial selection menu from which the user can select one of the displayed options.

The following SSX/VSE system administration and operation tasks are supported through selection menus and execution procedures:

- Library Maintenance Support

Prompted parameters are:

- Function to be performed (e.g., display, catalog, etc.)
- Library type.
- Program name.

Knowledge of DOS/VSE job control or library control statements is not required.

- Data Set Management Support

Data administration prompters are provided for defining, using and deleting VSAM entry sequenced (ESDS), relative record number (RRDS) or key sequenced data sets (KSDS) with or without alternate indexes. The following functions are possible without the need to know VSAM/AMS macros:

- Define files.
- Delete files.
- Print files (or portions of a file).
- List catalog entries.
- Verify file integrity.
- Backup files.
- Restore files.
- Define new VSAM space.

- CICS/VS Table Maintenance

Procedures are provided to extend or modify most frequently used CICS tables.

- System Operation Support

- Initiation and termination.
- Job creation and submission (knowledge of the VSE Job Control Language is not required).
- System utilities like Disk Dump, Display Volume Table of Contents (VTOC), Diskette Copy, Assign Alternate Block, Backup/Restore of user libraries.
- Back up and restore of the complete system, volumes or individual data sets.

### Problem Determination Services

To aid the SSX/VSE user, a service program is provided in SSX/VSE as an extension to the Interactive Problem Communication System (IPCS) function. It assists the user in the analysis of dump related problems and collects data for problem reporting. The service program creates an error analysis report which serves as a guide for user application problems, as a base for communication between the SSX/VSE user and IBM.

### Network Installation Interface

SSX/VSE provides a network installation interface to allow integration of SSX/VSE into a given SNA cross-domain environment.

Installing SSX/VSE in this multiple processor environment requires network definitions for the SSX/VSE node. The SSX/VSE distribution tape contains a pre-formatted file for these network definitions.

SSX/VSE Release 2 also provides installation skeletons for the optional products NCCF and NPDA. Experienced central-site personnel can put this file on a disk and use an editor to specify the necessary network information. Network definition tapes can then be created and given to the administrators of the SSX/VSE nodes.

Once the SSX/VSE system is up and running, the administrator can install the network definition tape. SSX/VSE prompters help the administrator create the appropriate job. The job is processed automatically after CICS/DOS/VS and VSE/ICCF are shut down.

The next time the system is brought up, it is automatically established as a network node.

### Application Installation Interface

SSX/VSE provides a predefined Application Installation Interface.

This interface can be used to adapt and install an existing application on top of SSX/VSE. Applications using this interface are sometimes referred to as SSX/VSE adapted applications.

Characteristics:

- Programs packaged using this interface adhere to a specific installation tape layout.
- On this installation tape, the application owner provides jobs and information to:
  - Define and restore necessary libraries.
  - Define and load necessary application files.
  - Modify SSX/VSE startup procedures and CICS/VS tables.

With this format, the application type can be installed in four easy steps:

1. Read installation jobs into POWER queue from tape.
2. Execute installation and generation jobs.
3. Submit application activation job (which is part of SSX/VSE).
4. IPL to activate application.

The SSX/VSE application installation interface is designed to support one application on an SSX/VSE system.

The installation of more than one adapted application possibly requires coordination of system variables and therefore additional system skill and knowledge.

Before an application is installed, additional DASD space must be made available in order to store the application libraries and to allocate the required data files. This space resides outside of the DASD addresses reserved for the SSX/VSE system and the predefined user and ICCF libraries.

A complete description of the SSX/VSE functions and the application installation interface is provided in *SSX/VSE Pregeneration Specifications (SC33-6152)*.

### Application Development Framework

COBOL is the primary language for application programming in SSX/VSE. Based on COBOL, an application framework including a sample application is provided. The application framework consists of partially or completely preprogrammed building blocks for online CICS programs. Specializing the function of each building block simplifies application program development. Design and development of each program is made even easier by the sample program included in SSX/VSE. *SSX/VSE Application Development* describes the use of the application framework for COBOL programming in detail.

Other high-level languages (PL/I, RPG II, FORTRAN, BASIC) and program development productivity tools (ELIAS, DMS/CSP, SDF) can be installed on top of SSX/VSE (see optional IBM programs). These tools are described in their own documentation.

Program development under SSX/VSE is done interactively. The compilation of COBOL, PL/I, RPG II and FORTRAN programs is prompter-initiated. The compiled programs are stored into the SSX/VSE user private libraries. After having provided the necessary updates to the CICS tables (in case of online programs), these programs can be used from CICS terminals. Files supported are VSAM entry sequential (ESDS), key sequential (KSDS) and relative record number (RRDS) files.

SSX/VSE user programs are programs developed by the user under SSX/VSE control using the SSX/VSE-provided tools and procedures.

### OPTIONAL IBM PROGRAMS SUPPORTED ON SSX/VSE

There are two categories of optional IBM programs supported on SSX/VSE:

#### SSX/VSE Prompter-Supported Programs

SSX/VSE prompter-supported programs are defined as follows:

- IBM-supplied DOS/VSE programs
- Verified by IBM to run under SSX/VSE and, as far as required, adapted to SSX/VSE

PROGRAM PRODUCTS

Small System Executive/VSE (cont'd)

- Ease-of use prompter-supported in the SSX/VSE base system for easy installation and maintenance
- When appropriate, ease-of-use prompters are also included to aid in the use of these programs.

SSX/VSE Verified Programs

SSX/VSE Verified Programs are defined as follows:

- IBM-supplied DOS/VSE programs
- Verified by IBM to run under SSX/VSE
- Installed on SSX/VSE according to the documented installation procedures of the individual program, i.e., no aids have been included in SSX/VSE for these programs.

SSX/VSE Release 2 supports the following optional programs:

- High-level languages
  - \* DOS PL/I Optimizer Compiler & Libraries, Release 6.0 5736-PL3 (p)
  - DOS PL/I Resident Library 5736-LM4 (v)
  - \* DOS PL/I Transient Library 5736-LM5 (p)
  - DOS PL/I Compiler, Release 6 5736-PL1 (v)
  - \* DOS/VS RPG II, Release 3 5746-RG1 (p)
  - VS/FORTRAN, Release 2 Compiler & Libraries 5748-FO3 (p)
  - VS/FORTRAN Libraries 5748-LM3 (p)
  - RM-BASIC (IUP) 5796-BCX (p)
- Program Development Productivity Aids
  - DMS/CSP SSX/VSE Development and Test Execution 5668-282 (p)  
5666-283 (p)
  - ELIAS SSX/VSE 5666-291 (p)
  - SDF/CICS SSX/VSE 5666-288 (p)
- Hierarchical and Relational Data Base Support
  - DL/I SSX/VSE 5666-275 (p)
  - SQL/DS 5748-XXJ (p)
- Enhanced Central Management Capabilities
  - NCCF, Release 2 5735-XX6 (p)
  - NPDA, Version 2 5668-983 (p)
- Enhanced Security Support
  - VSE Access Control-Logging and Reporting 5746-XE7 (p)
- Finance Communication System Support
  - Subsystem Support Services Release 4 5747-CC6 (v)
  - 3600 Host Support IR, Release 7 5747-BR1 (v)
  - 4700 Host Support Program 5668-989 (v)
  - 4700 COBOL 5666-266 (v)
- Other Device Support
  - Downstream Load Utility Rel. 1.2 5668-006 (p)
- Applications for text processing
  - DCF, Release 2 5748-XX9 (v)
  - DLF 5748-XXE (v)
  - IPDT Version 1 Release 1 5785-DDD (v)
- Cross-Industry Applications
  - Financial Management System 5666-263 (v)
  - Interactive Personnel System 5746-AM1 (v)
  - Interactive Financial System
    - IFS1 Postings and General Ledger 5746-F52 (v)
    - IFS2 Profit & Loss, Balance Sheet.. 5746-F53 (v)
    - IFS3 Open Item Accounting 5746-F54 (v)
    - IFS4 Payment Processing 5746-F55 (v)
- Communications-Oriented Product Information and Control (COPICS) Products
  - COPICS Inventory Accounting II 5785-GBE (v)
  - COPICS Advanced Function Material Requirements Planning II 5785-GBF (v)

COPICS Product Cost Calculation II 5785-GBD (v)  
COPICS Bill of Material Online II 5785-GBA (v)

- (p) SSX/VSE prompter-supported
- (v) SSX/VSE verified program

\* Available on SSX/VSE Release 1 with a specific SSX/VSE program number. On SSX/VSE Release 2, these programs are ordered with their VSE program number.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

SSX/VSE is designed to operate on IBM 4300 processors in ECPS:VSE mode and on all storage sizes offered with these processors starting with a minimum of 1MB. It supports DASD, tape, terminals, printers, diskettes, MCR/OCR devices and a range of terminals and communication subsystems. It can be installed with 12 megabytes or 16 megabytes of virtual storage.

Note: Hardware devices not indicated are not supported by SSX/VSE.

MINIMUM CONFIGURATION: This is the minimum configuration needed to run SSX/VSE. The number in front of the device type indicates the minimum quantity of devices required.

Direct Access Storage Drives	Processor	(1) Console
4321 (1MB)	4321 (1MB)	3278 or
		3279
+-----+	+-----+	+-----+
(2) 3310 *--+	4331 (1MB)	(1) Line
or		Printer
(1) 3370	4341 (1MB)	+-----+
+-----+	+-----+	+-----+
(1) Mag Tape Unit	12 Megabyte	* 3262 or
	virtual storage	3289-4 or
		3203 or
		3211 or
		4245
+-----+	+-----+	+-----+
8809 or	**	
3410/11 *--+		
or		3278
3420		or *
+-----+	+-----+	+-----+

- (\*) Locally attached via the display/printer adapter or via a channel-attached terminal control unit.
- (\*\*) 16MB virtual storage in case of IBM 4341.

STANDARD CONFIGURATION: This range of configurations is assumed by SSX/VSE as default hardware configuration, so that all prompts at installation time which relate to hardware configurations will be bypassed (see also "General Configuration Considerations").

There is no standard configuration for a 4341 processor. This is because a 4341 does not have the device adapters shown in the following figure.

DASD 2 to 16 drives	Processor	
	4321	
	4331	
+-----+	+-----+	+-----+
3310 *--+	DASD	Display
	Adap	Printer
	+-----+	Adapter
		Console
		(NOTE)
or-----+		up to 15 of
*		the following
1-8 drives	ECPS:VSE	devices
3370 (2-16	mode	*---3262 )
addresses)		Printer)
		*---3289 )Max.2
		Printer)
+-----+	+-----+	+-----+
8809	Disk-	
/-  Adap	ette	*---3287
	Drive	Terminal
	+-----+	Printer
Tape 2	12 megabytes	
x 8809	virtual	*--- 3278-2 or
	storage	3279-A2
		Displays
		(NOTE)
+-----+	+-----+	+-----+
		* integrated
		user diskette

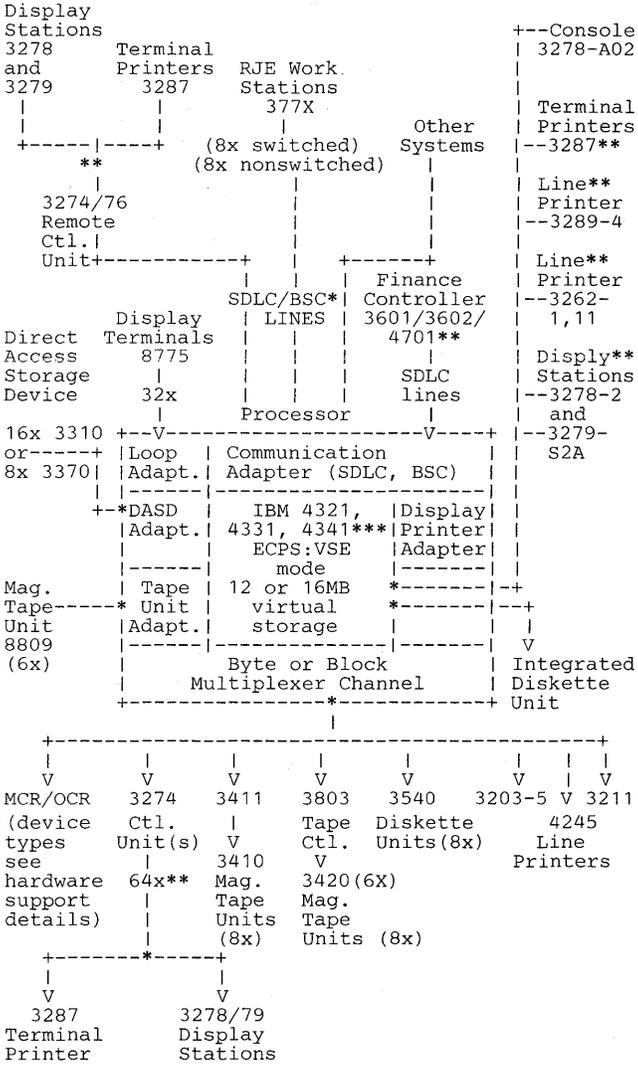
NOTE: See hardware Support Details regarding support of 3279 color display stations and color console.

PROGRAM PRODUCTS

Small System Executive/VSE (cont'd)

**MAXIMUM CONFIGURATION:** The following I/O devices, terminals and lines are supported in SSX/VSE. The numbers (e.g., 8x) indicate for each device type the maximum number of device addresses supported by SSX/VSE when installed as an independent operating system.

**Note:** The device adapters shown in the following figure are not available on the 4341 processor. Because of this, devices must be attached to a 4341 via a channel and a control unit.



- Notes:**
- \* Only SDLC lines are pregenerated in SSX/VSE.
  - \*\* See Configuration considerations point 5.
  - \*\*\* On IBM 4341 systems, the following restrictions apply:
    - No support of remote communication (3705-type devices).
    - No support of IBM 3310 DASD, 8809 tapes, integrated diskette and devices attached to the Display/Printer adapter.
    - IBM 3370 DASD attached via channels.
    - 16 megabytes virtual storage only.

**CONFIGURATION CONSIDERATIONS**

For any SSX/VSE configuration:

1. SSX/VSE recognizes specific device addresses. The addresses are described in the *SSX/VSE General Information* manual.
2. Either 3310s or 3370s are supported but not both on the same system.
3. In case of IBM 3310 DASDs, a system with at least three IBM 3310 DASD drives is recommended to allow for sufficient VSAM space for user data files. The amount of user VSAM data space available on the first two IBM 3310 DASD addresses is approximately 0.5 million bytes, and on the first two IBM 3370 DASD addresses is approximately 200 million bytes. Installation of one or

more of the optional programs requires the reservation of space on an IBM 3310/3370 DASD drive.

The total amount of DASD space required depends on the size of the data files. SSX/VSE supports a maximum of 16 DASD addresses of either IBM 3310 or 3370.

4. If the system uses IBM 3370 drives and frequent full backup is required, it is recommended to have at least one IBM 3420 tape unit that supports 6,250 bytes-per-inch tape density.
5. Maximum number of terminals - Each SSX/VSE Release 2 system allows the definition of up to 250 local and remote display stations as shown in the following table. This includes any terminals physically attached to other systems which can access a given SSX/VSE system (cross-domain terminals).

Device Type	Attachment	Maximum
3278/3279 display stations and 3287 terminal printers	Local; via a display/printer adapter or via channel-attached 3274	64*
8775 display terminals	Local; via an integrated loop adapter	32
3278/79 display stations and 3287 terminal printers	Remote; via 3274/76 control units on nonswitched BSC or SDLC lines	250**
3600/4700 logical units accessed by CICS	Remote; via 3600/4700 control units on switched or nonsw. SDLC lines	

\* Maximum number of terminals attachable to the display/printer adapter is 15.

\*\* Minus all locally-attached terminals.

**Hardware Support Details**

**4321/31 Processor Features Supported:**

- DASD Adapter #3201 for IBM 3310 and IBM 3370
- 8809 Magnetic Tape Unit Adapter #4910
- Byte Multiplexer Channel #5248
- Block Multiplexer Channel #1421
- Diskette Drive #3401
- Display/Printer Adapter Expansion #2001
- Communication Adapter #1601 and associated features.
- Loop Adapter features #4830, 4831
- High Speed Block Multiplexer Channel #1431 (4331-2 only)
- External Signals #3898
- Second DASD Adapter #3202 (only if SSX/VSE is used under VM)

**4321/31 Processor Features Not Supported:**

- 14XX compatibility #3950
- Printer-Keyboard mode #5550
- Direct Access Storage Compatibility #7901
- 5424 Adapter #3901
- 3340/3344 Direct Attachment #7851
- Data Link Adapter #4840

**4341 Processor Features Not Supported:**

- Channel-to-Channel Adapter #1870

**Device Support**

**Disk Drives:** IBM 3310 (mdls A1, A2, B1, B2) or IBM 3370 DASD (mdls A1, B1) are supported. Minimum disks required are two IBM 3310 drives or one IBM 3370 drive (two addresses). The maximum number of disk drives is either sixteen IBM 3310 drives (16 addresses) or eight IBM 3370 drives (16 addresses). A mixture of IBM 3310 and IBM 3370 strings is not possible. The IBM 3370 string switch feature is not supported.

**Tape Drives:** The maximum number of tape drives supported is six IBM 8809 attached to the 8809 tape unit adapter, eight IBM 3410/11 models 1 - 3 channel-attached, and eight IBM 3420 models 3 - 8 channel-attached via a 3803 tape control unit. The 7-track feature is not supported. As a minimum, one tape drive is required.

**Diskette Drives:** SSX/VSE supports the integrated diskette drive as an IBM 3540. Up to six additional IBM 3540 diskette drives (six 3540 B01 or three 3540 B02) attached to a channel are supported.

PROGRAM PRODUCTS

Small System Executive/VSE (cont'd)

**Printers:** SSX/VSE supports the Printers IBM 3262 models 1 and 11, 3289-4, 3203-5, 3211, and 4245. All 5 printer types are supported as system printers (SYSLS). At least 1 printer is required. The maximum number of IBM 3262 or IBM 3289 Printers attachable to the display/printer adapter is two. In addition, up to six IBM 3203-5s, 3211s, or 4245s can be attached to a channel.

**OCR/MCR:** The following Magnetic and Optical Character Readers are supported:

Magnetic Ink Character Readers	Optical Character Readers	Document Processor
1255	1270	3890
	1275*	
1259	1287	
	1288	
1419*	3881	
	3886	

\* Dual Address Adapters are supported.

If SSX/VSE is used as a guest under VM, only the IBM 3886/3890 are supported.

**Terminals Supported:** (see configuration considerations for maximum number of terminals allowed)

- Locally attached to the Display/Printer Adapter (available on IBM 4321 and 4331):
  - Operator Console IBM 3278-2A or IBM 3278-2C (see note 1 below)
  - Display station IBM 3278-2
  - Color Display Station IBM 3279-2A, S2A, O2X
  - Terminal Printer IBM 3287-1, 2, 1C, 2C
  - Line Printer IBM 3289-4
  - Line Printer IBM 3262-1, 11
- Locally attached to the Byte or Block Multiplexer Channel via appropriate IBM 3274 (IBM 3272 version) terminal control units:
  - Display Station IBM 3278-2, 3, 4
  - Color Display Station IBM 3279-2A, 2B, S2A, S2B, 3A, 3B, S3G, O2X, O3X
  - Terminal Printer IBM 3287-1, 2, 1C, 2C
- Attached to the Local Loop Adapter
  - IBM 8775 mdls 1, 2
  - Extended functions (RPQ SU0183 and SU0184) are supported. 960-character screens are not supported.
- Attached to the Communication Adapter via nonswitched SDLC lines and appropriate IBM 3274 and/or 3276 terminal control units:
  - Display Station IBM 3278-2
  - Color Display Stations IBM 3279-2A, 2B, S2A, S2B, 3A, 3B, S3G, O2X, O3X
  - Terminal Printer IBM 3287-1, 2, 1C, 2C
- Attached to the Communication adapter via nonswitched BSC lines and appropriate IBM 3274 or 3276 terminal control units:
  - IBM 3278 mdls 2, 3, 4
  - IBM 3279 mdls S2A, S2, S3G
  - IBM 3287 mdls 1, 2, 1C, 2C
- Attached to the Communication adapter via switched or non-switched BSC lines
  - IBM 2770, 2780, 3770 (in 2770/3780 compatibility mode), 3741, 3780 line protocols
- Attached to the Communication adapter via switched or non-switched SDLC Lines IBM Finance Communication Controllers
  - IBM 3601 mdls 1, 2A, 2B, 3A, 3B
  - IBM 3602 mdls 1A, 1B
  - IBM 4701 mdls 1, 2, 5

Subconfigurations under 3601/02 or 4701 Controllers are supported by the Controller Programs as announced for Finance Communication Systems IBM 3600 and IBM 4700.
- Attached to the Communication Adapter via SDLC lines:

DEVICE	MODEL	ATTACHABLE DEVICES			
		Reader	Punch	Printer	Storage Devices
3771	1, 2, 3	3501	3521	None	None
3773	1, 2, 3	None	None	None	One integr. device
3774	1P, 2P	2502	3521	3784	1 or 2 (diskette)
3775	1P	3501 2502	3521	None	1 or 2 (diskette)
3776	1/2	3501 2502	3521	None	1 or 2 (diskette)
3777	1	3501 2502 2502	3521 3521 3521	3203-3 3262-2 /12	1 or 2 (diskette)

**Notes:**

1. SSX/VSE supports the IBM 3279 color display console (model 2C) as a 3278-2A with no specific color support, i.e., three colors are supported by default.
2. Applications running under SSX/VSE which use the IBM display stations 3278 and 3279 will be able to utilize the extended data stream capabilities including all colors according to the application program coding.  
  
The SSX/VSE components have not been programmed to exploit the extended data stream capabilities of IBM 3278 display stations for prompts, helps and messages. The IBM 3279 color display station is used by SSX/VSE components in 3278 compatibility mode.

**SOFTWARE REQUIREMENTS**

SSX/VSE Release 2 is a complete operating system with no prerequisite software requirements. It is ready for use immediately after installation. It is shipped mainly in object code format.

Cross-domain application communication from a processor running SSX/VSE with another processor can be established via SDLC lines, if the other processor has one of the following software packages installed:

- Another SSX/VSE program product.
- ACF/VTAM with Multisystem Network Facility and ACF/NCP.
- ACF/VTAME (DOS/VSE only).

RJE connections for job networking and file transfer to other SNA processors are possible via SDLC lines if the other processor has one of the following software packages installed:

- Another SSX/VSE licensed program.
- VSE/Advanced Functions Release 3 with VSE/POWER Version 2 and ACF/VTAME or ACF/VTAM Release 2 or later with MSNF and ACF/NCP.
- MVS/SP-JES2 (Version 1, Release 3 or later) unless otherwise specified, and ACF/VTAM (Release 2 or later) with MSNF and ACF/NCP.

Job networking via BSC lines is possible if the other processor has the following software installed:

- Another SSX/VSE licensed program.
- VM/370 Remote Spooling Communications Subsystem (RSCS), Release 2.
- DOS/VSE with VSE/POWER Version 2.
- MVS/SP-JES2 (Version 1, Release 3 or later, unless otherwise specified).

**Note:** SSX/VSE is pregenerated to communicate with other systems using SDLC line control. SSX/VSE Pregeneration Specifications describe how BSC line control can be used for host-to-host connections under control of the POWER component.

**COMPATIBILITY**

**Compatibility to DOS/VSE:** SSX/VSE Release 2 is upward compatible to a DOS/VSE system with the exception of the SSX/VSE unique function, the file transfer function, and the ICCF operator console function. To be upward compatible, the DOS/VSE system must include program products at the appropriate release level which are contained in SSX/VSE. SSX/VSE users can functionally enhance their systems in the future by moving to a SIPO/E full function DOS/VSE system and related products. Additional education will be required for the user to learn the base interfaces such as job control language and the various user options available.

In general, existing DOS/VSE programs can be executed on SSX/VSE if they:

- Meet SSX/VSE requirements for

PROGRAM PRODUCTS

**Small System Executive/VSE (cont'd)**

- Hardware configuration
- Pregenerated software components
- System layout
- Library definitions.

• Do not require:

- Direct or indexed sequential access method (DAM or ISAM)
- ISAM interface program (IIP)

To perform direct access I/O, the FORTRAN user will be required to change the source program. The data set must be defined as a VSAM Relative Record Data Set (RRDS). See the VS/FORTRAN publications on requirements for VSAM processing.

The majority of existing VSE programs are not affected by above restrictions and will, therefore, run on SSX/VSE as on any other generated VSE system. The *Pregeneration Specification Manual* should be consulted for further information.

IBM-supplied VSE program products with local service (class A equivalent) are supported on SSX/VSE if they are announced as being supported on SSX/VSE.

To SSX/VSE Release 1: All applications which work with SSX/VSE Release 1 will also work with SSX/VSE Release 2. Only jobs created by means other than SSX/VSE-supplied prompters and procedures (e.g., including their own job control statements) may need changes. Users already familiar with SSX/VSE Release 1 will notice little difference in the appearance of Release 2 at the display station.

**DATA SECURITY, AUDITABILITY AND CONTROL**

SSX/VSE, via its ICCF and CICS/DOS/VS components and the optional program product VSE/Access Control-Logging and Reporting, provides the same security, auditability and control facilities as provided by these products in DOS/VSE. Customers are responsible for the selection, implementation and adequacy of security procedures for their applications.

**RELIABILITY, AVAILABILITY, SERVICEABILITY (RAS)**

SSX/VSE RAS support for IBM 4300 is equivalent to that of DOS/VSE.

The SSX/VSE specific Problem Determination Facility introduced in SSX/VSE Release 1 will be continued in SSX/VSE Release 2. This facility produces an analysis of dumped data for both batch and online programs. It helps the user to identify and overcome errors.

**PROGRAM CURRENCY**

SSX/VSE Release 2 replaces SSX/VSE Release 1. With the availability of SSX/VSE Release 2, SSX/VSE Release 1 will be withdrawn from marketing. IBM will provide Program Service for SSX/VSE Release 1 until December 31, 1983.

With the availability of SSX/VSE Release 2, the following program products available on SSX/VSE Release 1 will be withdrawn from marketing:

- SSX/VSE RPG II (5666-274)
- SSX/VSE PL/I Optimizer & Library (5666-276)
- SSX/VSE PL/I Transient Library (5666-277)

Refer to the optional IBM programs section for information on replacements. For purposes of IBM providing Program Services, these program products will be considered current until December 31, 1983.

**PERFORMANCE AND STORAGE CONSIDERATIONS**

**PERFORMANCE:** Generally SSX/VSE Release 2 and the optional IBM programs supported on it will have the same batch and interactive performance as a DOS/VSE system generated with the same program products and generation parameters on equivalent 4300 configurations.

The performance of SSX/VSE Release 2 functions already available in Release 1 will be about the same as in SSX/VSE Release 1.

**MAIN MEMORY:** SSX/VSE requires a system with a minimum of 1 megabyte of processor storage. The amount of processor storage needed for a specific customer installation depends on the number of terminals in use and the mix of concurrent work. Such a mix may contain:

- Batch program execution
- Online program development
- Simple or complex online program use
- DL/I use in batch or online programs
- Telecommunication operations
- Job networking and cross-domain management
- Central Network Management

Multi-application environments (e.g., concurrent use of online processing, application development and cross-domain communication) can be expected to require additional storage.

**DASD SPACE:** SSX/VSE requires a minimum of two DASD addresses for system residence (i.e., 2 3310 DASD drives or 1 3370 DASD drive).

Included on these disks is some space available for the user as shown in the table below (in approximate figures):

DASD Area	3310 Megabytes	3370 Megabytes
VSAM Master Catalogs	2.0	2.0
VSAM User Space	0.5	200.0
ICCF Library	10.0	95.0
POWER Files	4.5	27.0
User Private Library (core image, relocateable, source)	10.0	78.0

On additional DASD volumes space may be allocated for:

- VSAM data files
- A second set of private libraries
- A Feature library for optional IBM programs
- Extension of the ICCF library and POWER files
- Adapted application libraries and data

**DOCUMENTATION**  
(available from Mechanicsburg)

The documentation for SSX/VSE is contained in 8 manuals. This library will be updated to include the SSX/VSE Release 2 enhancements. These manuals are:

Overview/Evaluation:

SSX/VSE General Information GC33-6143-2  
Available since October, 1982.

Manuals for Specific Tasks: These manuals provide 'how to use' information for all tasks which can be performed by the user of the SSX/VSE system. Conceptual information is kept to a minimum.

SSX/VSE Installation SC33-6147-1  
 SSX/VSE Operation SC33-6144-1  
 SSX/VSE Administration SC33-6145-1  
 SSX/VSE Application Development SC33-6148-1  
 SSX/VSE Problem Determination SC33-6149-1  
 These manuals will be available in January, 1983.

Reference Type Manuals:

SSX/VSE Messages and Codes SC33-6146-1  
 SSX/VSE Pregeneration Specifications SC33-6152-1  
 These manuals will be available in January, 1983.

**Note:** Tasks which require VSE, CICS, VTAM or other DP skills are documented only in the *SSX/VSE Pregeneration Specification Manual*.

**RPQs**

Should a customer wish to use SSX/VSE without the full complement of components, an RPQ can be submitted which allows the customer to delete selected components from the tape distributed by PID. Prices will be adjusted to reflect the deletion of components. for details.

**Note:** The terms and conditions for the licensed programs optionally available on SSX/VSE Release 2 remain as announced for the individual products.

PROGRAM PRODUCTS

**4700 FINANCE COMMUNICATION SYSTEM  
COBOL SUPPORT - DOS/VSE (5666-266)**

**PURPOSE**

The 4700 Finance Communication System COBOL Support - DOS/VSE (5666-266), executes under DOS/VSE. Output of the compiler is object programs that will execute on the 4700 controllers.

The 4700 COBOL compilers should provide customers with a powerful, comprehensive, easy-to-use language for use in preparation and execution of finance application programs. The language offers a wide range of features, plus facilities for handling input/output, and debugging COBOL programs.

**SPECIAL MARKETING CONSIDERATIONS**

Since applications developed using 4700 Finance Communication System COBOL Support are developed at a higher level user interface than those developed with controller assembler language, they may require additional features and/or hardware to provide for equivalent transaction loads.

**HIGHLIGHTS**

- Language
  - Support of American National Standard (ANS) COBOL X3.23-1974 (except for the RERUN clause).
- User Options
  - Source Listings.
  - Cross reference.
  - Storage map of variables.
  - Statement offset listing.
  - Object listing.
- Program Development and Productivity Aids
  - Symbolic debug.
  - Flow trace.
  - Extensive error checking.
  - Generalized CALL.

**I/O Capabilities:** 4700 Finance Communication System COBOL Support programs can work with SEQUENTIAL, RELATIVE, and INDEXED files. The access methods supported are as follows:

- Sequential Organization
  - Sequential processing.
- Relative Organization
  - Sequential processing.
  - Random processing by relative record number.
- Indexed Organization

**Table Handling:** Define and process fixed length tables up to three dimensions.

**Segmentation:** The segmentation feature permits:

- Dividing the Procedure Division of a COBOL program into a series of segments.
- Specifying that some segments (fixed segments) must be resident in main storage while the program is running, and cannot be overlaid, while others (independent segments) are loaded into an overlay area when needed.
- Reducing main storage requirements during program execution.

**Interprogram Communication:** This facility allows transferring of control from one COBOL program to another. Control can also be transferred to an appropriate controller assembler language program. Programs can access the same or unique data.

**Data Communications:** Data communications support for COBOL is via a CALL interface.

**Industry Standards:** Designed in accordance with the American National Standard (ANS) COBOL X3.23-1974 as understood and interpreted by IBM as of January, 1980, with the exception of the RERUN clause. ANS COBOL is identical to ISO 1989-COBOL approved February, 1978, by the International Organization for Standardization.

**Processing Modules:** The following processing modules are supported:

- 1 NUC 1, 2
- 1 TBL 1, 2
- 1 SEQ 1, 2 \*
- 1 REL 0, 2 \*
- 1 INX 0, 2
- 1 SEG 0, 2
- 1 LIB 0, 2
- 1 DEB 0, 2
- 1 IPC 0, 2

\* RERUN clause is checked for syntactic correctness only.

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level specified for the American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the Standard.

In addition to the above, the following NUCLEUS Level 2 features are also supported:

- COMPUTE statement
- Qualification
- Arithmetic operators
- Complex conditions
- CORRESPONDING phrase
- ACCEPT and DISPLAY verbs
- Multiple operand support for arithmetic statements
- Nested IFs
- PERFORM UNTIL
- 01 through 49 level numbers
- String/Unstring from level 2 of the ANS 1974 COBOL nucleus module.

**Language Extensions:**

- Support for terminal I/O.
- Symbolic characters facility for defining and referencing hexadecimal values.
- Initial Attribute to optionally cause program to be in its initial state each time it is called.
- Program access to the system global segments 13 and 15.

**I/O File Support:**

- EDAM file on diskette and disk via sequential, relative and indexed files I/O modules.
- CALL interface to handle unique 4700/3600 device characteristics.
- CALL interface to handle temporary files.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the installation of IBM Licensed Programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation and day-to-day operation lies solely with the customer. Installation of IBM Licensed Programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 4700 Finance Communication System COBOL Support - DOS/VSE requires at least a 192K byte partition as well as a configuration sufficient to run the selected operating system.

Object program execution can be on any 4700 system that has sufficient user storage and 4700 controller support, including the zoned decimal support. The actual user storage requirements are a function of the COBOL source program.

**CONVERSION/COMPATIBILITY**

Some degree of upward compatibility does exist between the 4700 COBOL compilers and the OS/VS and DOS/VS compilers. However, differences do exist and some conversion will be necessary. The differences include I/O and communications support and language features introduced to support specific 4700 controller functions.

**DOCUMENTATION**

(available from Mechanicsburg)

*4700 Finance Communication System COBOL Support General Information Manual (GL23-0078). ... IBM 4700 Finance Communication System: System Summary (GC31-2016) ... IBM 4700 Finance Communication System: System Configurator (GC31-2017) ... IBM 4700 COBOL DOS/VSE Host Compiler and Library Licensed Program Specifications (GL23-0080) ... IBM 4700 Finance Communication System: COBOL Programmer's Guide (SL23-0082) ... IBM 4700 COBOL Language Reference Manual (SL23-0081) ... IBM 4700 COBOL Problem Diagnosis and Reference Manual (SL23-0083).*

RPOs ACCEPTED: No



**DIRECT MULTINETWORK LINK (DMNL) for CICS/DOS/VS  
VERSION 1 RELEASE 1  
5666-269**

**PURPOSE**

Direct Multinetwork Link (DMNL) is an application program product that enables the preparation and processing of messages related to banking transactions.

**HIGHLIGHTS**

As a generalized communication monitor, Multinetwork Link is a base product and provides the following end-user oriented services for the banking environment.

- Message Processing
  - Online message processing
  - Batch message processing
  - User application program support
  - Operator control of the system
- Message Definition Facility
- General Services
  - Routing
  - Message format service
  - Queue management
  - Journaling

**DESCRIPTION**

DMNL is a message processing facility that allows the end-user to work with a display terminal or sequential devices. With DMNL, a user can prepare messages based on user-specified or S.W.I.F.T. formats. These messages can be transmitted to the network interface for any public or private network including the S.W.I.F.T. network. Communication network interface functions provide a base to establish and operate the connection to any network including the S.W.I.F.T. network, and allow the concurrent operation of multiple network links within one DMNL installation.

DMNL provides message formatting and routing services to control the message flow from function to function, and to gain access to individual fields within a message. The Message Format Service (MFS) maps the various formats of the messages to a common internal format or maps a message from the internal format to a format compatible with the device where it is to appear. MFS simplifies the access to each individual message field for inspection and further processing. The level of detail to which a message is segmented is determined during DMNL generation by the facilities provided.

Routing services control the movement of input and output messages from one DMNL function to the next. Routing criteria are either found in the message itself or are introduced by the end user handling the message. All messages are stored in queues. The queues of all message processing functions are collected in one data set. Queue management dynamically utilizes this data set. The journal saves information on events that occur during the operation of DMNL. This information can be used for security and reliability purpose.

As a general application package, DMNL is integrable into a banking application environment. Together with other banking applications that can automatically be initiated by the user application interface facility, Direct Multinetwork Link allows a full computer-assisted processing of banking transactions.

**Reference Information:** Direct Multinetwork Link is available for the following environments:

- DMNL-CICS/DOS/VS (5662-269)
- DMNL-CICS/OS/VS (5668-965)
- DMNL-IMS/VS (5668-964)

To communicate with the S.W.I.F.T. network, the user of Direct Multinetwork Link has to install Direct S.W.I.F.T. Network Link (DSNL) (5668-926).

DMNL/DSNL are internally restructured, functional extensions of the program product Direct S.W.I.F.T. Link (DSL), Program Numbers 5746-F14 (DSL-CICS/DOS/VS), 5740-F15 (DSL-CICS/OS/VS) and 5740-F16 (DSL-IMS/VS).

**CUSTOMER RESPONSIBILITIES**

Users are responsible for the following prerequisites:

- The operating system and data communication system must be generated and installed as required for Direct Multinetwork Link.
- The required library space must be provided.
- Customization and installation must be performed for DMNL.
- End users must be defined and end-use functions must be selected and defined.
- Routing modules that reflect the bank's organizational requirements must be provided.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Direct Multinetwork Link program product is designed to operate on the following IBM machines.

IBM S/370 mdls 135-3 through 158  
IBM 3031, 3033  
IBM 43XX

The size of the processor for DMNL depends on the operating system (DOS/VSE with VSE/Advanced Functions) and the data communication system (CICS/DOS/VS) used to control the operation of DMNL.

The system requirements of DMNL/DSNL, in addition to those of the operating system used, are the following:

- At least one IBM 327X display station (i.e., 3278-2, 3279-2).
- If printing services are desired, one IBM 328X Printer (i.e., 3287-2, 3288-2) or equivalent.
- A direct access storage device for DMNL data sets and library. DMNL batch programs under DOS/VSE support all direct access storage devices supported by DTFSD, as well as DTFMT devices for no label and standard label.

**SOFTWARE REQUIREMENTS**

The programs that constitute the Direct Multinetwork Link program product are written in IBM S/370 Assembler language.

The operational requirements are:

- IBM Disk Operating System/Virtual Storage Extended (DOS/VSE) (5745-030) Release 3.0, together with VSE/Advanced Functions (5746-XE8) Release 3.0 or subsequent releases.
- Customer Information Control System/Virtual Storage (CICS/DOS/VS) Version 1 (5746-XX3), Release 5.0, or subsequent releases.
- The DMNL/DSNL queue, user table, journal and the authenticator-key file are VSAM data sets. VSE/VSAM (5746-AM2) must be available for DOS/VSE. VSE/VSAM is part of the DOS/VSE System IPO.

**Restart/Recovery:** Restart/Recovery assistance is supplied for:

- DMNL restart based on queues.
- Device failures of IBM 3278-2 and 3287-2 and their equivalents.
- Failure of the IBM system covered by the recovery capabilities of the operating and data communication system.

**COMPATIBILITY and MIGRATION**

Direct Multinetwork Link together with the separate program product Direct S.W.I.F.T. Network Link support all S.W.I.F.T. specific services. Direct S.W.I.F.T. Network Link is the interface between Direct Multinetwork Link and the S.W.I.F.T. network. The program products DMNL/DSNL Release 1.0 are internally restructured, functional extensions of the program product Direct S.W.I.F.T. Link DSL (5746-F14 - DSL-CICS/DOS/VS), (5740-F15 - DSL-CICS/OS/VS), and (5740-F16 - DSL-IMS/VS). With respect to DSL Release 2.0, DMNL/DSNL Release 1.0 provides the following new functions:

- Direct Multinetwork Link (DMNL)
  - NOPROMPT mode in addition to normal screen processing in PROMPT mode.
  - Compressed printer layout.
  - Dynamic queue-key table.
  - Separated signon processing.
  - Improved console operator message.
  - Improved Message Format Service error diagnostics.
  - Extended panel command availability.
  - CICS command level interface.
  - 3375 and 3380 support.
  - Online maintenance of the user-table (passwords, users).
  - Support of customer-added applications, including record formats other than S.W.I.F.T.
- Direct S.W.I.F.T. Network Link (DSNL)
  - Support of all S.W.I.F.T. message types, including message category 7 (documentary credits).
  - Optional automatic retry of LOGIN processing.

To ease migration, DMNL/DSNL are designed to be functionally upward compatible with DSL. However, a customer migrating from DSL to DMNL/DSNL must follow the same installation procedure as a new customer.

The generalization of the facility to define user-specific messages has implied modifications of the message format service, queue manage-



PROGRAM PRODUCTS

**DMNL for CICS/DOS/VS (cont'd)**

ment and routing in DSL. User-written application programs that use these services may have to be rewritten.

**User Modifications:** During DMNL installation, each user can determine the customizing options that best meet his requirements. For additional, individual changes, the programs are designed so that users can:

- Modify the layout and the language of the panels used to display a message or related data on screens, terminal printers, and line printers.
- Modify the layout of a S.W.I.F.T. message and other related data in internal storage.
- Add individual code of user-specific message processing steps.

**DOCUMENTATION**  
(available from Mechanicsburg)

*DMNL/DSNL 1.0 General Information Manual (GH12-5142).*

The following publications will be provided at availability of DMNL/DSNL 1.0:

*Licensed Program Specifications ... Program Reference Manual ... System and Application Programmer's Guide ... Operations Guide ... Messages and Codes ... Program Logic Manual ... Program Listing Microfiche.*

**RPQs ACCEPTED:** No

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**DOS/VS RPG II Release 3 (5746-RG1)  
SSX/VSE RPG II (5666-274)**

**PURPOSE**

DOS/VS RPG II is a programming language that can be used to create programs to perform a wide variety of commercial data processing jobs. Release 3 of DOS/VS RPG II is an enhancement of the current DOS/VS RPG II Release 2 compiler mainly for interactive usage. DOS/VS RPG II Releases 2 and 3 run under the control of DOS/VSE with VSE/Advanced Functions or CMS in VM/370 Release 6 with VM/BSE program products or VM/SE. RPG II Release 3 also runs under control of SSX/VSE. A minimum of 64K bytes of virtual storage is required for the compilation of batch applications and 128K bytes for the CICS/DOS/VS Command Language Translator. For the batch DL/I DOS/VS Translator, a minimum of 96K bytes of storage in a virtual partition is required. An interactive partition of 140K bytes of virtual storage is required for the RPG II Source Entry Facility under VSE/ICCF or CMS. The DOS/VS RPG II compiler executes on any configuration supported by DOS/VSE, SSX/VSE or CMS in VM/370 Release 6 with VM/BSE or VM/SE program products.

**HIGHLIGHTS**

**FBM Support**

The DOS/VS RPG II compiler supports all fixed blocked mode devices which are supported by the data management of DOS/VSE on 4331, 4341, 4361 and 4381; and SSX/VSE on the 4331, 4341 or 4361 Processors.

**Adaptation of the Compiler for Conversational Monitor System (CMS) in VM/370:** The adaptation of the compiler for running under CMS/DOS provides the interactive user with the capability to:

- Catalog the compiler object deck into the user's CMS library.
- Catalog the compiler SYSLST output into the user's CMS library.
- Write all compiler error messages to the user's terminal.

These facilities enable the interactive user to invoke the compiler from his terminal via a CMS EXEC procedure which will:

- Ensure that the CMS/DOS environment is active.
- Establish the requisite device assignments and labels for the compiler workfiles and input/output files.
- Provide environmental checks (e.g., R/W access, file names etc.)
- Fetch the RPG II compiler for execution.
- Release all workfiles and reset all labels.
- Provide the user with a return code when errors are detected in the environment for the control of further steps.

This EXEC procedure is available to the user for modification, thereby providing a convenient method of satisfying any special user requirements.

The "error messages on user terminal" feature allows the interactive user to receive the compiler error messages on his terminal so that he can modify his source immediately and resubmit his compilation without the need to interrogate his output listings.

**Adaptation of the Compiler for VSE/Interactive Computing and Control Facility:** The adaptation of the compiler for running under VSE/ICCF provides the interactive user with the capability to:

- Catalog the compiler object deck onto the user's VSE/ICCF library.
- Write all compiler error messages to the user's terminal.

The "error messages on user terminal" feature allows the interactive user to receive the compiler error messages on his terminal so that he can modify his source immediately and resubmit his compilation without the need to interrogate his output listings.

A VSE/ICCF CLIST procedure is provided for compiling RPG II programs under VSE/ICCF. This CLIST procedure is similar to those available for other high level languages under VSE/ICCF. The parameters passed to this procedure define the compiler input and output.

**RPG II Source Entry Facility (RSEF) for Conversational Monitor System (CMS) and VSE/Interactive Computing and Control Facility:** RPG II Source Entry Facility (RSEF) provides an easy-to-use, interactive facility for entry and/or modification of RPG II source language in a format that eliminates the need for column counting on the screen, and at the same time provides line-by-line syntax checking.

The RPG II source being entered or modified is checked for correct syntax, as far as possible on a line-by-line basis, after a source line entry or modification. The user is informed when syntactical errors are detected in the input, so that corrective action can be taken immediately, before the source is submitted to the compiler.

**Native Language Text Capability:** All RSEF screen texts, messages and prompting texts are modularized which means that World Trade countries wishing to provide native language texts for the various

countries have only to generate these modules in the required language, and then link the RSEF anew.

**DMS/CMS Call Interface Support (Conversational Monitor System):** The Display Management System for CMS (DMS/CMS) is available to RPG II programs in the CMS/DOS environment with the DMS/CMS product installed. DMS/CMS allows the programmer to define terminal panels, and to use previously defined panels in RPG II programs: He can move data from data fields in the panel to data fields in the program, and vice versa; he can control display intensities, position the cursor, sound the audible alarm and he can add comments to the bottom line of the panel before it is displayed.

The RPG II programmer invokes the DMS/CMS panel manager interface routine using the DOS/VS RPG II HLL interface, i.e., the CALL, PLIST and PARM calculation specification. A calculation specification with the operation code CALL provides the ability to link to another program. Parameter passing is specified by PLIST (parameter list) and PARM (parameter) Calculation Specifications.

**IFS/CMS CALL Interface Support (Conversational Monitor System):** The VM/Interactive File Sharing (IFS) is available to RPG II programs in the CMS/DOS environment with the IFS product installed. IFS provides an easy to use, interactive interface for creating shared /VSAM/ files and for multiple CMS applications to access those shared files. Sequential and keyed access is provided. An RPG II application invokes the IFS data access interface using the DOS/VS RPG II HLL interface in the same manner as described for DMS/CMS.

**Error Cross-Reference List:** This additional support of error messages fulfills the special requirement for debugging programs in an interactive terminal environment.

This cross reference list includes the following information:

- Text of error message (identical to current compiler messages).
- Sequence number of statement or statements where the error occurred (new function).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

DOS/VS RPG II operates on any IBM S/370 or 4300 processors supported by DOS/VSE or SSX/VSE. A minimum of 64K bytes of storage in a virtual partition must be available for batch applications. For performance reasons, a minimum of 24K bytes of real storage is recommended. For the CICS/DOS/VS Command Language Translator, a minimum of 128K bytes of storage in a virtual partition is required. For the batch DL/I DOS/VS Translator, a minimum of 96K bytes of storage in a virtual partition is required. An interactive partition of 140K bytes of virtual storage is required for the RPG II Source Entry Facility under VSE/ICCF or CMS. If the RPG II Source Entry Facility of DOS/VS RPG II Release 3 is to be used, either VSE/Interactive Computing and Control Facility under DOS/VSE or VM/BSEPP 1.2/CMS must be installed.

For the Compiler, two work files are necessary; if Auto Report is used after the CICS/DOS/VS Command Language Translator or the batch DL/I DOS/VS Translator, three workfiles are preferable but only two are necessary. The maximum number of files for any source program is 50. The Standard Instruction Set and the Decimal Arithmetic Feature (#3237) are required in order to use the DOS/VS RPG II Compiler.

**SOFTWARE REQUIREMENTS**

The DOS/VS RPG II Release 3 Compiler and its object programs are designed to operate under control of DOS/VSE with VSE/Advanced Functions or SSX/VSE or VM/BSEPP 1.2/CMS with a DOSLIB.

At system generation of DOS/VSE "SYSFIL=YES" (if DASD or diskette is used with device independence) of the FOPT supervisor generation macro must be specified.

DOS/VS RPG II DC and/or DB requests require the IBM CICS/DOS/VS program product (5746-XX3) Version 1 Release 4 and/or the IBM DL/I DOS/VS program product (5746-XX1) Version 1 Release 4.

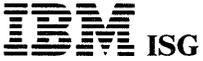
SSX/VSE supports only DOS/VS RPG II batch programs through compilation promptors.

If ADDRROUT is used for nonRRDS files, the IBM DOS/VS Sort/Merge II program product (5746-SM2), or an equivalent sort/merge program is required.

If ADDRROUT is used for RRDS files, the IBM DOS/VS Sort/Merge II program product (5746-SM2) or an equivalent sort/merge program is required.

Under VM/BSEPP 1.2/CMS the Auto Report Feature can only be used if a DOS/VSE SYSRES is installed.

For installation of DOS/VS RPG II the use of the DOS/VSE Restore Utility program and the DOS/VSE Maintain System History Utility program is required. For installation of DOS/VS RPG II under



PROGRAM PRODUCTS

**RPG II - DOS/VS R3 & SSX/VSE (cont'd)**

VM/BSEPP 1.2/CMS, an installation EXEC is provided as part of the distribution package.

Release 3 of DOS RPG II is also available as Promptor-supported program product on SSX/VSE with a specific order number.

**COMPATIBILITY**

- Source Programs.  
Source programs written for the DOS RPG II Compiler and the DOS/VS RPG II Compiler Releases 1 and 2 will be accepted, without modification, by the DOS/VS RPG II Compiler Release 3.
- Object Programs.  
If the Formatted Dump facility is to be used, the core image library must contain the appropriate transient routines:
  - DOS/VS RPG II Release 1 object programs require the DOS/VS RPG II Release 1 Formatted Dump routines.
  - DOS/VS RPG II Release 2 object programs require the DOS/VS RPG II Release 2 Formatted Dump routines.
  - DOS/VS RPG II Release 3 object programs require the DOS/VS RPG II Release 3 Formatted Dump routines.

The Formatted Dump facilities of RPG II cannot be used with programs running under CICS/DOS/VS.

**PERFORMANCE CONSIDERATIONS**

**Compile Time:** There will be no change in the compile time compared to the DOS/VS RPG II Release 2 compiler on an equivalent system, if the compilation is without compile error messages.

**Object Time:** There will be no change in the performance of the execution of object code compared to the object code produced by the DOS/VS RPG II Release 2 compiler on an equivalent system.

**RPG II Source Entry Facility:** The response time when operating under CMS or VSE/ICCF is determined by the chosen interactive system.

**DOCUMENTATION**

(available from Mechanicsburg)

DOS/VS RPG II Licensed Program Specifications	GC33-6029
DOS/VS RPG II General Information	GC33-6030

PROGRAM PRODUCTS

**DATA LANGUAGE/I DISK OPERATING SYSTEM/  
VIRTUAL STORAGE  
DL/I DOS/VS (5746-XX1) - DL/I SSX/VSE (5666-275)**

**PURPOSE**

DL/I DOS/VS is a data base management control system developed to help improve the user's ability to implement data base processing applications. It provides data organization methods that are useful in the creation, interrelation and maintenance of large common data bases. DL/I DOS/VS executes as an application program in a virtual storage environment under DOS/VS or DOS/VSE.

DL/I DOS/VS has been designed to permit the concurrent scheduling of multiple programs requesting DL/I DOS/VS services, thereby allowing access by more than one user to the same or different data bases at the same time. Application programs may utilize this design concept in conjunction with the Customer Information Control System/DOS/VS (CICS/DOS/VS), program product 5746-XX3, to access DL/I DOS/VS data bases in either an online environment or batch environment.

**DESCRIPTION**

Application programs call upon the data base management services through DL/I DOS/VS. DL/I DOS/VS provides the application program with access to the data base management services which is independent of storage media programming considerations. Through installation management tools provided by DL/I DOS/VS, storage media programming considerations may be manipulated independent of application programs. Existing DL/I DOS/VS application programs can be insensitive to the reorganization of stored data, the addition of new applications or data, changes in access methods, organization or access strategy, and the introduction of new storage devices.

The data base management services of DL/I DOS/VS help the user:

- Describe data base structures
- Create data bases
- Reorganize data bases
- Recover and reconstruct data

Using DL/I DOS/VS utilities supplied with the system, the user describes the structure of the data base from two viewpoints: The stored data structure as seen by the system and the logical data structure as seen by the application. Only one description of the stored data exists. However, multiple logical descriptions may exist. These data base descriptions are external to application programs. They exist as physical data themselves and are referenced by the system when it is processing access requests for application programs.

Data base descriptions define symbolic names for data items (fields), segments and data bases. Within a single data base, the system description defines a hierarchic relationship among segments of the stored data structure. It also contains information about organization, access strategy, the physical attributes of the data (length, format, etc.), the physical structure of the stored data segments and storage device characteristics.

To access or maintain stored data, the application program issues a CALL or an EXEC command for data base management services. As part of the functional request, the application program supplies symbolic names which identify the data (segment type) to be processed. Through data base descriptions, the system relates the application-supplied logical data names to corresponding stored data names, and performs the requested function against the stored data.

A data base may be stored in two general organizations: Hierarchical Sequential (HS) or Hierarchical Direct (HD). For HS-organized data, the access method and basic processing strategy may be sequential or indexed sequential. For HD-organized data, it may be direct or indexed direct.

Application programs may process data bases independent of physical organization or storage device used. Data management services are provided by the DOS/VS Virtual Storage Access Method (VSAM) or VSE Virtual Storage Access Method (VSE/VSAM) for data bases of the Hierarchical Direct (HD) organization and indexed sequential data bases of the Hierarchical Sequential (HS) organization. Sequential Access Method (SAM) provides data management services for SHSAM and HSAM data bases.

Data bases may be shared between DL/I subsystems in one host or across hosts; one system having update capability concurrent with multiple read-only subsystems. DL/I's use of the CICS/DOS/VS Intercommunication Facility, or equivalent, permits access to both local and remote DL/I data bases within the same CICS/VS logical unit of work.

Interactive Macro Facility (IMF) is a tool that helps reduce the complex task of defining and generating DL/I Data Base Definition (DBD), Program Specification Block (PSB) and online program, its view and authorization. It provides formatted displays on a 3270-type terminal and prompts the user, who can then choose either the appropriate activity and enter the required information in interactive mode, or accept defaults.

Reorganization and recovery of stored data bases are supported by a set of DL/I DOS/VS utilities supplied with the system.

**HIGHLIGHTS**

**Application Programming:** High-Level Programming Interface (HLPI) provides a high-level source language interface for the programmer using DL/I DOS/VS in a COBOL or PL/I (Optimizing Compiler) application program. This consists of a set of commands which enable the application programmer to access DL/I function. These commands are translated by a translator into call statements. DL/I and CICS/VS HLPI commands may be used in the same application program.

Boolean Qualifications Statements in Segment Search Arguments (SSAs) or HLPI commands can decrease the application program logic necessary for complex data retrieval by permitting multiple Boolean logic tests within a single DL/I CALL. The qualification statements are logically related by the Boolean AND and OR operators.

Segment expansion/compression exits are provided for HD-organized data bases, permitting user-written encode/decode routines to improve utilization of direct access storage space or to strengthen security of stored confidential data.

Generation and support of low-level codes along with continuity check are functions provided in application support programs for the manufacturing industry user. These are techniques that permit the user to specify hierarchical levels within a data structure and to ensure that a structure is not dependent upon itself. Although primarily provided for manufacturing industry applications, they can also be utilized in other environments.

**Application Environments:** There are three application environments:

- Batch
- Multiple partition support
- Online

**Batch:** Under CMS/DOS, batch DL/I application programs can be coded, compiled and tested to load, retrieve and update data bases.

**Multiple Partition Support:** Multiple Partition Support (MPS) can execute in several DOS/VS or SSX/VSE partitions and/or VSE/ICCF pseudo partitions and may access the same data base concurrently with online users. For example, one or more online applications can retrieve information from a data base while a batch program updates that same data base. MPS, following DL/I conventions, uses DL/I resources and the multitasking facilities of DL/I and CICS/VS. (CICS/VS, therefore, is a prerequisite for running MPS.)

**Online:** DL/I uses CICS/VS facilities for multitasking and terminal control.

DL/I DOS/VS users may move to the Information Management System/VS (IMS/VS, 5740-XX1), which accesses the DL/I data bases of IMS/VS.

**Alternate Accessing:** Secondary indexing provides an alternate path to the data. It provides indexed access to root or dependent segments within an HD-organized data base. Fields within most segments of a data base may be indexed.

The ACCESS Macro is designed to help the data base administrator more easily define data base indexes. It is an alternative to the index definition supplied by the LCHILD and XDFLD macros and the /SX and /CK named types of the FIELD statements.

HD-organized data bases may be defined such that relationships are established between segments of different hierarchical structures stored within the same or different data bases. This support is called 'Logical Relations'.

Extended Logical Relations for HDAM or HIDAM data bases include the ability to switch directions from an inverted sequence to a normal sequence (up to down).

**Data Security:** Data base integrity and security is provided through the concept of sensitivity, a description of a program's intended access to a data base.

Field Level Sensitivity gives the user the ability to have different views of a physical segment on an application basis. The basic support allows a user to specify those fields from the physical definition to be included in his view of the segment, including the location in the new view. DL/I will map the fields from the physical segment into the user's view.

## DL/I (DOS/VS & SSSX/VSE) (cont'd)

The following items are also supported under Field Level Sensitivity:

- **Virtual Fields** - The ability to identify a field in the application's view of a segment that doesn't exist in the physical view.
- **Automatic Data Format Conversion** - The ability to change the format of the physical data without re-compiling the application programs.
- **User Field Exit Routine** - The ability to specify a routine to get control any time a field is retrieved or stored.
- **Dynamic Segment Expansion** - The ability to add fields to a segment without reloading the data base or re-compiling the application programs.
- **No Sequence Field Order Restrictions** - Sequence fields need no longer be the first fields defined by field statements, allowing the user to define his fields in the order in which they appear in his segment. Scheduling of multiple online application programs for concurrent execution is based on their sensitivity.

**Logging Capabilities:** Data base recovery is facilitated through the use of data base activity logging. Disk logging is an option to allow the disk-only user to take advantage of data integrity features of DL/I DOS/VS; these features are primarily BACKOUT, RECOVERY, and CHANGE ACCUMULATION. In an online environment, the Shared Log option eliminates the need for separate tape drives to be assigned to CICS/DOS/VS Journal and DL/I DOS/VS Log by optionally directing all DL/I DOS/VS log information to the CICS/DOS/VS tape journal. Module identifiers and a system log print utility enhance serviceability. For debugging purposes, the Log Print Utility will selectively print log records by:

- DBD name
- CICS task ID
- VSAM relative block number (RBM)

Support is provided for multiple logs on a single tape, as well as a multiple volume log file. Unload sequence checking is provided.

**Reorganization Utilities:** Reload Restart enables the user to restart the reloading of an HD-organized data base that failed before completion. The data base can be reloaded without rerunning the entire job by resubmitting the job with an additional JCL statement identifying the job as a restart of the Reload Utility. The system operator needs only to supply a checkpoint identification number obtained from a console message as a restart point.

The HD Reorganization utility permits specification of the number of data base records to be unloaded between each DL/I checkpoint.

- **Partial Data Base Reorganization Utility**  
The Partial Data Base Reorganization Utility allows the customer to reorganize only that portion of his data which needs it.
- **Separate Index Reorganization**  
Separate Index Reorganization permits reorganization of an index without requiring concurrent reorganization of the associated data base.
- **Selective Unload**  
The user can reformat a data base through the use of the HD Unload Utility and program (PSB) views of the original data. This allows the Data Base Administrator to, for example, delete or rearrange fields within a segment, and produce a revised physical data base.
- **Rewind Option - Reorganization Utilities**  
A Tape Rewind Option is available for HISAM and HD Reorganization Utilities. Several unload data bases may be stacked on a single tape reel when these utilities are used.

**Performance Considerations:** Through optional parameters, the tuning facility allows DL/I DOS/VS to be adapted to specific environments and/or application characteristics. The tuning facility provides flexible control mechanisms for buffer and main storage allocation. Two facilities used to capture tuning data are CMF and RUN and Buffer Statistics.

- **CICS/VS Monitoring Facility (CMF) Hooks**  
DL/I performance statistics may be optionally gathered in an online (including MFS) environment using CMF for data capture and recording.

### Run and Buffer Statistics

This facility captures DL/I system statistics pertaining to the online environment, and writes them to a CICS/VS data set. This data can then be printed by CICS/VS during its shutdown.

Users may reserve Free Space in the Hierarchical Direct-organized data bases (HDAM and HIDAM) at load or reload time in order to reduce instances of extensive processing during space management search, and also to reduce access time for retrieving related segments.

A processing option (PROCOPT=0) is also supported on the PCB statement that provides a performance improvement by inhibiting any locking (enqueueing) by the program isolation function during retrievals of the same segments type in a data base.

**Debugging Aids:** VSE IDUMP Support provides a mechanism for obtaining standardized IDUMP-format dumps instead of DL/I dumps on a DL/I-initiated abnormal termination of an application program. These dumps can be used to assist the system user with problem determination. These dumps are captured on disk storage devices using a logical unit called SYSDMP.

DL/I provides a trace facility for both batch and online environments.

A PL/I user may use the PL/I diagnostic information to 'debug' an error condition, before the error is returned to DL/I DOS/VS.

A sample problem utilizing more advanced function to demonstrate the capability of DL/I DOS/VS for broader application usage is included. The examples are discussed in the *Guide for New Users* (SH24-5001). The sample problem shows examples of variable-length segments.

The HLPI user can use CICS Execution Diagnostic Facility in online DL/I applications to trap and study DL/I and CICS HLPI commands during execution.

### HIGHLIGHTS of VERSION 1 RELEASE 7

**Interactive Generation of Utility Job Streams:** Interactive dialogs have been added to support all DL/I utilities. These dialogs are designed to make it easier to generate DL/I utility job streams. Utilities will be automatically generated in their correct execution order with all required parameters.

**Easy-to-use menus** will assist users in generating utility jobs. Information such as data base names will be saved when entered for an early step in the generating process, and automatically used in later steps. Future job stream generations will also use this saved information, eliminating the need for the user to re-enter data. Data base information can also be entered by choosing the menu option for this function. This makes it unnecessary to enter detailed data base information when generating a utility job stream.

Defaults are used extensively for many specifications such as size, number of records and utility parameters. What was entered previously will be the default value the next time a similar job stream is created. This will reduce the amount of data the user must actually enter.

VSE job control statements will be generated, including JOB, EXEC, ASSGN, DLBL, EXTENT and TLBL. The VSE/VSAM 'Space Management for SAM Feature' will be used whenever possible for SAM disk files. This reduces the amount of data required because specific track locations need not be specified. Also, because VSAM supports secondary allocation, jobs are less likely to abnormally end from lack of sufficient space.

**HLPI Support for Boolean Operators:** The DL/I High-Level Programming Interface (HLPI) is an easy-to-use method for processing DL/I data bases. It provides commands similar in syntax to those in CICS/VS command language.

Boolean operators 'AND' and 'OR' provide HLPI users with logic capability in segment selection through the WHERE clause. Application program logic necessary for complex data retrieval is easier with this added function.

**HLPI Key Feedback:** Segment keys and key length may optionally be made available in an area provided by the application program using HLPI to retrieve data.

**Variable-Length Index Source Segments:** Dynamic segment expansion provides the ability to add fields to a segment in the application program's view without recompiling other programs that access the segment. This feature requires variable-length segments.

Index source segments were previously restricted to fixed-length. Index source segments may now be defined in the DBD as variable-length. This provides customers with more flexibility in data base design, especially those who use dynamic segment expansion.

**Recovery/Restart Guide:** This new document consolidates the information necessary to plan for and conduct data base recovery in a data systems environment.

The Recovery/Restart information is presented for the batch, MPS batch, and the online environments. Also included, therefore, is information about CICS/VS as it applies to the user's DL/I DOS/VS recovery/restart procedures.

## DL/I (DOS/VS & SSX/VSE) (cont'd)

**Utilities Operational Improvements:** Control statements are added to several utilities to eliminate, in many cases, manual intervention. For example, multi-file tape capability is added to the Change Accumulation, Forward Recovery, Log Print, Backout and Image Copy utilities.

**DL/I Documentation Aid:** The DL/I Documentation Aid is intended to provide an ease-of-use facility in documenting DL/I definitions that can be accessed by ISQL, the interactive facility of SQL/Data Systems (5748-XXJ).

The DL/I Application Control Blocks Creation and Maintenance utility (ACBGEN) is intended to create and store, at the user's request, the DBD and PSB definitions into predefined SQL/DS tables. These tables can then be accessed and displayed in various views using ISQL. Sample ISQL query routines will be provided with this function.

This function furthers the complementary relationship between DL/I and SQL/DS.

**Automatic Extract Definitions:** This is a utility that provides an automatic creation of an ISQL routine of EXTRACT DEFINE commands that identifies a DL/I data base to the ISQL EXTRACT facility.

It uses the SQL/DS tables created by the DL/I Documentation Aid.

**Low-Level Code/Continuity Checking Improvement:** Low-level code/continuity checking is used extensively in a manufacturing product structure.

The algorithm to generate the low-level codes and do the continuity checking is changed to increase efficiency.

**MPS Restart:** DL/I is extended so that its checkpoint capability can be used in conjunction with the VSE checkpoint/restart facility in a Multiple Partition Support (MPS) batch environment. Through this extension, the application programmer will be able to checkpoint an MPS batch job and subsequently restart it if it fails.

**IMF Adaptation to ISPF:** The Interactive Macro Facility (IMF) has been changed to run with Interactive System Productivity Facility (ISPF).

An option to convert existing IMF tables from Interactive Productivity Facility to ISPF is provided.

### USE

The DL/I DOS/VS program is distributed in a RESTORE format and must be restored to a scratch pack using the DOS/VS or DOS/VSE library restore program. The restored DL/I DOS/VS libraries may then optionally be merged with user libraries.

### CUSTOMER RESPONSIBILITIES

A customer installing DL/I DOS/VS must:

- Meet the minimum configuration (see "Specified Operating Environment").
- See to it that appropriate hardware training (especially direct access storage device education) be given to system analysts, system programmers and system operators.
- Have DOS/VS or DOS/VSE successfully installed (no customer should attempt to implement DL/I DOS/VS until the installation has achieved proficiency in the use of DOS/VS or DOS/VSE).
- Have personnel schooled in DL/I DOS/VS (a thorough knowledge and understanding of data base concepts and DL/I DOS/VS before installation is essential).
- Provide adequate protection against the accidental loss or misuse of his data (functions exist within DL/I DOS/VS to assist him in providing data security.).
- Have DOS/VS or DOS/VSE personnel trained in COBOL, PL/I, RPG II or Assembler language.
- Design the structure of each data base and its program views.
- Specify and implement application programs.

In addition to the above, additional time considerations should be given if the user wishes to process in an online environment in conjunction with CICS/DOS/VS.

If DL/I DOS/VS is to be used under CMS/DOS, refer to pages on VM/370 and VM/BSE or VM/SP as appropriate for additional considerations.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The minimum machine requirements for DL/I DOS/VS are the same as those needed for conventional operation of DOS/VS, DOS/VSE or SSX/VSE. Because of virtual storage support, the minimum machine configuration is dependent on application characteristics and performance requirements. Central processing unit performance may be traded off against main storage size. DL/I DOS/VS will operate on any IBM machine currently supported by DOS/VS, DOS/VSE, or SSX/VSE that has sufficient real storage to meet the combined requirements of

DL/I DOS/VS, DOS/VS, DOS/VSE or SSX/VSE and other customer-required applications. Batch DL/I DOS/VS has a recommended real storage requirement of 256K bytes (including VSE/VSAM). Online DL/I DOS/VS, using CICS/DOS/VS, for example, has a recommended minimum real storage requirement of 512K bytes (including VSE/VSAM and CICS/DOS/VS). See the *General Information Manuals* for DL/I DOS/VS (GH20-1246) and CICS/VS (GC33-0066) when configuring these systems. VM/370 storage requirements must be considered if CMS/DOS is to be used.

When using DL/I DOS/VS in conjunction with CICS/DOS/VS in a VM/370 virtual machine, (under control of DOS/VS or DOS/VSE), the following considerations apply:

1. CICS/VS operating in a virtual machine has the same requirements as CICS/VS operating in a real machine. Other software components (e.g., access methods, compilers and the release of DOS/VS, or DOS/VS under which CICS/VS runs) must be valid for that release of CICS/VS).
2. The minimum hardware requirements of CICS operating in a VM/370 virtual machine are the same as those for CICS/VS running in a real machine, and should be considered as additional to the minimum requirements for VM/370 itself, and any other virtual machines within the VM/370 environment.
3. Processor utilization and possibly terminal response times will be greater when CICS/VS is running under VM/370 than when it is running in a real machine. The effect on performance will be most noticeable when VM/370 is introduced into an installation where processor and main storage resources are already substantially committed to existing CICS/VS and other work. General guidance on the performance considerations associated with the running of CICS/VS under VM/370 is contained in the *CICS/VS System Programmer's Reference Manual*.

Data base storage files may be on any of the following:

2314 Direct Access Storage Facilities  
2319 Disk Storage  
3330-1/3330-11 Disk Storage  
3340/3344 Direct Access Storage Facilities  
3310 Direct Access Storage  
3350 Direct Access Storage  
3370 Direct Access Storage  
3375 Direct Access Storage

If DL/I is used in conjunction with SSX/VSE, the data base storage files must be either on 3310 Direct Access Storage or on 3370 Direct Access Storage.

In addition, at least two 9-track 2400, 3400 or 8809 series tape units and control are required, if tape logging is to be utilized or HSAM or SHSAM files are on tape.

Any terminal device supported by CICS/DOS/VS, or equivalent product, may be used for online DL/I DOS/VS. IMF requires an IBM 3270-type terminal.

PROGRAM PRODUCTS

DL/I (DOS/VS & SSX/VSE) (cont'd)

SOFTWARE REQUIREMENTS

DL/I DOS/VS will operate on DOS/VS (Release 34) or VSE with Advanced Functions (VSE/AF) program product. The following chart cross-references DL/I releases to various operating system releases and CICS/VS:

DL/I Release	DOS/VS Rel 34	VSE ADVANCED FUNCTIONS			
		Rel 1	Rel 2	Rel 3	Rel 3.5
1.5.0	CICS/VS 1.4.1	CICS/VS 1.4.1	CICS/VS 1.4.1	No	No
1.5.1 (1)	No	CICS/VS 1.4.1	CICS/VS 1.4.1	No	No
1.5.5 (2,3)	No	No	CICS/VS 1.5	CICS/VS 1.5	No
1.6	No	No	No	CICS/VS 1.5, 1.6	CICS/VS 1.6
1.7	No	No	No	No	CICS/VS 1.6

Notes:

- DL/I 1.5 ICR (1) or DL/I 1.5.1 contains Interactive Macro Facility (IMF) support.
- DL/I 1.5 ICR (2) or DL/I 1.5.5 contains High-Level Programming Interface (HLPI) and Intercommunication Checkpoint support.
- DL/I Release 1.5.5 is a separately-orderable prompter-supported program to be used with SSX/VSE Releases 1 and 2. No other releases of DL/I are supported by SSX/VSE Releases 1 and 2.

DL/I DOS/VS will also operate in batch mode, with certain exceptions, on the level of Virtual Machine/370 (VM/370) Conversational Monitor System DOS/VS simulator (CMS/DOS) which supports the equivalent DOS/VS or VSE/AF release.

DL/I DOS/VS is designed to work with DOS/VSE (5745-020 and 5745-030) and the following licensed programs (or their equivalents, e.g., in SSX/VSE):

- VSE/Advanced Functions, 5746-XE8
- CICS/DOS/VS Version 1 Release 5, 5746-XX3
- VSE/VSAM, 5746-AM2
- DOS/VS Sort/Merge Version 2 Release 2.0, 5746-SM2
- VSE POWER, 5746-XE3
- Interactive Productivity Facility Release 1, 5748-MS1
- VSE/ICCF (VSE/Interactive Computing and Control Facility), 5746-TS1

VM/370 SCP (5749-010) supports IMF through CMS and the following Licensed Programs (or their equivalents):

- Interactive Productivity Facility (5748-MS1)
- VM/Basic Systems Extensions (5748-XX8)
- VM/Systems Extensions (5748-XE1)
- VM/System Product (5664-167)

DL/I DOS/VS is supported for use with:

- DOS/VS COBOL compiler (5746-CB1) or Library Only (5746-LM4)
- Full ANS COBOL V3 Compiler (5736-CB2) and Full ANS COBOL Library (5736-LM2)
- ANS Subset COBOL (5736-CB1)
- PL/I Optimizing Compiler and Libraries (5736-PL3)
- PL/I Optimizing Compiler (5736-PL1)
- PL/I Resident Library (5736-LM4)
- PL/I Transient Library (5736-LM5)
- RPG II - DOS/VS (5746-RG1)
- VM/370 SCP (5749-010)
- VM/Basic Systems Extensions (5748-XX8)
- VM/Systems Extensions (5748-XE1)
- VM/System Product (5664-167)

DL/I DOS/VS is designed to run in batch or Multiple Partition Support (MPS) mode in VSE/Interactive Computing and Control Facility (VSE/ICCF), 5746-TS1, pseudo partitions. VSE/ICCF can also be the host environment for the Interactive Productivity Facility (IPF), 5748-MS1, under which the DL/I DOS/VS Interactive Macro Facility runs.

DL/I DOS/VS uses the Virtual Storage Access Method (VSAM), Sequential Disk IOCS, and Magnetic Tape IOCS data management facilities.

DB/DC Data Dictionary DOS/VS (5746-XXC) enhances DL/I DOS/VS by helping to simplify and manage the creation, maintenance and reporting definitions of the data in the system and its use by the application programs.

Development Management System/CICS/VS (5746-XC4) provides DL/I DOS/VS support for inquiry, insertion, update and deletion of data base records. Access into the data base may be via primary or secondary indexes.

Entry Level Interactive Application System (ELIAS, 5746-XXV) will assist new data base/data communications (DB/DC) users in implementing their early DB/DC applications and the more experienced DB/DC users in increasing their programming productivity. ELIAS provides an interactive interface for the definition of DL/I DOS/VS data bases.

DL/I DOS/VS Space Management Utilities IUP (5746-PKF) is designed to help improve system performance and programmer productivity. They are designed to detect and report DL/I hierarchical direct (HD) pointer discrepancies, to provide statistics and information for HD tuning, and to assist with segment restructuring and reloading during data base reorganization.

COMPATIBILITY

- The following facilities in DL/I DOS/VS are not supported by IMS/VS:
  - Interactive Generation of Utility Job Streams.
  - MPS Restart.
  - Variable-Length Index Source Statements.
  - DL/I Documentation Aid.
  - Automatic Extract Definitions.
  - Field Level Sensitivity Extensions.
  - Fixed Block Architecture (FBA) DASD Devices.
  - Interactive Macro Facility.
  - High Level Programming Interface (HLPI).
  - Application programs written in RPG.
  - The concept and implementation of Extended Remote PSB.
  - ACCESS Macro.
- The following facilities in DL/I DOS/VS are supported in IMS/VS in a different manner:
  - Checkpoint.
  - Operational aspects of certain DL/I DOS/VS utilities.
- Certain utility-generated files may only be processed by the system under which they were created.

Data set portability and alternate access between DL/I DOS/VS and IMS/VS are provided by the IMS Compatibility Support facility in DL/I.

DL/I DOS/VS Version 1 Release 7 is upward compatible from DL/I DOS/VS Version 1 Release 6.

No application programming changes are required.

For program support purposes, DL/I DOS/VS Version 1 Release 5 (and its ICRs) will remain current with Central and Local Service until January 31, 1982.

DOCUMENTATION  
(available from Mechanicsburg)

Licensed Program Specifications (GH24-5025)

RPOs ACCEPTED: No

NOTE: Please note that the SSX/VSE version of DL/I DOS/VS is based on Release 5 ICR (2).



PROGRAM PRODUCTS

**DOS PL/I TRANSIENT LIBRARY (5736-LM5)  
SSX/VSE TRANSIENT LIBRARY (5666-277)**

**PURPOSE**

This Program Product is used in conjunction with the DOS PL/I Optimizing Compiler (5736-PL1). For the complete compilation and execution of a PL/I program using this compiler, the following additional program products are required: DOS PL/I Resident Library - 5736-LM4 (for link-edit) ... DOS PL/I Transient Library - 5736-LM5 (for execution).

**SPECIAL SALES INFORMATION**

For a Processor in which programs are compiled but not link-edited or executed, only the compiler is required. For a Processor in which programs are link-edited but not compiled or executed, only the resident library is required. For a Processor in which programs are executed but not compiled or link-edited, only the transient library is required.

**DESCRIPTION**

The DOS PL/I Transient Library consists of those phases loaded dynamically during object program execution, thus minimizing the space occupied by the object program. These phases reside in the core image library; they are transient and are loaded when required, by the system macro LOAD.

The principal functions of the PL/I Transient Library modules are:

- Error and interrupt handling.
- Opening and closing the files.
- Record-oriented and stream-oriented input/output transmission.

The transient library module remains in core for as long as it is required by the problem program being executed.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Direct access storage space is required for the Transient Library subroutine (approximately 101 blocks of 1,728 bytes for 2311, 103 blocks of 1,688 bytes for 2314, 115 blocks of 1,504 bytes for 3330/3333 or 115 blocks of 1,540 bytes for 3340). For Release 29 and subsequent releases, the requirement is approximately 167 blocks of 1,024 bytes, regardless of device type.

The main storage requirements of the object program are a function of the PL/I facilities used. The decimal and floating point instruction sets are required.

The object program can utilize the following IBM input/output devices if they are supported by the release of the DOS or SSX/VSE system used:

**Using SAM support:**

- Magnetic Tape Units - 2400, 3420, 3410/3411
- Card Units - 1442, 2501, 2520, 2540, 3504, 3505, 3525, 2560, 5425
- Optical Mark Reader - 3881
- Diskette Unit - 3540
- Printers - 1403, 1404, 1443, 1445, 3203, 3211, 3262, 4245, 5203
- Direct Access Storage - Fixed block disk devices

**Using SAM, and DAM support:**

- Direct Access Storage - 2311, 2314, 2321, 3330-1, 3330-11, 3340, 3344, 3350

**Using ISAM Support:**

- Direct Access Storage - 2311, 2314, 2321, 3330-1, 3340, 3344, 3350 in 3330-1 compatibility mode

**Using VSAM support:**

- Direct Access Storage - 2314, 3330-1, 3330-11, 3340, 3344, 3350 and fixed block disk devices

Under CMS, the object program can utilize those I/O devices which are supported under the IBM Disk Operating System provided they are supported by VM/370. For a list of the devices supported by VM/370, see the *IBM VM/370: Planning and System Generation Guide* (GC20-1801).

**SOFTWARE REQUIREMENTS**

Release 5.1 of the transient library is supported on DOS Release 26 through DOS/VS Release 34, DOS/VSE with VSE/Advanced Functions Releases 1 and 2 and the CMS component of Releases 3 through 6 of VM/370, until March 31, 1982. After March 31, 1982, Release 5.1 of the transient library is no longer current.

Release 6.0 of the transient library is supported on DOS/VSE with VSE/Advanced Functions Release 2, on SSX/VSE and on the CMS component of Release 6 of VM/370, and subsequent versions, releases and modifications, unless otherwise stated in a modification of the specifications.

Object programs must be executed under the Disk Operating System or SSX/VSE or under the Conversational Monitor System (CMS) component of VM/370. All object programs require SAM modules in the generated operating system. Object programs may also be executed as application programs in the CICS environment.

Support for the ASCII character set is provided for object programs by SAM. Object programs can create or access data sets in ASCII provided the data sets are on magnetic tape with formats U, F, FB, D or DB. These data sets will be supported by STREAM files and RECORD SEQUENTIAL BUFFERED FILES using the CONSECUTIVE ENVIRONMENT option. Only character data may be written onto an ASCII data set.

Programs using the PL/I ENVIRONMENT option INDEXED to access ISAM data sets require ISAM modules. Programs using the REGIONAL ENVIRONMENT option to access DAM data sets require DAM modules. Programs using the INDEXED or VSAM ENVIRONMENT option to access VSAM data sets require VSAM modules. VSAM can be used directly if the VSAM ENVIRONMENT option is specified.

**Execution Under CMS:** Execution of a PL/I program under CMS is subject to restrictions in the following areas: INDEXED file support, REGIONAL FILE support, PL/I Checkpoint/Restart Facilities, ASCII data sets and other miscellaneous functions. For additional information refer to *DOS PL/I Optimizing Compiler: CMS User's Guide* (SC33-0051).

**Compatibility:** For successful execution, the DOS PL/I Transient Library must be from the release corresponding or subsequent to that of the DOS PL/I Resident Library used.

**DOCUMENTATION**  
(available from Mechanicsburg)

Title	Order Number
DOS PL/I Transient Library Specifications	GC26-3995
DOS PL/I Optimizing Compiler General Information Manual	GC33-0004

RPQs ACCEPTED: No

**Note:** The SSX/VSE version of the DOS/PL1 Optimizing Compiler and Libraries is based on Release 5.1. The DOS PL/1 resident library will be available as a separate Prompter Supported program product under SSX/VSE with a specific order number.

**INTERACTIVE SYSTEM PRODUCTIVITY FACILITY/  
PROGRAM DEVELOPMENT FACILITY FOR VSE  
ISPF/PDF VSE (5666-281)**

**PURPOSE**

The Interactive System Productivity Facility/Program Development Facility for VSE (ISPF/PDF VSE) is a program product that aids in the development of various types of applications, including dialogs. It uses display terminals in an interactive environment to assist with many programming tasks. The Interactive System Productivity Facility (ISPF) and ISPF/PDF VSE are related IBM program products. Together they are designed to increase user productivity in the development of applications by taking advantage of the features of display terminals. They contain special functions for the development and use of interactive applications (dialogs). ISPF/PDF VSE requires the use of ISPF.

**HIGHLIGHTS**

- ISPF/PDF VSE is an interactive facility that aids in the development of various types of applications including dialogs. It may be used with both conventional and structured programming techniques and provides simplified procedures for development of dialog applications.
- ISPF/PDF VSE is a dialog that runs under the ISPF program product.
- Multilevel programming library support that allows maintenance and tracking of program segments at different versions or levels. **Note:** The VSE user must use normal VSE library naming conventions to provide this function.
- Full-screen, context editing that allows multiple additions and changes to information on a screen with one interaction with the host system. The most frequently used editing functions are invoked using simple, 1-character commands.
- Models that help a user develop dialog panels, messages, function routines, file skeletons and tables.
- Scrolling (in any direction) of source data and listings, with location of data provided by character string or line number.
- Utilities to specify and maintain libraries and data.
- Interface to standard language processors (compilers, assemblers, and linkage editors or loaders). These processors may be invoked as batch jobs.
- Dialog test facilities that help a user test ISPF dialog applications.
- Online tutorial for instruction or reference. This feature is especially valuable for the new or occasional user.

**DESCRIPTION**

- An ISPF PARMs option allowing the user to display and change a variety of ISPF parameters at any time during the session. Changes remain in effect until the user changes the parameter again, and are retained across sessions.

The ISPF PARMs option allows the user to specify:

- Command delimiters.
- Terminal characteristics.
- Program function (PF) key assignments.
- A BROWSE option allowing the user to display source data or output listings. Browse is primarily intended for viewing large files (data sets) such as compiler listings or dumps.
- A full-screen EDIT that allows the user to create, display and change source data, such as program code, test data, or documentation.
  - Edit reads the selected member (or entire sequential file) into virtual storage, and retains it there during edit operations.
- A UTILITIES option which provides a variety of functions or processes library members of VSE/POWER queues.
- The BATCH Option provides an interface with standard language processors for:
  - Background compilation and assembly of programs stored in VSE and ICCF libraries.
  - Linkage editing using control statements stored in VSE source statement library members.
  - User can customize batch options to match his compilers and pre-processors, and to combine job steps for compile/link-and-go.
- A COMMAND option allows the user to enter ICCF commands during execution of PDF. Typically, the command and any resulting output is displayed to the user as though the command had been issued in the ICCF environment.
- A DIALOG TEST option provides users with aids for testing ISPF dialog parts (functions, panels, messages, tables, skeletons) and complete ISPF applications. The dialog test option provides for:

- Tracing of application or function calls and variable usage and browsing of trace output during test.
- Specification of breakpoints at which execution can be suspended to use test facilities.
- Display of all ISPF variables.
- Table display and row manipulation.
- A TUTORIAL Option allows the user to obtain immediate online instruction in the use of PDF. The tutorial may be viewed sequentially from beginning to end, or randomly by selecting topics from the table of contents or index. The tutorial may also be entered from other PDF options by using the HELP command or PF key.

**CUSTOMER RESPONSIBILITIES**

The installation of ISPF/PDF requires a properly configured system, with appropriate terminals and other devices, as required for the desired operating system. A user of ISPF/PDF must be familiar with the base operating system and should review the *ISPF/PDF Reference Manual*.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

PDF operates on any IBM processor that meets the minimum requirements for its prerequisite program product (ISPF).

**Storage:** The following table lists the:

- Approximate disk storage space required to contain the PDF libraries.
- Size of the shared virtual area (SVA) required for PDF program residency on VSE systems. The first value shown is the minimum required area. The second value is the size needed for all components of the product. The use of SVA beyond the minimum requirement is recommended for performance reasons but not required. Most of the performance benefits may be achieved by using the asterisked (\*) value shown in this entry in the table.

	VSE
Cylinders of disk storage (3330)	10
Pseudo Partition (K bytes)	198
SVA size required (K bytes)	0
(* = recommended)	360*
	260*

**Terminals:** PDF runs on any IBM 3270 Display Terminal supported by its prerequisite program product (ISPF).

**SOFTWARE REQUIREMENTS**

The ISPF program product is a prerequisite for the operation of PDF. PDF itself has no additional system requirements over those required for its prerequisite program product.

ISPF/PDF VSE provides interfaces to the following IBM processing programs and object code generated by them in batch execution:

- System Assembler (available with VSE)
- Linkage Editor (available with VSE)
- Full ANS COBOL Compiler and Libraries (5746-CB1)
- VS/FORTRAN Compiler Release 2 (5748-FO3)
- PL/I Optimizing Compiler and Libraries (5736-PL3)
- RPG II Compiler (5746-RG1)

The appropriate processing programs must be installed to use the batch option. All the program products listed above can be ordered separately under IBM licensing agreements.

**Installation:** Installation procedures are described in the *ISPF Installation and Customization* publication.

**Dependencies:** ISPF/PDF VSE is dependent upon the Maintain System History Program (MSHP) for installation on VSE/ICCF. ISPF/PDF under VSE operates with ICCF. ISPF (5668-960) is a prerequisite program product.

**DATA SECURITY**

ISPF/PDF VSE provides no security or data integrity functions beyond those provided by the environments in which it operates. It is the responsibility of customer management to use existing programs to provide this support.

**DOCUMENTATION**

(available from Mechanicsburg)

*ISPF General Information (GC34-2078) ... ISPF Program Summary (GC34-2077) ... ISPF/PDF Licensed Program Specifications (GC34-2082) ... ISPF for VSE Installation and Customization (SC34-2080) ... ISPF/PDF for VSE Reference (SC34-2079).*



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PP 5666-281.2

Nov 83

PROGRAM PRODUCTS

ISPF/PDF VSE (cont'd)

RPQs ACCEPTED: No

## PROGRAM PRODUCTS

**DEVELOPMENT MANAGEMENT SYSTEM/  
CROSS-SYSTEM PRODUCT  
FOR the SSX/VSE ENVIRONMENT  
DEFINITION (5666-282) - EXECUTION (5666-283)**

**PURPOSE**

The Development Management System/Cross-System Product (DMS/CSP) provides an interactive interface for developing, testing, generating and executing application programs in an SSX/VSE environment. It is fully compatible with the DMS Cross-System Product for CICS/VS, TSO or VM/CMS. DMS/CSP Definition includes the facilities for developing, testing and generating DMS/CSP applications. DMS/CSP Execution provides for production execution of DMS/CSP applications.

**HIGHLIGHTS**

- Interactive definition, test and execution of application programs.
- Trace/debug facility at development time.
- Direct execution of generated CICS applications.
- Call and transfer linkage to other applications.
- Access to user-defined VSAM files.
- Portability of application definitions (within published restrictions) between DMS/CSP, DMS/DPPX, and DMS/DPCX.

**DESCRIPTION**

**Data Definition** - Allows the definition of data structures and the characteristics associated with that data. Single elements of data are defined as data items. Each data item name is unique within a library called the Member Specification Library (MSL). Data items are components of a record, table, map or working storage. After a data item has been defined once, it may be used in other records, tables, maps or working storage by entering the data item name. The associated characteristics of the data item, collected from the MSL, need not be reentered.

**Map Definition** - Allows the definition of a map for a terminal display or printer. Each map is given a unique name within a map-group (a group of maps for use in an application) and device. The variable fields defined on a map are named and characteristics are defined for each. Characteristics may be collected from data definitions on the MSL if an already defined data item name is used.

**Application Definition** - Provides for the definition of an application as a group of related processes. Processing statements can be used to define arithmetic operations, movement of data, use of tables, access to map fields and record data items, and logical testing and branching.

**Application Test** - Allows the user to verify the syntax and logic design of any DMS-defined application as well as to view the logical sequence of map displays as the user will see them in the production environment.

**List Processor** - Provides the capability to list all members of an MSL, or select subsets to be listed, and then invoke other DMS/CSP functions against them. These functions are: Copy, rename, delete, print, change, where used, edit, view, export. Most utilities and editors can be invoked directly from the list processor.

**Utilities**

- **EXPORT** - Allows an MSL member to be moved out of an MSL.
- **IMPORT** - Allows a previously exported member to be moved into an MSL.
- **Member Maintenance** - Allows members in an MSL to be copied, deleted, renamed, or printed.
- **File Maintenance** - Allows the user to view or change data that is stored in a file that has been previously created and defined. If the change option is selected, the user may display, replace, delete, add or copy records to the file. File maintenance replaces the previously available File Inquiry facility.
- **Tutorial** - Can be used to learn about DMS/CSP by reading it as a manual or by direct selection of certain sections. It can be accessed at any point in DMS/CSP by pressing the HELP program function key.

**Modes of Operation:** DMS/CSP operates in either of two modes during application development:

- **TUTOR** - An instructional or teaching mode for use by a new or learning DMS/CSP user.
- **PROMPT** - An input assistance mode for the experienced DMS/CSP user.

A change from TUTOR to PROMPT, or vice versa, can be made at any time by entering the subcommand MODE.

If a user requires assistance during the execution of DMS, the HELP function key may be pressed.

**Application Generation:** This process translates the defined application into a set of tables which may be executed using DMS/CSP Execution. These tables are placed in an execution library called the Application Load File (ALF). Once there, the application can be executed without reference to the MSL.

**Application Execution:** Once an application has been generated, it may be executed under the control of the DMS/CSP Execution product. DMS/CSP Execution retrieves the application definition from the Application Load File, initializes it to the run-time environment and manages the execution of the application.

**CUSTOMER RESPONSIBILITIES**

**INSTALLATION:** The DMS/CSP installation procedure consists of loading programs and data files from the distribution tape to disk. All DMS/CSP programs are distributed in object module form and program assembly is not required. DMS/CSP Execution is required for DMS/CSP Definition and should be installed first.

The DMS/CSP installation is prompter-supported under SSX/VSE. This means that the installation is assisted by IBM-supplied prompting programs. These prompters reduce the system knowledge and user intervention required and shorten the install time. DMS/CSP installation supports the Maintain System History Program (MSHP) for system and change management.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

DMS/CSP is designed to operate on the following systems configuration:

- An IBM 4300 processor with enough real storage to meet the operating requirements of SSX/VSE.
- Any magnetic tape drive supported by SSX/VSE (required only for installation).
- A minimum of one IBM 3270 1,920-character display station or other compatible device with 12 program function keys.

**SOFTWARE REQUIREMENTS**

IBM DMS/CSP requires IBM SSX/VSE, program number 5666-265.

Both DMS/CSP Definition and Execution must be installed for application development and test. DMS/CSP Execution may be used separately when only application execution is planned.

**Storage Requirements:** DMS/CSP Definition requires 280K of virtual storage shared by all definition users; of this, 136K is shared with DMS/CSP Execution. Each concurrently-used definition terminal requires an additional 50K to 150K of virtual storage. However, this storage will be reduced if the users are invoking the same function within Definition.

DMS/CSP Execution requires 210K of virtual storage which is shared by all executing applications. Additional storage requirements vary by application.

**COMPATIBILITY and PORTABILITY**

**COMPATIBILITY with DMS/CSP for CICS/VS, TSO and VM/CMS:** DMS/CSP for SSX/VSE and DMS/CSP for CICS/VS, TSO and VM/CMS are fully compatible. Application definitions are fully compatible and portable between products. In addition, application definitions generated for SSX/VSE or for CICS/VS are fully compatible in Application Load File (ALF) form.

**COMPATIBILITY with DMS/DPPX:** The DMS/Cross-System Product and DMS/DPPX provide a means for defining applications which, with little or no change, can be migrated between S/370, 3000-Series, 4300 and 8100 systems. This is achieved as follows:

The definition facilities, by which a user describes his application and data, are identical in DMS/DPPX and DMS/Cross-System Product. These definitions are stored in a Member Specification Library which can be moved from one system to another. The DMS/Cross-System Product and DMS/DPPX each include utilities for moving definitions between them.

The generation and execution recognize differences between environments and allow use of certain facilities unique to the environment. While use of these facilities does not preclude portability, the user should be cautious in taking advantage of them during definition as they may introduce some extra effort into migrating between supported environments.

Additional information on application portability is included in the *DMS/CSP General Information Manual*.

**COMPATIBILITY with DMS/DPCX:** DMS/DPPX, DMS/DPCX and DMS/CSP are conceptually the same in the definition phase. However,



PROGRAM PRODUCTS

**DMS/CSP (cont'd)**

DMS/DPPX and DMS/CSP offer functions that are not available with DMS/DPCX. Applications developed on DMS/DPPX or DMS/CSP which use these unique capabilities may require redesign or redefinition if the application is also to be generated for a DPCX system.

Applications defined using DMS/DPCX are portable to DMS/DPPX or DMS/CSP environments within previously published restrictions. For more information about DMS portability, see the *DMS/CSP General Information Manual*.

**COMPATIBILITY with DMS/CICS/VS:** There is no compatibility or portability between DMS Cross-System Product and DMS/CICS/VS.

**CONVERSION:** Not applicable.

**PERFORMANCE GUIDELINES**

DMS/CSP will support a limited number of concurrent users in application definition and/or execution within a 4321 or 4331 with one million bytes of main storage. Customers who plan to use DMS/CSP for application development and concurrent application execution will normally require two million bytes of storage. Applications designed for volume workloads will likely require two million bytes or more of storage.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information (GH20-5555) ... How to Use DMS/Cross-System Product (SH20-5585) ... Application Development Guide (SH20-5584) ... Definition Program Reference and Operation (SH20-5586) ... Execution Program Reference and Operation (SH20-5587) ... Messages and Codes (SH20-5588) ... Problem Determination Guide (SH20-5589) ... Licensed Program Specifications - Definition (GH20-5347) ... Licensed Program Specifications - Execution (GH20-5350) ... Reference Summary (GX20-2379)*

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SCREEN DEFINITION FACILITY/  
CUSTOMER INFORMATION CONTROL SYSTEM  
SMALL SYSTEMS EXECUTIVE/VIRTUAL STORAGE  
EXTENDED - RELEASE 1 (5666-288)**

**PURPOSE**

Screen Definition Facility/Customer Information Control System - Small Systems Executive/Virtual Storage Extended (SDF/SSX) is an online application development tool for the CICS/VS application programmer who wants to define or edit maps and map sets for the CICS/VS Basic Mapping Support (BMS). The online operation and the ease-of-use oriented functions of the program enhance productivity in map and map set development and maintenance.

**SPECIAL SALES INFORMATION**

All established or new SSX/VSE installations which use or plan to use the Basic Mapping Support of CICS/VS can utilize SDF/SSX.

SDF/SSX is designed to run in the environment provided by the Small Systems Executive/Virtual Storage Extended (SSX/VSE, 5666-265). SSX/VSE provides an Installation Prompter to assist the user in installing SDF/SSX.

SDF/SSX is functionally equivalent to SDF/CICS Release 3 (program numbers 5740-XYF for OS/VS, 5746-XXT for VSE/AF). The maps generated by SDF/SSX can be used in the SSX/VSE, VSE/AF and OS/VS environments.

**HIGHLIGHTS**

- Online development productivity
  - Online definition of new maps and map sets.
  - Online editing of maps and map sets.
  - Ease-of-use in operation and maintenance.
- Support of device independence for maps and map sets.
  - Multiple-device support, including color displays.
- Management of map and map set inventory in installation
  - Libraries for maps and map sets.
  - Library directory support.
- Hierarchy of users
- Session profiles of defaults
- Generation of physical and symbolic map descriptions
- CICS/VS - BMS map generation
- Page definition and simulation
  - Early test of maps and pages.
  - Immediate end user review of maps, pages and sessions.
- Online demo session capability
- Online testing of maps during definition
- Smooth migration from BMS macro-defined maps and map sets to SDF/SSX
- Online education
  - Tutorial and help functions.
  - Tutorial sample and built-in demo.
- Batch utilities

**CUSTOMER RESPONSIBILITIES**

The customer should ensure that the functions of SDF/SSX match their application requirements and that the hardware configuration is sufficient to allow realization of the benefits of an online programming environment.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

SDF/SSX is designed to operate in the same hardware environments as SSX/VSE.

The configuration must provide sufficient direct access space to contain the VSAM files used by both online and batch SDF functions.

The terminals supported by SDF/SSX as target devices are the same as those supported for the definition of maps by the Basic Mapping Support of CICS/VS Version 1, Release 5.0.

The SDF/SSX development terminals, that is, those devices on which the SDF/SSX programmer enters or receives information are:

IBM 3276 Control Unit Display Station, model 12, (SDL C - remote).  
IBM 3278 Display Station, model 2 (local and remote).  
IBM 3279 Display Station, models A2, B2 (local and remote).

**SOFTWARE REQUIREMENTS**

SDF/SSX requires for its installation and operation the following programs, all of which are provided in the pre-generated SSX/VSE product:

VSE/AF SCP  
VSE/Advanced Functions Release 3  
VSE/VSAM Release 2  
VSE/POWER Version 2  
MSHP

If the SDF/SSX user specifies a programmed symbol set attribute, it is his responsibility to ascertain that the specified symbol set is loaded into the device.

Whenever SDF/SSX is used with a device in base color mode, the fields on SDF/SSX screens are displayed in base colors according to the attributes associated with the screens.

SDF/SSX supports application programming in:

System/370 Assembler language  
PL/I  
COBOL  
RPG II

COBOL is included in the pre-generated SSX/VSE system. PL/I and RPG II are available as prompter-supported program products if application programs are to be compiled or assembled on the system.

SDF/CICS provides a skeleton map for use of the ELIAS-I prompter-supported program product:

ELIAS/SSX (5666-291)

The distributed Basic Material consists of pre-generated object modules, CICS/VS table entries, and a job stream to create ICCF members which update the CICS/VS tables, and to create the VSAM clusters necessary to run SDF/SSX.

**Virtual and Real Storage Requirements:** The online part of SDF/SSX works as a CICS/VS transaction, the batch part of SDF/SSX occupies a single partition in SSX/VSE. Partition sizes as established by SSX/VSE are adequate for SDF/SSX.

**Installation:** SDF/SSX is installed using the SSX/VSE Installation Prompter which is included in the SSX/VSE product. Instructions for invoking the Installation Prompter are provided in the SDF/SSX Program Directory.

**COMPATIBILITY/CONVERSION/MIGRATION**

SDF/SSX can be used to define and generate maps for all the CICS/VS environments that are supported by SDF/CICS Release 3.0. The physical maps generated by SDF/SSX are fully compatible with equivalent maps generated by the map and map set definition macros of the CICS/VS Basic Mapping Support.

The symbolic description maps generated by SDF/SSX are a compatible superset of maps that can be generated by the CICS/VS Basic Mapping Support. In particular, longer field names and arrays of structures can be defined and corresponding symbolic description maps can be generated.

CICS/VS maps and map sets in their BMS macro source format can be imported into SDF/SSX from non-SSX/VSE environments. Such maps and map sets can be converted by a batch utility into SDF/CICS card formats, which then can be loaded into the SDF/SSX map libraries.

**Education:** The SDF/SSX online tutorial serves as computer-based education material. SDF/SSX also contains two online demo sessions that demonstrate the definition of a simple map and the conversion of an old map to extended color field attributes.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Screen Definition Facility/Customer Information Control System SSX/VSE General Information (GH19-6096) ... Screen Definition Facility/Customer Information Control System SSX/VSE Program Reference (SH19-6098) ... Screen Definition Facility/Customer Information Control System Operations Guide for SSX/VSE (SH19-6097) ... Screen Definition Facility/Customer Information Control System SSX/VSE Messages and Codes (SH19-6099) ... Screen Definition Facility/Customer Information Control System SSX/VSE Reference Summary (SX11-6100).*

RPOs ACCEPTED: No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**ENTRY LEVEL INTERACTIVE APPLICATION SYSTEM -  
SMALL SYSTEMS EXECUTIVE/  
VIRTUAL STORAGE EXTENDED  
ELIAS SSX/VSE (5666-291)**

**PURPOSE**

ELIAS SSX/VSE is an interactive program which runs under the control of the Interactive Productivity Facility that is included in the Small System Executive/Virtual Storage Extended (SSX/VSE, 5666-265). When correctly installed in its Specified Operating Environment (SOE), ELIAS SSX/VSE is designed to provide a system intended to facilitate the design, development and implementation of VSAM, DB, DC, and/or DB/DC programs. These programs may be written in COBOL or PL/I. Through the facilities of ELIAS SSX/VSE, they may invoke the functions provided by the CICS and VSAM components of SSX/VSE and DL/I SSX/VSE in a manner which is simpler than the direct interface to these program products. This interactive approach can also reduce the amount of time spent in searching documentation and also for data entry, thus improving productivity.

ELIAS SSX/VSE is a major functional subset of ELIAS I/VSE (5746-XXV). It has been modified to operate in the environment provided by SSX/VSE. Many CICS and VSAM functions are included in the SSX/VSE program product. The facilities of DL/I are available in DL/I SSX/VSE (5666-275) and PL/I is available via PL/I SSX/VSE Optimizing Compiler and Libraries (5666-276) and PL/I SSX/VSE Transient Library (5666-277).

SSX/VSE provides an Installation Prompter specifically designed for ELIAS SSX/VSE which simplifies the installation and maintenance of this product.

The ELIAS SSX/VSE program product and its supporting documentation is designed to provide an approach to batch and DB/DC application creation tailored to the inexperienced user. It is thus well suited to the needs of many users of SSX/VSE. Straightforward interactive dialogs are provided which prompt for the information necessary to create, access and maintain data bases and screens. A standardized program framework, for COBOL and PL/I programs, is provided and filled in, where possible, with information provided in previous dialogs. Pre-defined sequences of code (called bricks) to perform frequently used system functions are available. These may be easily included in the program using Program Function keys. HELP functions are provided in all the dialogs.

**DESCRIPTION**

Dialogs (called Procedures) and bricks are provided in the following main functional areas:

- Assistance with data base definition. Screens request input used by the procedures to generate DBDs, PSBs, SSAs and the associated VSAM files, together with associated COBOL and PL/I structures. The screens are designed to reduce the level of experience necessary to provide the required parameters. The output of these procedures is standard source code which can then be passed to the SSX job submission facility.
- Assistance with PSB importing. A procedure to make available to the ELIAS SSX/VSE program generation procedure PSBs which have been defined externally to ELIAS SSX/VSE. This function can be useful in an environment where DL/I data bases already exist.
- Assistance with DL/I data base maintenance. A procedure is provided to generate the utility JCLs required for loading, reorganization and backup/recovery of DL/I data bases.
- Assistance with screen map generation using Basic Mapping Support for the CICS-based component of SSX/VSE. An interactive procedure allows easier definition of application screens to ELIAS SSX/VSE design standards. These maps can be defined for use either with COBOL or PL/I application programs.
- Programs generated by ELIAS SSX/VSE may specify the use of screen maps generated and maintained by SDF/SSX (5666-288). The use of these two program products together, while not required, is recommended to further simplify the task of screen definition and maintenance.
- Assistance with batch and online program creation and maintenance in COBOL and PL/I. ELIAS SSX/VSE provides skeleton programs with data areas, screen maps, as well as linkage and error recovery code for DL/I (CALL or High-Level Programming Interface), and the SSX/VSE components based on VSE/VSAM and CICS/DOS/VS. Wherever possible, data available from other procedures is automatically entered in the skeletons. The services of a full screen editor are employed to create a user statements file.
- 'Fetch a Brick' capability. Easy inclusion of pre-defined sequences of code (bricks) to request system services related to DL/I, VSAM and CICS. A program function key fetches the brick and simple use of the full screen editor allows whatever tailoring is necessary.
- Direct interface to SSX/VSE job submission facilities. ELIAS SSX/VSE allows the user to submit the source code created to the SSX/VSE job submission facilities for compilation and link editing.

**Additional Features:**

- Prompter-supported installation and maintenance. SSX/VSE contains a prompter specifically designed for ELIAS SSX/VSE. It leads the user through the installation and maintenance processes by providing step-by-step instructions on the screen. It either detects when the user has compiled or accepts simple responses.
- Upward Compatibility with ELIAS I. Since ELIAS SSX/VSE is a major functional subset of ELIAS I/VSE Release 2, the user will have a consistent interface when running in either the SSX/VSE or VSE environments.
- Transportability of the Generated Code. ELIAS SSX/VSE generates source code that is valid for compilation and execution in both SSX/VSE and VSE environments. To transport an application, the user need only submit this code for compilation in the appropriate VSE environment. In addition, where feasible, ELIAS SSX/VSE allows user selection of options for the VSE environment that are not valid in SSX/VSE. In this way, source code can be produced which is designed for execution under VSE. The transportability feature is especially useful for both migration, and where the SSX/VSE system is being used for development. Warnings are provided to help prevent specification of input that is invalid when the application is to execute under SSX/VSE.
- Code may also be generated in the VSE environment using ELIAS I/VSE that can then be transported to an SSX system. In this case, care should be taken not to violate the software/hardware constraints of the target system. If ELIAS SSX/VSE is installed on the SSX system, it may be used to make modifications to the transported elements once they have been reloaded to the appropriate SSX libraries. The use of SSX system facilities to accomplish this reloading may require somewhat greater user experience than normal SSX operation. However, once this is done, the full functions of ELIAS SSX/VSE are available to make changes and submit the application components to SSX job submission.
- Support for High-Level Programming Interface (HLPI). ELIAS SSX/VSE supports the use of the HLPI feature of DL/I. This allows both the user and the ELIAS SSX/VSE-supplied bricks to directly invoke DL/I services from COBOL and PL/I programs.
- ELIAS SSX/VSE supports all types of VSAM files supported by SSX/VSE, for COBOL and PL/I programs (batch and online). This support includes error handling in program frameworks and coding of VSAM file access statements through the use of specific bricks.
- Default Options. When ELIAS SSX/VSE is invoked for the first time, the user can specify installation standard default options. These may be modified, if necessary, at subsequent invocations using a supplied procedure. In addition, ELIAS SSX/VSE supplies certain default options which represent acceptable solutions and relieve the user of the necessity of determining them himself.
- Input Checking. User input is checked for validity at input time. This significantly reduces the amount of rerun time caused by incorrect data or keying errors. In addition, ELIAS SSX/VSE requires much less input than would be necessary to produce an equivalent amount of source code by direct preparation of the macros and program statements. This can result in initial resource savings and reduced effort in correcting errors identified at compile and test time.
- Documentation is straightforward and 'how to' oriented. The format and content is designed to be compatible with that supplied with SSX/VSE.

The ELIAS SSX/VSE program product should be of interest to users of SSX/VSE who do not have experience in batch and/or DB/DC applications. Together with the associated documentation and available education, it provides a simplified methodology for application design and implementation that can provide a significant improvement in DP productivity.

ELIAS SSX/VSE offers advantages to the experienced user as well. Skilled personnel can concentrate on the more complex aspects of applications while using ELIAS SSX/VSE to more easily generate base application elements. It can also be an effective vehicle for training new people who work under the direction of the advanced designer/programmer.

ELIAS SSX/VSE may also be of significant value where SSX is specifically installed as a development system (see "Customer Responsibilities").



PROGRAM PRODUCTS

ELIAS SSX/VSE (cont'd)

CUSTOMER RESPONSIBILITIES

The customer should ensure that the functions of ELIAS SSX/VSE match their application requirements and the hardware configuration is sufficient to allow realization of the benefits of an online programming environment.

When generating source code for compilation and execution in the VSE environment, it is the user's responsibility to transport and submit the output of ELIAS SSX/VSE to the target system. It is also the user's responsibility to provide the required software/hardware configuration for the VSE system necessary for compilation, link editing and execution.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

ELIAS SSX/VSE is designed to operate in the same hardware environments as SSX/VSE.

When generating code for submission to SSX/VSE, only fixed block architecture (FBA) DASD devices may be specified to ELIAS SSX/VSE procedures. Specifically, these are the IBM 3310 and 3370. For compilation and execution in the VSE environment, ELIAS SSX/VSE will generate code supporting IBM 3310, 3330, 3340, 3350 and 3370 disk storage devices.

The estimated library space requirements, according to library type, are shown below:

Library Type	Directory Entries	Library Space
Core Image Library	24	950 blocks
VSE/ICCF Library	455	14,000 records

ELIAS SSX/VSE can be installed and executed in the minimum SSX/VSE hardware configuration with the exception that one additional DASD spindle is required for the program libraries.

SOFTWARE REQUIREMENTS

All programming requirements necessary for the execution of ELIAS SSX/VSE are provided by SSX/VSE. In addition, an ELIAS SSX/VSE installation prompter is supplied as part of SSX/VSE.

The set of macros and application programs generated by ELIAS SSX/VSE may interface with the following programs:

CICS/DOS/VS Release 1.5 or the CICS-based component of SSX/VSE.

VSE/VSAM Release 2 or the VSE/VSAM-based component of SSX/VSE.

DOS/VS COBOL Release 3 or the COBOL component of SSX/VSE.

The following SSX Installation Prompter-Supported program products are also supported by ELIAS SSX/VSE:

DL/I SSX/VSE (5666-275)

PL/I SSX/VSE Optimizing Compiler and Libraries (5666-276)

PL/I SSX/VSE Transient Library (5666-277)

**Virtual and Real Storage Requirements:** ELIAS SSX/VSE operates in the same partition as CICS. Within this partition, ELIAS SSX/VSE procedures operate in an ICCF batch pseudo-partition under the control of IPF. The ELIAS SSX/VSE editors execute in the ICCF foreground pseudo-partition. Partition sizes as established by SSX/VSE are adequate for ELIAS SSX/VSE.

COMPATIBILITY/CONVERSION/MIGRATION

Application elements (programs, file definitions, etc.) generated with ELIAS SSX/VSE may be transported to a VSE environment for compilation, link-editing, and execution. It is the user's responsibility to extract these elements from the SSX libraries and move them to the appropriate VSE libraries. If ELIAS I/VSE is present in the VSE environment, it will recognize these elements, construct the necessary job stream, and submit the job. If ELIAS I/VSE is not present, the user must perform these tasks.

When migrating from SSX/VSE to VSE, the user may move all ELIAS-generated application elements to the new environment. Changes may be required to exploit the differences in hardware/software configurations. ELIAS I/VSE may be used to make these alterations. The user will find few procedural differences in interfacing to either product.

DOCUMENTATION

(available from Mechanicsburg)

The following ELIAS I/VSE Release 2 manuals will be provided, without change, with ELIAS SSX/VSE:

*Application Design Guide* (SH19-6220) ... *System Administrator's Guide* (SH19-6221) ... *COBOL Application Programmer's Guide* (SH19-6222) ... *PL/I Application Programmer's Guide* (SH19-6223).

The following manuals are either entirely new or are updates of relevant ELIAS I/VSE Release 2 publications:

*General Information Manual* (GH19-6269) (\*) ... *Reference Card* (GX11-6072) ... *Using ELIAS SSX/VSE under SSX/VSE* (SH19-6271)

(\*) available at announcement.

**Ordering Instructions:** ELIAS-SSX/VSE is ordered separately from SSX/VSE.

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**QUERY MANAGEMENT FACILITY for VSE**  
**QMF/VSE VERSION 1 RELEASE 1**  
**5666-292**
**PURPOSE**

QMF/VSE is a new program product that extends query and report writing facilities within the VSE Advanced Function Release 3 environment. It is designed to complement SQL/Data System (SQL/DS) Release 2 by providing interactive facilities to retrieve and modify, display, or print relational data. It expands the ease-of-use characteristics and enhances the report writing capabilities of the interactive SQL (ISQL) function of SQL/DS. The QMF/VSE user may select his query language between the structured query language (SQL) and the query-by-example (QBE) style language.

**SPECIAL SALES INFORMATION**

Query Management Facility for VSE is a key part of IBM's data systems and Information Center offerings extending data access to end-users.

**HIGHLIGHTS**

**Report Writer Capabilities:** QMF/VSE reports can be either a displayed or printed version of relational data. These reports are formatted via user-defined or default form specification. Using the form, a variety of different reports types including listing, summary, or across-summary reports can be generated. In addition, column headings, subtotal descriptors, page headings, and page footings can be changed or added by the user simply by updating the form specification.

**Ease-of-Use Considerations:** QMF/VSE extends the query and report writing capabilities to the end-user by providing functions designed to support typical user tasks. The performance of those tasks is easy for the end-user with little or no data processing related skills. It can also be useful as a high productivity programming tool in application development, and in prototyping for the data processing professional. At the same time, it offers flexibility regarding the order in which the steps of such tasks are performed by the user.

**User Aid Facilities:** Model queries, sample tables, prompting, and comprehensive online HELP facilities are also provided to assist the end-user. In addition, the user may define parameters in queries and procedures that may be specified at execution time.

**Query Language Selection:** The user may optionally select his preferred query language since QMF/VSE supports both the structured query language (SQL) and the query-by-example (QBE) style language.

**Command-Driven Display Screens (called panels):** QMF/VSE provides a simple set of commands in conjunction with the panels which guide the end-user in the creation or alteration of queries, reports, or procedures. Users of QMF/VSE can produce meaningful results utilizing only a portion of the SQL or QBE language facility and/or QMF commands, and utilizes Program Function (PF) Keys as well. QMF/VSE also provides the capability to share saved queries, report forms, and procedures.

**Migration of ISQL Users:** Facilities are provided to assist in the migration of ISQL users to QMF/VSE.

**Relational Data Base Manipulation:** Data definition, retrieval, update, insert, delete, and authorization control operations are supported by the structured query language (SQL) of SQL/DS. Access to these facilities is provided through the command languages of QMF/VSE.

**DESCRIPTION**

Typical functions which an end-user might perform include:

- Ad-hoc query in SQL or QBE languages.
- Report preparation.
- Preparation of data for graphic presentation.
- Definition and execution of a procedure consisting of a series of query/report functions.

**Ad-Hoc Query** - Either SQL or QBE may be used to retrieve selected information that is formatted and displayed at the user's terminal. Scrolling commands may be used to browse through the data. The user may then display the original query and modify it in order to obtain different results. Subsequently, the user may save the data, print it, save the request that produced the data, or simply go on to another task.

**Report Preparation** - The results of executing a query will be displayed to the user as a simple table. A form is generated which describes the default format for presentation of the result. Alternatively, a user-defined, pre-stored form may be specified at the time the query is run. The user can then describe the nature of the report (headings and other text, format and summarization required) by filling and changing the values in the form. With only a few specifications, the user can produce a variety of different report types including listing, summary or across-style reports. Once the form is satisfactory, the user merely requests the selected data be redisplayed. QMF will format and display the report at the user's terminal. Since preparing a report can often be an iterative process, QMF make it easy for a user to move from one step to another. That is, display the report format, and redisplay the

data using the updated form. These commonly performed command functions are offered as Program Function (PF) Keys as well. Once the user is satisfied with the report, he can print the report and also save the report description form.

**Graphic Presentation Preparation** - A sample program is provided with QMF/VSE which can invoke the Interactive Chart Utility (ICU) to present the data prepared using QMF/VSE. The ICU is a facility provided with the Presentation Graphics feature of the licensed program GDDM (5748-XXH).

**Procedures** - For periodic reports, users can create a 'procedure' definition that allows the execution of a series of commands which can be invoked through a single command. The execution of both SQL- and QBE-style queries can be included in a single procedure.

Because QMF takes advantage of the features of CICS/DOS/VS and GDDM, the creation and alteration of queries and procedures is easy for the user. As examples, corrections and insertions are simply typed over incorrect information or into blank spaces. Deletions can be made by simply blanking out the unnecessary data. Also, prompts and HELP panels are provided (if called upon) to guide the user as he performs his tasks.

**CUSTOMER RESPONSIBILITIES**

A customer installing QMF/VSE must:

- Have installed at least the minimum machine configuration.
- Have installed the prerequisite products.
- Assure that appropriate VSE/Advanced Functions and S/370 training (including terminal and direct access storage education) be given to system analysts, application programmers, system programmers, and system operators.
- Have VSE/Advanced Functions successfully installed.
- Have personnel educated in QMF/VSE.
- Provide adequate protection against the accidental loss or misuse of his data.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

QMF/VSE is designed to operate on those processors supported by VSE with Advanced Functions Release 3 (or later). The minimum real storage requirement is two megabytes, although four megabytes is recommended.

The processors must have sufficient real storage to satisfy the combined requirements of VSE with Advanced Functions Release 3, SQL/Data System (SQL/DS) Release 2, QMF/VSE, GDDM, CICS/DOS/VS, appropriate access methods, batch requirements, and other customer-required applications. The configuration must include sufficient I/O devices to support the requirements for system output, system residence, and system data sets. Sufficient direct access storage must be available to satisfy the user information storage requirements, and may consist of any direct access facility supported by the system configuration and the programming system.

**DASD:** Query Management Facility is independent of DASD device type. Any disk devices supported by VSE with Advanced Functions may be used. Query Management Facility uses disk devices for the following data sets:

- Spill file data set which holds the data for the report which a user is viewing (used only when the data does not fit into virtual storage)
- Data base data sets managed by SQL/Data System (SQL/DS) Release 2

**Data Communications Devices:** Query Management Facility operations can be controlled from the CICS/DOS/VS terminal.

Query Management Facility supports the following IBM display stations:

- 3277 mdl 2
- 3278 mdls 2, 3, 4, and 5
- 3279 all mdls (in 4-color compatibility mode)
- 3178 mdl C1 and C2
- 3290 mdl 1

See the appropriate (CICS/DOS/VS or GDDM) documentation.

**SOFTWARE REQUIREMENTS**

QMF/VSE is designed to operate with and requires VSE with Advanced Functions Release 3 or later. The following related (or equivalent) licensed products are also required:

**QMF/VSE (cont'd)**

- SQL/Data System (SQL/DS) Release 2 (5748-XXJ) and its prerequisites.

The SQL/Data System (SQL/DS) Release 2 licensed product provides relational data base capabilities to users in the VSE with Advanced Functions operating system environment, and the base upon which query entries using Query Management Facility can operate to satisfy customer information demands.

- Customer Information Control System (CICS/DOS/VS, 5746-XX3) Release 1.5 or later.

The Customer Information Control System (CICS/DOS/VS) licensed product controls online DB/DC applications serving a network consisting of a wide variety of terminals and subsystems. CICS/DOS/VS is used to invoke QMF/VSE as CICS transaction, to control terminal displays, and provides the Basic Mapping Services (BMS) for QMF/VSE operational, prompt, and HELP panels.

- Graphical Data Display Manager (GDDM), Release 2 or later (5748-XXH)

- The Graphical Data Display Manager licensed product provides the QMF user with a comprehensive formatting, displaying, and printing capability that coexists with current applications. GDDM is used by Query Management Facility for device support for displays involving dynamically changing data fields. GDDM Release 3 and CICS/DOS/VS Release 1.6 are required for support of the 3290 mdl 1 in large-screen mode.

**COMPATIBILITY/CONVERSION**

Query Management Facility and SQL/Data System (SQL/DS) Release 2 are complementary products designed to provide solutions to end-user information needs. Data managed by SQL/DS is available to end-users through the Query Management Facility (subject to appropriate authorization). Data managed by DL/I DOS/VS can be retrieved by the extract facility of SQL/DS which loads the data into an SQL/DS table. In addition, the SQL/DS Data Base Services Utility (DBSU) can be used to load the data into an SQL/DS table. This data is then accessible to end-users using QMF/VSE.

**MIGRATION CONSIDERATIONS**

Facilities are provided to assist in the migration of ISQL users to QMF/VSE. Additional information on migration to QMF/VSE will be supplied with the publications when the product is available.

**DATA SECURITY and AUDITABILITY**

In a QMF installation, facilities which will allow customer installation management to control its usage and impact are provided by the relational data base manager. Additionally, QMF itself controls the authorization for stored queries, forms, and procedures. Through the facilities of the data base manager, QMF users can specify security authorization for access to their data. Multiple levels of authorization make it possible to place restrictions on the different users' accessibility to data. For example, one user may be given unlimited access to the data for all types of operations. Another user may only be allowed to read information, not alter it. Still another user may be restricted to reading a subset of the information (for example, only information pertaining to a particular department within an organization).

**PERFORMANCE CONSIDERATIONS**

The primary objective of Query Management Facility is ease-of-use. The actual system resource requirements vary and depend on many factors such as number of records searched, complexity of the query, and availability of indexes. Response time and throughput depend on the allocated system resources, the priority of the executing task, and the nature of the transaction.

**DOCUMENTATION**

(available from Mechanicsburg)

*QMF/VSE General Information ... QMF/VSE Licensed Program Specifications ... QMF/VSE Planning and Administration Guide ... QMF/VSE Installation Guide ... QMF/VSE Learner's Guide ... Introduction to QMF/VSE ... QMF/VSE User's Guide and Reference ... QMF/VSE Reference Summary ... QMF/VSE Diagnosis Guide ... QMF/VSE Diagnosis Reference.*

**RPQs ACCEPTED: No**

**5666-294 - PARIS/BASE  
PLANNING AID for  
RETAIL INFORMATION SYSTEM/BASE**

**PURPOSE**

Planning Aid for Retail Information System/Base (PARIS/Base) is a set of 16 data bases designed to support retail merchandise processing and merchandise information applications. PARIS/Base uses the DOS/VSE Operating System in conjunction with CICS/VS, DMS/CICS/VS, and DL/I.

**SPECIAL SALES INFORMATION**

PARIS/Base provides a retail establishment with the data bases and associated online maintenance routines needed to insert, delete and create data to support retail applications. These applications include purchase order preparation, merchandise information, merchandise planning, receiving, checking, merchandise distribution, operational planning, vendor invoice matching, and big ticket or warehouse subsystems. PARIS/Base is a set of data bases to support an integrated retail information system.

This product is intended for retail firms that order merchandise from vendors, process the receipt of the merchandise from a receiving dock to the sales floor, and process the vendor invoice. The retailer can utilize items on order and sales information as input to merchandise and operational planning systems.

**HIGHLIGHTS**

- PARIS/Base contains the Data Base Descriptions (DBDs) and Program Specification Blocks (PSBs) in support of 16 data bases. Application Control Blocks (ACBs) are supplied for the maintenance routines.

The 16 data bases are:

Charge Back	Department/Class/Store
Freight Payment	Manifest
Purchase Order	Reservation/Order
Security	Transfer
Control/SKU Number	Distribution Center
Invoice	Overage
Receipts	Route Guide Delivery
Stock Keeping Unit	Vendor

- The online maintenance routines utilize CICS/VS, DMS/CICS/VS and COBOL support routines.
- Control and audit features are included in PARIS/Base through the security data base. Controlled access to secured files is via user-defined passwords.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The PARIS/Base licensed program is designed to operate on IBM S/370, 303X or 43XX processors supported by DOS/VSE that meet the minimum processor storage requirements described below. The processor should be selected based on the user's projected transaction load along with other CPU workload.

For batch or online processing, PARIS/Base requires 64K bytes of real storage and 3,600K bytes of virtual storage, in addition to the storage required for the VSE operating system, CICS/DOS/VS, DMS/CICS/VS, DL/I DOS/VS and the application program. Optimum real storage and processor requirements may vary. Users are responsible for determining optimum real storage and processor requirements. The minimum machine requirements for PARIS/Base are:

- One IBM 4300 processor with 1MB of storage.
- Two IBM direct access storage devices supported by DOS/VSE. To install PARIS/Base, approximately 200 cylinders for the source library and 182 cylinders for the core image library on the IBM 3340 or equivalent storage on other direct access devices are required.
- One IBM 3278 or 3279 Display Station mdl 2 or equivalent supported by DOS/VSE.
- One IBM console display device supported by DOS/VSE.
- One IBM 3262 Printer with 132 print positions or equivalent supported by DOS/VSE.
- One IBM card reader punch supported by DOS/VSE.
- One tape drive supported by DOS/VSE.

**SOFTWARE REQUIREMENTS**

PARIS/Base is written using DL/I DOS/VS, CICS/DOS/VS and DMS/CICS/VS, COBOL and Assembler language. It is supplied in the form of source statement books for the data bases and core image phases, and source statement books for the maintenance routines. It is designed to operate with the following prerequisite products:

- DOS/VSE System Control Program (5745-030) Release 3.
- COBOL/VS Compiler (5746-CB1) Release 3.

- CICS/DOS/VS (5746-XX3) Release 1.5.
- DMS/CICS/VS (5746-XC4) Release 3.
- DL/I DOS/VS (5746-XX1) Release 1.6.
- VSE/Advanced Functions (5746-XE8) Release 3.1.
- VSE ICCF (5746-TS1) Release 3.
- VSAM (5746-AM2) Release 2.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual (GH20-5611) ... Program Reference and Operations Manual ... Program Logic Manual.*

**RPQs Accepted: No**



**5666-295 - NPDA V3 (DOS/VSE, SSX/VSE)  
5668-920 - NPDA V3 (MVS/370, MVS/XA)  
NETWORK PROBLEM DETERMINATION APPLICATION  
VERSION 3**

**PURPOSE**

Network Problem Determination Application (NPDA) Version 3 provides functional and usability enhancements, new device support, and support for host and 37X5/EP attached resources in an MVS/XA environment.

NPDA Version 3 licensed program is designed to enhance the network operators' capability to detect and resolve problem situations. NPDA provides an alert management facility which monitors alert messages and automatically notifies the network operator of error situations or threshold conditions previously defined by the user. The alerts can be dynamically displayed on selected operator stations. NPDA collects and interprets information about detected errors or events and maintains statistical data originated by hardware and software components that provide such information. NPDA also recommends possible user activities to locate and relieve problems.

**HIGHLIGHTS**

In addition to the previously announced NPDA functions, NPDA Version 3 offers enhanced support as follows:

- Additional product support:
    - 3725 Communications Controller. NPDA Version 3 integrates support for the 3725 Communication Controller with its attached links and resources that is similar to that provided for the 3705. In addition, NPDA provides support for 3725 solicited and unsolicited RECFMS records. The 3725 support for NPDA requires ACF/NCP Version 2.
    - X.25 Networks (X.25 NCP Packet Switching Interface licensed program). NPDA provides storage, analysis, and display support for the X.25 NCP Packet Switching Interface licensed program Release 4.
    - Series/1. NPDA supports event/alert records from the Series/1 Realtime Programming System (RPS) Version 6.1 Remote Manager licensed program and the Event Driven Executive (EDX) Version 4 Remote Manager licensed program.
    - 3274 Control Unit. NPDA Version 3 provides support for event/alert records generated by 3274 Control Unit (Configuration Support C and D). This support is in addition to the presently available SNA summary data (RECFMS 01, 02, 03, and 05 records).
    - System/38. NPDA supports event/alert records from the System/38 Control Program Facility (CPF) Release 5.
    - 3650 Programmable Store System. Alerts generated by the 3650 Programmable Store System Release 4.1, including user alerts, are recorded and made available for display.
    - 6580 Displaywriter System. NPDA supports event/alert data received for the communication adapter from the 6580 Displaywriter Electronic Documentation Distribution (EDD) feature program.
    - MVS/Extended Architecture (MVS/XA) System. NPDA Version 3 extends its support to resources attached to the host and attached to a 37X5/EP communication controller or 270X communication control unit in an MVS/XA environment.
    - 4700 Finance Communication System. NPDA Version 3 integrates support for the 4700 Finance Communication System.
    - Network Routing Facility licensed program. NPDA Version 3 integrates support for the Network Routing Facility program product.
  - Functional/Usability Enhancements:
    - Improved CLIST capability. NPDA Version 3 permits the inclusion of any NPDA command in a CLIST initiated by an NPDA operator.
    - Filtering based on alert/event descriptions. The NPDA Version 3 filtering capability has been extended to permit the selection of records based on alert/event descriptions.
    - New event types. NPDA Version 3 supports 16 event types. Event types are used in the selection of records to be recorded and/or viewed.
    - Expanded data transfer for problem recording with Information Management Version 2. The number of fields transferred as problem information by NPDA to Information/Management has been expanded to include the data presented by NPDA on its Event Detail and Recommended Action displays.
- Additional capability is provided in NPDA Version 3 over previous versions by allowing previously created Information Management

problem records existing in the Information/System Version 2 data base to be updated by NPDA Version 3.

**DESCRIPTION**

NPDA Version 3 assists operators in performing the problem determination task by:

- Collecting records of detected errors and events from hardware and software components.
- Collecting and interpreting statistical data about permanent and temporary errors.
- Generating alerts to the appropriate personnel about potential problem situations.
- Recommending possible user actions to relieve detected problems.
- Transferring problem information to the data base of the Information/Management Version 1 (a feature of the Information/System program product Version 1 (5735-OZS) or Version 2 (5665-953)).

NPDA Version 3 uses system functions provided by the Network Communications Control Facility (NCCF) Version 1 Release 2 or Version 2 licensed program for access to this accumulated information. This data is presented as:

- Identification of the component causing a specific event.
- Description of the event.
- Probable cause of the event based on an analysis of the record data.
- Recommended actions that the user may follow to correct or override any problems caused by the event.
- Accumulated statistics about temporary or recoverable errors. This data may be used to analyze performance degradation or unre-solved intermittent failures.

The cross-domain capability of SNA communication subsystems is used by NPDA Version 3 to permit displays of event, alert, and statistical data collected in remote network domains running NPDA Version 3.

An important feature of NPDA Version 3 is the filter function. Filters are designed to screen out data before it is recorded in the NPDA Version 3 data base and are also used to screen out recorded data from each user's display.

Filters can be defined by the user to control the recording and viewing of:

- Specific event or alert description (recording only)
- Specific event types
- Specific resources
- Specific resource types
- Combinations of the above
- Events based on the time of occurrence (viewing only)

**PRODUCTS SUPPORTED:** NPDA Version 3 collects alert, event, and statistical data associated with various IBM products.

**Resources Attached to a 37X5/NCP Communications Controller**

- Network Control Program (ACF/NCP/VS Version 1 and ACF/NCP Version 2)
- X.25 NCP Packet Switching Interface (NPSI) licensed program Release 4
- Network Routing Facility
- SDLC Lines (with or without 386X Modems or 3867 Link Diagnostic Unit), X.21 (switched SDLC) and X.25 (packet switching)
- 3232 mdl 1 Keyboard Printer
- 3274 Control Unit mdls 1C, 21C, 31C, 41C, 51C, 52C, and 61C
- 3276 Control Unit Display Station mdls 11, 12, 13, and 14
- 360X Control Unit with Communications Network Management Controller Support (CNM/CS)
- 3651 Programmable Store System - Store Controller
- 3770 MLU mdls (3776 mdls 3 and 4, and 3777 mdls 3 and 4)
- 4701 Control Unit with Communications Network Management Controller Support (CNM/CS)
- 6580 Displaywriter System Electronic Document Distribution licensed program (5608-SR8)
- 7426 Terminal Interface Unit mdl 2
- 8100 Information System Distributed Processing Programming Executive (8100/DPPX)
- 8100 Information System Distributed Processing Programming Executive Problem Determination Aid (8100/DPPX/PDA)
- 8775 Display Terminal mdls 11 and 12
- Series/1 Realtime Programming System (RPS) Remote Manager

## NPDA V3 (cont'd)

Series/1 Event Driven Executive (EDX) Remote Manager System/38 with Control Program Facility Release 5

**BSC Lines** (with or without 386X Modems or 3867 Link Diagnostic Unit)  
3271 Control Unit mdl 1 and 2  
3274 Control Unit mdls 1C, 21C, 31C, 41C, 51C, 52C, and 61C  
3275 Display Station mdl 2  
3276 Control Unit Display Station mdls 1, 2, 3, and 4

### Start/Stop Lines

**Resources Attached to a Communications Adapter on a 4321/4331 Processor**

### SDLC Lines

3232 mdl 1 Keyboard Printer  
3274 Control Unit mdls 1C, 21C, 31C, 41C, 51C, 52C, and 61C  
3276 Control Unit Display Station mdls 11, 12, 13, and 14  
360X Control Unit with Communications Network Management Controller Support (CNM/CS)  
3651 Programmable Store System - Store Controller  
3770 MLU mdls (3776 mdls 3 and 4, and 3777 mdls 3 and 4)  
4701 Control Unit with Communications Network Management Controller Support (CNM/CS)  
6580 Displaywriter System Electronic Document licensed program  
7426 Terminal Interface Unit mdl 2  
8100 Information System Distributed Processing Programming Executive (8100/DPPX)  
8100 Information System Distributed Processing Programming Executive Problem Determination Aid (8100/DPPX/PDA)  
8775 Display Terminal mdls 11 and 12  
Series/1 Realtime Programming System (RPS) Remote Manager  
Series/1 Event Driven Executive (EDX) Remote Manager System/38 with Control Program Facility Release 5

### BSC Lines

3271 Control Unit mdls 1 and 2  
3274 Control Unit mdls 1C, 21C, 31C, 41C, 51C, 52C, and 61C  
3275 Display Station mdl 2  
3276 Control Unit Display Station mdls 1, 2, 3, and 4

**Resources Attached to a Loop Adapter on a 4321/4331 Processor**

3104 Display Terminal  
3232 mdl 11 Keyboard Printer  
3274 Control Unit mdls 51C, 52C, and 61C  
3276 Control Unit mdls 11, 12, 13, and 14  
7426 Terminal Interface Unit mdl 1  
8775 Display Terminal mdls 1 and 2

In general, any SNA physical units that support the current levels of REQMS and RECAMS record types can contribute data to the NPDA data base, although the machine type designators may not always be interpreted by NPDA.

**Resources Attached to a 37XX/EP Communications Controller or to a 270X Transmission Control Unit (for MVS/370 and MVS/XA)**

### BSC Lines

3271 Control Unit mdls 1 and 2  
3274 Control Unit mdls 1C, 21C, 31C, 41C, 51C, 52C, and 61C  
3275 Display Station mdl 2  
3276 Control Unit Display Station mdls 1 and 2

### Start/Stop Lines

**Network Host Processor Data (for MVS/370 and MVS/XA)**

NPDA collects alert, event, and statistical data for certain resources of the host processor when the networking system is in operation.

CPUs (4300, S/370, 30XX)  
Integrated Channels  
Channels (2860, 2870, 2880)  
DASD (3330, 3340, 3344, 3350, 3375, 3380, 3830, 3880)  
Tapes (3410, 3420)  
3272 Control Unit mdls 1 and 2  
3274 Control Unit mdls 1B, 1D, 21B, 21D, and 31D  
3274 Control Unit mdls 1A, 21A, 31A, and 41A (MVS/370, MVS/XA, and VSE)  
370X Communications Controllers  
3725 Communications Controllers  
3790 Communications System (as an SNA Controller)  
380C Printer Subsystem mdl 1

## SPECIFIED OPERATING ENVIRONMENT

### HARDWARE REQUIREMENTS

NPDA Version 3 and its IBM 3600 (4700) Threshold Analysis and Remote Access feature are designed to operate on IBM 4300, S/370 and 30XX processors.

NPDA Version 3 storage requirements vary with the number of users and their demand for program storage. NPDA has no fixed real storage or system area requirements. The virtual storage requirement for NPDA varies depending on use but is approximately 300K bytes.

NPDA Version 3 requires space on any DASD device supported under VSAM for the NPDA Version 3 data base. Disk storage requirements for the NPDA data base are dependent on the network configuration and user options. Program library space is estimated at 20 cylinders on 3330 DASD plus 420 directory blocks.

User access to NPDA is supported with any display station/unit supported by NCCF.

### SOFTWARE REQUIREMENTS

NPDA Version 3 logging and display components execute as subtasks under NCCF Version 1 Release 2 or Version 2.

NPDA Version 3 is designed to operate with any of the following combinations of operating system and communications access methods:

- MVS/XA
  - ACF/VTAM Version 2
  - ACF/TCAM Version 2 Release 4
- MVS/370
  - ACF/VTAM Version 1 Release 3
  - ACF/VTAM Version 2
  - ACF/TCAM Version 2 Release 4
- DOS/VSE
  - ACF/TCAM Version 1 Releases 2 and 3
  - ACF/VTAM Version 1
  - ACF/VTAME
- SSX/VSE
  - ACF/VTAME

In a VM/370 environment with VM/SP and VM/VCNA, NPDA Version 3 is designed to operate with communications access methods as listed above. NPDA Version 3 supports only remotely-attached controllers and terminals in the VM/370 environment.

Information/Management Version 2 must be installed to take advantage of the additional data fields that NPDA Version 3 will transfer when the problem management link is invoked. If Information/Management Version 1 is installed the additional data fields will be ignored by Information/Management.

### MIGRATION

The NPDA Version 2 data base is upward compatible with the NPDA Version 3 data base. NPDA Version 2 should not be used to view Version 3 data. The NPDA Version 3 data base like that of NPDA Version 2 is incompatible with the NPDA Version 1 data base. However, NPDA Version 1 and NPDA Version 3 may coexist in the same system for data display purposes.

Coexistence of NPDA Version 2 with Version 3 on the same host should only be of value during a transition stage when Version 2 might be required to execute commands in a cross-domain environment with a second NPDA Version 2 product.

Users of 3600 (4700) Threshold Analysis and Remote Access feature must reorder the feature for NPDA Version 3. The functions are the same but the feature provides the necessary control statements to install with NPDA Version 3.

### DEPENDENCIES

The System Modification Program (SMP) or the System Modification Program Extended (SMP/E) is required for installation on MVS/370 and MVS/XA. Maintain System History Program (MSHP) is required for installation on DOS/VSE and SSX/VSE systems. The function provided by NCCF Version 1 Release 2 or Version 2 program product is a prerequisite for operation of NPDA Version 3.

### DATA SECURITY

This program accesses hardware and software failure data. Normally, customer data is not included in the failure data (in some instances a user or user application has the capability to create NPDA records with the user-specified data). Customer management is responsible for the selection, application, and adequacy of these controls for their environment.

### CURRENCY STATEMENT

NPDA Version 1 (5735-XX8) is withdrawn from marketing.

Programming Services previously announced for Version 1 of NPDA will be available until June 1984.

**NPDA V3 (cont'd)****DOCUMENTATION**

(available from Mechanicsburg)

*Network Problem Determination Application Version 3: Program Summary (GC34-2110) ... Network Problem Determination Application Version 3: General Information Manual (GC34-2111) ... Network Problem Determination Application Version 3: Installation (SC34-2117) ... Network Problem Determination Application Version 3: User's Guide (SC34-2112) ... Network Problem Determination Application Version 3: Recommended Action Guide (SC34-2113) ... Network Problem Determination Application Version 3: Messages (SC34-2115) ... Network Problem Determination Application Version 3: Diagnosis (SC34-2130) ... Network Problem Determination Application Version 3: Licensed Program Specification (GC34-2116) ... Network Problem Determination Application Version 3: User Reference (SC34-2114).*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs where the installation of NPDA Version 3 introduces an exposure to the system integrity of MVS. Refer to Programming Announcement, "Statement of MVS System Integrity", dated October 21, 1981. This program is intended to run authorized during initialization only.

**RPQs ACCEPTED: No**

**5666-296 - VSE/SP 1.1.0 PRODUCTION**  
**5666-297 - VSE/SP 1.1.0 GENERATION**  
**5750-AAP - VSE SYSTEM IPO/E 1.4.0 VERSION 1.1.0**

**PURPOSE**

VSE/System IPO/E 1.4.0 is an important enhancement and extension of the well-accepted VSE System System IPO/E. VSE System IPO/E 1.4.0 is restructured and enhanced to further reduce time and skill level required to install and service VSE.

The primary design emphasis for VSE System IPO/E 1.4.0 is the following:

- Improved system stability and quality by system testing all of the programs as a single package.
- Reduced installation time and complexity through pre-generated and pre-tailored VSE System IPO/E 1.4.0 programs and libraries. In many cases, the process to install the system can be completed in approximately two hours.
- A new and simplified service procedure. Customers can choose the PRODUCTION format, which significantly reduces service time and complexity.
- A new and simplified ordering procedure.

**OVERVIEW**

**VSE System IPO/E 1.4.0** consists of SCPs, VSE/SP 1.1.0, Optional and Documented support products which are tested as a system to provide high system quality. Previously, VSE System IPO/E consisted of several bases. These bases have been combined and enhanced into a single base for VSE System IPO/E 1.4.0, called VSE/SYSTEM PACKAGE 1.1.0 (VSE/SP 1.1.0). The VSE Interactive Productivity Facility has been incorporated into the VSE/SP 1.1.0. The performance of Interactive Productivity Facility has been improved by approximately 50% for key dialogs. New programs have been added and release levels of other VSE System IPO/E programs have been upgraded in VSE System IPO/E 1.4.0.

**VSE/SP 1.1.0:** This licensed program, with its prerequisite System Control Programs (SCPs), is an operational, interactive, data communication operating system. The prerequisite SCPs are not a part of the VSE/SP 1.1.0 licensed program, but are merged into the pre-generated VSE/SP 1.1.0. All references to VSE/SP 1.1.0 include both the licensed program and its prerequisite SCPs unless specifically indicated otherwise. VSE/SP 1.1.0 is comparable to the previous VSE System IPO/E Data Communications (DC) base. It is built and tested as a pre-generated package of VSE programs and delivered as a single licensed entity. It is part of VSE System IPO/E 1.4.0 and is ordered via the VSE System IPO/E 1.4.0 order process.

VSE System IPO/E 1.4.0 introduces a new and improved delivery process and a new service process for the PRODUCTION format.

All programs within VSE System IPO/E 1.4.0 are available in PRODUCTION and in GENERATION format. Both formats provide full function, are pre-generated and ready to use. The pre-generated options are selected to meet a very high degree of existing VSE installations. The GENERATION format, which also includes the PRODUCTION libraries, is provided for those users who want to modify the system.

Customers who order the VSE System IPO/E 1.4.0 in PRODUCTION format will benefit from a new service process, which reduces the service time and complexity. For the GENERATION format, service is similar to that of VSE System IPO/E 3.1.

The VSE/SP 1.1.0 PRODUCTION system is offered at a lower price than the GENERATION system.

VSE/SP 1.1.0 is offered with a new One-Time-Charge (OTC) Option as an alternative to the Monthly License Charge (MLC).

VSE/SP 1.1.0, in addition to the above, provides hardware support for the 3430 Tape Unit, the 4245 and 3262-5 Printers, and the 4341 Model Groups 9 - 12 Processors.

**HIGHLIGHTS**

**VSE**

- Is delivered and installed as a pre-generated SYSTEM via VSE System IPO/E 1.4.0 with VSE/SYSTEM PACKAGE 1.1.0 as its base.
- VSE/SP 1.1.0 is offered with a new One-Time-Charge (OTC) Option as an alternative to the Monthly License Charge (MLC).

**VSE/SP 1.1.0**

- Is a pre-generated package of VSE programs.
- Is an operational, interactive, data communications operating system without any other prerequisite software
- Is delivered as one entity under a single license.
- Is ordered as the base for VSE System IPO/E 1.4.0.

**VSE System IPO/E 1.4.0**

- Is available in only one version comparable to the Data Communication (DC) version of the previous VSE System IPO/E.
  - The DB/DC version of the previous VSE System IPO/E can be obtained by installing VSE/SP 1.1.0 plus the Optional Product DL/I DOS/VS.
  - A Batch/Interactive version will not be available as a standard offering with VSE System IPO/E 1.4.0.
- All programs within VSE System IPO/E 1.4.0 are available in:
  - PRODUCTION format to significantly reduce service time and complexity, and in
  - GENERATION format for users who want to modify the system.

**Ordering/Shipping**

- Improved order process and physical packaging for VSE System IPO/E 1.4.0.
- In order to simplify the packaging, only VSE System IPO/E 1.4.0 documentation will be included in the shipment. Documentation for individual VSE System IPO/E products is now only ordered through SLSS.
- VSE/SP 1.1.0 is available as part of the VSE System IPO/E 1.4.0 and is ordered via the VSE System IPO/E 1.4.0 order process. The prerequisite SCPs are shipped together with VSE/SP 1.1.0.
- Optional and Documented Support Products are ordered individually as part of the VSE System IPO/E 1.4.0 order.
- The number of distribution tapes is reduced from 13 to 2 when ordering VSE System IPO/E with Optional Products in PRODUCTION format. Ordering ACF/NCP, VM/VSE feature, or Documented Support Products increases the number of tapes.
- Customized libraries are shipped to VSE System IPO/E 1.4.0 users.

**Installation**

- The installation of VSE System IPO/E 1.4.0 including Optional and Documented Support Products can be done in approximately two hours.
- The installation process for VSE/SP 1.1.0 Optional and Documented Support Products is simplified via pre-tailored library packaging and a simplified customization process.
- The usage of a single DASD type for system files further reduces installation complexity.
- System file sizes have been established to meet the needs of most users, reducing the necessity to expand, regenerate, and reload these files.
- The Interactive Productivity Facility dialogs are easier to understand by using fewer DP terms.
- Performance of Interactive Productivity Facility has been improved by approximately 50% for key dialogs.
- Online information is available in the form of 'Explain facilities' and a 'First Use Tutorial' to improve ease-of-use.
- The number of user responses during installation of VSE System IPO/E 1.4.0 is reduced to about 25% compared with previous System IPO/E releases.
- Recovery and restart procedures have been added for operator errors, system failures or uncontrolled system shutdown during the installation process.

**Quality**

- System quality, stability and availability is improved via more comprehensive tests of VSE System IPO/E 1.4.0.
- Optional and Documented Support Products are system verification-tested within VSE System IPO/E 1.4.0 based on VSE/SP 1.1.0.

**New Service Process**

- Customers who order VSE System IPO/E 1.4.0 products in PRODUCTION format will benefit from a new service process.
- This process will ensure that cross-component module dependencies have been included, resolved and tested on a VSE System IPO/E 1.4.0 level for all VSE/SP 1.1.0 Optional and Documented Support Products.
- The IBM service organization now has the capability of testing and verifying corrections to a greater degree than before, because they have the same set of modules and executable phases as the customer.

PROGRAM PRODUCTS

VSE System IPO/E V1.4.0 & VSE/SP 1.1.0 (cont'd)

- This new service eliminates the time consuming process of recompilation and/or link-editing.
- Service for executable phases of products ordered in PRODUCTION format are supplied pre-link edited, ready to be merged to production libraries.
- Service for relocatable/source members is applied directly to production libraries.
- Service libraries are not provided for a PRODUCTION system.
- For VSE System IPO/E 1.4.0 products ordered in GENERATION format, the service process is similar to that in the previous VSE System IPO/E 1.3.1.

New Hardware Support

- 3430 Tape
- 4225 Printer
- 3262-5 Printer
- 4351 Processors Model Group 9 - 12
- 3290 Information Panel in 3278 mdl 2-5 compatibility

In S/370 mode

- Support of FBA DASD
- Virtual Storage Address extension to 16MB independent of the real storage size (max. 8MB real memory in S/370 mode)

DESCRIPTION

VSE SYSTEM IPO/E 1.4.0

Product Content

Note: Program numbers listed in the tables that follow denote the individual program numbers outside the VSE System IPO/E 1.4.0.

VSE/SP 1.1.0

VSE/SP 1.1.0 (5666-296 and 5666-297)		
COMPONENT NAME	NUMBER	V. R. M.
VSE/Advanced Functions	5746-XE8	1.3.5
VSE/ICCF	5746-TS1	1.3.5
VSE/POWER	5666-273	2.1.0
VSE/VSAM	5746-AM2	1.3.0
VSE/VSAM Space Management	5746-AM2	1.2.0
VSE/VSAM Backup/Restore	5746-AM2	1.2.0
VSE/INTERACTIVE PRODUCTIVITY FACILITY	N/A	N/A
CICS/DOS/VS	5746-XX3	1.6.0
VSE/FAST COPY	5746-AM4	1.2.0
DITTO FOR VSE AND VM	5668-917	1.1.0
BTAM-ES	5746-RC5	1.1.0
ACF/VTAM	5666-280	2.1.0
VSE/POWER SHARED SPOOLING VM/VSE Feature	5666-273	2.1.0
DOS/VSE SCP	5745-030	1.3.5
BTAM SCP	5747-CG1	1.1.0
EREP	5656-093	2.2.0
OLTEP	5656-092	1.1.0
Device Support Facility	5747-DS2	1.6.0

Notes:

1. The ACF/VTAME Communication Adapter support is incorporated into ACF/VTAM 2.1.0.
2. The VM/VSE feature provides support for the VM/VSE environment of Interactive Productivity Facility and needs to be ordered as a separate feature of VSE/SP 1.1.0.  
VM/SP 2.1.0 is required when the VM/VSE feature is used.
3. The VSE Interactive Productivity Facility is included in the VSE/SP 1.1.0, but is separately available upon request.

**Optional Products:** Optional Products are installed and tested within the VSE System IPO/E 1.4.0 environment. Inter-product/component dependencies are resolved for the VSE System IPO/E user. Dialog support for key functions of these products is provided by Interactive Productivity Facility. Support for Optional Products has already been generated in VSE/SP. Library space for Optional Products is pre-assigned. The set of Optional Products available with the VSE System IPO/E 1.4.0 is shown in the following table, which also compares the release levels with the previous VSE System IPO/E Release 3.1 components.

OPTIONAL PRODUCTS			
	LICENSED PROGRAM NUMBER	VSE SYSTEM IPO/E	VSE SYSTEM IPO/E
PRODUCT NAME		R 3.1	1.4.0
VSE/IPCS	5746-SA1	1.3.0	1.3.0
VSE/OCCF	5746-XC5	1.1.0	1.1.0
Sort/Merge II	5746-SM2	2.4.0	2.5.0
DL/I DOS/VS	5746-XX1	1.6.0	1.6.0
EP/VS - DOS/VS	5747-AG1	1.3.0	1.3.0
VSE/Access Control Logging & Reporting	5746-XE7	1.1.0	1.1.0
ACF/NCP/VS (which includes) ACF/NCP/VS	5735-XX1	1.2.1	1.2.1
SSP for ACF/NCP/VS	5735-XX3	1.2.1	1.2.1
NCP/SSP SCP	5747-CH1	1.2.1	1.2.1
NCP/SSP SCP with EP Support feat. #6004	5747-CH1	1.3.0	1.3.0
NCCF	5735-XX6	1.2.0	1.2.0
NPDA	5668-983	1.2.1	2.1.0
DOS/VS COBOL	5746-CB1	1.3.0	1.3.0
DOS/VS RPG II	5746-RG1	1.3.0	1.3.0
PL/I COMP/LIB	5736-PL3	1.6.0	1.6.0
PL/I OPT. COMP	5736-PL1	1.6.0	1.6.0
PL/I RES. LIB	5736-LM4	1.6.0	1.6.0
PL/I TRANS LIB	5736-LM5	1.6.0	1.6.0

Notes:

1. The Optional Products ordered with VSE System IPO/E 1.4.0 are shipped as pre-tailored libraries that are restored within the VSE System IPO/E 1.4.0 install process.
2. The Optional Products are available with the same installation and servicing attributes as VSE/SP 1.1.0.

**Documented Support Products:** Documented Support Products are installed and tested with the VSE System IPO/E 1.4.0. The set of Documented Support Products in the VSE System IPO/E 1.4.0 are listed in the following table.

DOCUMENTED SUPPORT PRODUCTS			
	LICENSED PROGRAM NUMBER	VSE SYSTEM IPO/E	VSE SYSTEM IPO/E
PRODUCT NAME		R 3.1	1.4.0
DMS/CICS/VS-DOS	5746-XC4	1.3.0	1.4.0
DMS/CICS/VS IAG	5746-XC4	1.3.0	1.4.0
DMS/CSP DEFINITION	5668-944	N/A	1.1.0
DMS/CSP EXECUTION	5668-945	N/A	1.1.0
ELIAS-I	5746-XXV	1.2.0	1.2.0
DB/DC Data Dictionary	5746-XXC	1.4.0	1.4.0
ISPF	5668-960	N/A	1.1.0
ISPF/PDF	5666-281	N/A	1.1.0
INFO SYSTEM	5735-OZS	N/A	1.1.2
SQL/DS	5748-XXJ	1.1.0	1.2.0

Notes:

1. The DASD space required to install Documented Support Products is additional to minimum DASD requirements.
2. Documented Support Products are shipped as pre-tailored libraries that are restored using jobs created by Interactive Productivity Facility dialogs.
3. Documented Support Products are available with the same packaging and servicing attributes as VSE/SP 1.1.0.
4. SQL/DS 1.2.0 will be available in 1/84.
5. VSE/Performance Tool (VSE/PT) Release 2 Modification Level 1 has been tested with VSE System IPO/E 1.4.0 and is available at PID for installation as a non-SIPO program. The Technical Newsletter (TNL) (N20-0602) describes the installation and activation tasks.
6. It is IBM's direction to extend the ISPF dialog manager to the future VSE System IPO/E.

**Installation of VSE System IPO/E 1.4.0 products ordered after the initial installation:** VSE System IPO/E 1.4.0 Optional and Documented Support Products that are ordered after the initial order are installed into the pre-allocated libraries using jobs created by Interactive Productivity Facility dialogs.

## VSE System IPO/E V1.4.0 & VSE/SP 1.1.0 (cont'd)

### PRODUCTION and GENERATION Definition of VSE System IPO/E 1.4.0 Products

**PRODUCTION Definition:** PRODUCTION is generally defined as providing full product function but not providing for user modifications of this function. The products are pre-generated and shipped primarily in object code (library restore format) to simplify installation and service and to enhance usability. Flexibility for system environment adjustments is still maintained. Source code required for program development and program execution is included. These pre-generated options are selected to meet the requirements of most existing VSE installations. Service libraries are not provided. A user who orders VSE System IPO/E 1.4.0 products in PRODUCTION format will benefit from the new service process, which significantly reduces time and complexity of service application.

VSE/SP PRODUCTION is the pre-generated VSE/SYSTEM PACKAGE 1.1.0. It contains several pre-assembled supervisors to cover various 4300 and S/370 VSE and VM/VSE environments. CICS/DOS/VS 1.6.0 is pre-generated, but allows for environmental adaptations of the Terminal Control Tables, Program Control Tables, Transient Data Table, Basic Mapping Support, etc. These adaptations can either be done at initial installation or at a later time when needed, as described in the CICS/DOS/VS 1.6.0 documentation.

**GENERATION Definition:** VSE System IPO/E 1.4.0 products shipped in GENERATION format include the PRODUCTION format as well as all library members available with the Basic Machine-Readable Material of stand-alone products.

GENERATION allows the user to modify and to re-assemble certain programs. The GENERATION format is provided for users who:

- Require unique system or subsystem generation parameters that are not provided in the PRODUCTION format of VSE/SP 1.1.0 or other VSE System IPO/E 1.4.0 products.
- Modify IBM-provided code/generation options to support additional hardware or software.

The service process for programs ordered in GENERATION format is similar to that of the VSE System IPO/E 3.1.

**Note:** Details about the characteristics and considerations of System IPO/E 1.4.0 products shipped in PRODUCTION format versus GENERATION format can be found in the *VSE System IPO/E 1.4.0 Planning Guide* (GC20-2003). This document will be shipped after the VSE System IPO/E 1.4.0 announcement to all SLSS users with VSE/AF in their SLSS profiles.

**VSE/System Package 1.1.0 Characteristics:** The VSE System IPO/E 1.4.0 with VSE/SP 1.1.0 is a significant step to address VSE as a total system

VSE/SP 1.1.0 is an operational, interactive, and data communication operating system. It is built as a package of VSE programs and delivered as a single licensed entity as the base for VSE System IPO/E 1.4.0. The optional VM/VSE feature of VSE/SP 1.1.0 can be ordered for execution of Interactive Productivity Facility under CMS.

The components within VSE/SP 1.1.0 have been serviced to a service update level concurrent with all VSE System IPO/E 1.4.0 products.

**Functions of VSE/SYSTEM PACKAGE 1.1.0 by Program:** (Detailed functional descriptions can be found in the documentation associated and available with each program.)

**VSE/Advanced Functions (VSE/AF) 1.3.5:** VSE/AF is extended to provide the following new support:

- **New I/O devices:**
  - 2,000 lpm 4245 Printer attached via channel
  - 5,650 lpm 3262 Printer attached via channel
  - 3430 Tape device with recording densities of 1,600 and 6,250 bpi attached via channel
- **New functions:**
  - **Support of FBA DASD in S/370-mode**  
Any supervisor mode now supports FBA Direct Access Storage Device (FBA DASD).
  - **More Virtual Storage in S/370-mode**  
With VSE/AF 1.3.5 up to 16MB of virtual storage size can now be specified also in S/370 supervisor mode regardless of the real memory size. However, the 16MB of virtual storage space is reduced by the supervisor size and the sum of the real partition sizes specified.  
For ease-of-use, VSIZE can be specified in units of M-Bytes in addition to units of K-Bytes.
  - **SIOF (START IO FAST) Support**  
The SIOF instruction will be used in the VSE/AF supervisor.

Along with the support of the SIOF instruction, the extended I/O architecture for improved I/O busy handling (SIO Queued) will be supported. The supervisor will process 'delayed I/O interrupts'. This support will be used by processors which can exploit this SIOF instruction. It can improve performance in environments with heavy I/O activity. The use of SIOF allows VM a better guest system dispatching in case of I/O operations.

- **Ease-of-Use, Availability, Reliability**
  - **ISPF Support**  
This support allows use of the Documented Support Product ISPF as dialog and panel manager in a VSE system with dialog and panel compatibility of other systems running ISPF. ISPF executes in an ICCF interactive partition.
  - **Integrity Improvements**  
The ABEND exit routine has been extended to be invoked for any type of termination (normal and abnormal). Thus, the task which is abended can keep control. This allows the user to program controlled termination actions like invocation of VSAM automatic close, completion of all pending I/O requests, free all locks etc. Using this function will more often leave a functioning system after an BEND, and thus make recovery/restart much easier or avoid recovery at all.
  - **Extended IPL support**  
Allows specification of volume serial number instead of device address in the IPL commands DEF, DLA, DLF and DPD. These enhancements further simplify IPL and give more flexibility in DASD usage.

### Device Support Facility 1.6.0

- Provides functions like Initialize Disk, Assign Alternate Block etc. for the DASD devices.

### VSE/ICCF 1.3.5

- **Multilevel Program Function Keys**  
The extension of the PF-key setting will be used to define and work with four different sets of PF-keys: One individual set for each, Command mode, LIST/SPOOL-mode, EDIT-mode and EXECUTION/READ-mode. Each set can be up to 24 PF-Keys and thus fully utilize the extended PF-Key keyboards. This facility is used to substitute PF-Keys for commands etc., for ease-of-use and productivity purposes.
- **@Exit Macro Order in the ICCF Macro Language**  
The new macro order will be used to exit a macro without reaching the physical end of a macro. This provides controlled flexibility in macro processing comparable to procedures.
- **Removal of @-Prefix for Macro Invocations**  
Macros may now be invoked in command mode by specifying the macro name without the @-prefix. Thus, a terminal user can invoke macros like he can invoke procedures. This functional extension improves ease-of-use and simplifies the human machine interface in VSE.
- **VSE/ICCF Notify Support**  
A communication link will be established between VSE/ICCF and VSE/POWER (via NOTIFY) so that e.g., batch job ending messages can be routed to the terminal user who submitted the job. This function notifies the terminal user about the job events automatically rather than have him query the system to get the information, thus providing a better level of information. This function complements the NOTIFY support in VSE/POWER.
- **/Include Job Entry Statement Resolved by DTSUTIL**  
The new parameter SDI will be introduced for the DTSUTIL-commands PRINT, PUNCH and PRTPCH to allow printing or punching of included members. This function provides ease-of-use in ICCF library handling. It relieves the user of analyzing library members to create extra punch or print cards for each INCLUDE statement within members. The INCLUDE statement will be automatically resolved by DTSUTIL.
- **Skip Recovery (via DTSANALS) if Library is Correct**  
DTSANALS will have the capability through the optional parameter OPT on the commands ANALYZE, RECOVER, and REORG, to decide whether the Analyze-, Recover- or Reorg-command should run or not depending on the current status of the ICCF library. This should reduce and improve restart/recovery time because unnecessary recovery runs can be eliminated
- **3290 Information Panel support**  
The 3290 Information Panel is supported as a 3278 mdl 2 -5 compatible display.

## VSE System IPO/E V1.4.0 & VSE/SP 1.1.0 (cont'd)

### VSE/POWER 2.1.0

- **New Device Support**  
VSE/POWER has been extended to support the new hardware devices which are supported in VSE/AF 1.3.5.
- **NOTIFY Support to a VSE/ICCF User**  
This support enables a message to be sent to a VSE/ICCF user when a job has executed locally or remotely, output has been received from another system for that user, or a job or output has been transmitted by the network. This complements the NOTIFY support in VSE/ICCF.
- **Network connectivity to MVS/JES3**  
The VSE/POWER networking function can now be used to connect with an MVS/JES3 Release 1.3.1 node via BSC lines (PTF UZ64973 has to be installed in MVS/JES3 1.3.1).

### VSE/Interactive Productivity Facility

- **Restructured Menu Hierarchy**  
Interactive Productivity Facility provides a structured menu hierarchy, which is more task-oriented.
- **Additional Hardware Support**  
VSE/Interactive Productivity Facility supports all new hardware devices which are supported in VSE System IPO/E 1.4.0.
- **Support of new Software Products/Components**  
VSE/Interactive Productivity Facility supports all new software components which are included in VSE System IPO/E 1.4.0.
- **Dialog Improvements**  
Performance for key Interactive Productivity Facility dialogs has been improved by approximately 50%.
- **VM/VSE Feature Enhancements**  
The VM/VSE feature will contain its own dialog manager in Interactive Productivity Facility and will no longer be dependent on VM Interactive Productivity Facility. The system interfaces in the Interactive Productivity Facility dialog manager are adapted to the new standard interfaces provided in VM/SP 2.1. Thus, VM/SP 2.1 is a prerequisite if the VM/VSE feature is used in a VM/VSE environment.

### CICS/DOS/VS 1.6.0 (For detailed information, see P-Letter 282-268)

- Application Programming Enhancements
- Guidance on CICS/VS Master Terminal and User Exits
- Security Enhancements
- Journal Management and Restart Enhancements
- CICS Resource Definition Online
- System Availability Enhancements
- Performance and Tuning Improvements
- Intercommunication Enhancements
- Device Support Enhancements
- Problem Diagnosis/Serviceability Aids
- New User Exit Facilities
- Serviceability Improvements

### VSE/Fast Copy 1.2.0

- Performance improvements for 8809 via a new Multiple Buffering concept developed in order to guarantee the streaming for the 8809 tape device in most cases of alternate block assignments.

**BTAM-ES 1.1.0:** BTAM-ES provides support for Bisynchronous and Start/Stop communication terminals and also supports local terminal attachment.

### ACF/VTAM/VSE 2.1.0

- **Full VTAM/NCP Environment**  
ACF/VTAM/VSE 2.1.0 provides the following enhancements over ACF/VTAM 1.3.0 in a VSE environment:
  - Integrated multisystem networking capabilities.
  - ACF/VTAM/VSE 2.1.0 hosts can function as intermediate routing nodes in the network
  - Ability to easily modify, replace, or suppress ACF/VTAM messages to suit installation needs or preferences.

- Enhanced processing of large SNA messages sent from ACF/VTAM application programs to potentially improve network performance and reliability.
- Allows programs to determine, at assembly and at execution time, what particular functions are supported with the given level of ACF/VTAM being used.
- Support for downstream load of devices with the Downstream Load Utility program on VSE.
- Reliability, availability, and serviceability (RAS) enhancements of ACF/VTAM networks.
- Dynamic collection of tuning statistics.

### • Communications Adapter Support

Integration of communication adapter and communications controller support in ACF/VTAM/VSE 2.1.0 provides VSE users with simplified growth paths for IBM communication products and enhanced data communication capability. ACF/VTAM/VSE 2.1.0 replaces ACF/VTAME in VSE System IPO/E.

With these enhancements, ACF/VTAM 2.1.0 VSE now provides support for:

- Customers installing their first teleprocessing system
- Non-SNA customers desiring to utilize:
  - Economies of SNA line sharing and terminal sharing
  - Communication network management licensed programs for centralized control and problem determination
  - Loop adapter support
- CICS/DOS/VS customers with terminals supported by BTAM who wish to migrate to terminals supported by SNA.
- ACF/VTAME customers wishing to utilize facilities previously available only in ACF/VTAM Release 3.

### VSE/VSAM 1.3.0

- VSE/VSAM is an access method designed to operate with direct access devices and to support both direct and sequential processing.
- Three types of data sets are provided: Key-sequenced, entry-sequenced and relative record data.
- VSE/VSAM offers multiple levels of password protection.
- Alternate Indexes permit application programs to access records of a VSAM entry or key-sequenced data set on the basis of keys other than the prime key.
- VSE/VSAM SPACE MANAGEMENT FOR SAM provides the capability to define and process a SAM file within VSE/VSAM data space giving automatic space management of the file.
- VSE/VSAM BACKUP/RESTORE of VSE/VSAM provides backup onto tape and restore from tape with high performance and low processor utilization. The VSE/VSAM feature is especially geared to the streaming mode of the 8809 tape drive.
- VSE/VSAM delivered in VSE/SP 1.1.0 can also be used for execution in a VM/CMS/DOS environment.

### VSE/OLTEP 1.1.0

- **Extended Hardware Support**  
VSE/OLTEP supports all hardware devices supported by VSE. In addition, it now supports FBA only and cardless systems.

**VSE/EREP 2.2.0:** EREP 2.2.0 availability for VSE environments is announced through this announcement. It will be available concurrent with VSE/AF 1.3.5 and VSE/SP 1.1.0.

### • Extended Hardware Support

EREP is extended to handle the new hardware devices which are supported in VSE/AF 1.3.5.

### • New Function - System Exception Report

This function of EREP 2.2.0 strengthens and extends the analytic/diagnostic capabilities of EREP in VSE environments, enabling a more rapid identification of significant component failures within a system and each of its major hardware subsystems.

**DITTO for VSE and VM 1.1.0:** DITTO for VSE and VM Release 1.1.0 provides the following new functions and improvements to existing functions:

- Full screen display mode for record display and alteration functions.
- A tape-to-tape compare function (TTC) to compare the contents of two different files. If a mismatch is found, the input and output records will be printed out.

**VSE System IPO/E V1.4.0 & VSE/SP 1.1.0 (cont'd)**

- A VSAM Record Load (VRL) function to allow direct alteration of VSAM file records.
- Further SET function extensions are provided to allow the user to specify:
  - Dump formats of UPDOWN or ACROSS (new horizontal format)
  - Print length of 80 or 132. The shorter length is especially useful on VSE/ICCE screens to avoid overlapped output lines.
- Significant ease-of-use improvements, for example:
  - SET function defaults can be changed via a profile.
  - Horizontal Dump format for printouts and full-screen displays.
  - The Display VTOC function (DVT) is extended to provide additional information about the files on the disk and is presented in a more compact format.
  - The Disk Record Scan function is extended to also show the offset of the data found in the record and to provide printouts of each record where a hit is found.
- DITTO for VSE and VM delivered in VSE/SP 1.1.0 can also be used for execution in a VM/CMS/DOS environment.

**Deleting VSE/SP 1.1.0 Components:** The option of taking VSE/SP 1.1.0 without the full complement of components is available. In this case, one of the following PRPQ versions of VSE/SP 1.1.0 has to be ordered, licensed and installed instead of VSE/SP 1.1.0 (5666-296/5666-297):

- VSE/SP 1.1.0 PRPQ - Partial Function PRODUCTION (5799-BNB)
- VSE/SP 1.1.0 PRPQ - Partial Function GENERATION (5799-BNC)

**Licensing Instructions:** To simplify the customers order process, the VSE/SYSTEM PACKAGE may be ordered and licensed as a single licensed program.

Customers who do not wish to use all of the components of the VSE/SYSTEM PACKAGE in their operational VSE system will be given permission via a VSE/SYSTEM PACKAGE memo-to-users, to use all of the components of the VSE/SYSTEM PACKAGE solely for the purpose of installing the VSE System IPO/E 1.4.0. The customer is then required to delete those components which the customer does not plan to use in his operational system. At time of general availability, an ordering check list will be provided on which the customer can select those components of VSE/SP 1.1.0 which the customer wants to use in his operational system.

See the Announcement Letter for Sample Order Checklists to be used for ordering VSE System IPO/E 1.4.0 and VSE/SP 1.1.0. The availability letter for VSE System IPO/E 1.4.0 will include an updated VSE System IPO/E 1.4.0 order checklist.

**CUSTOMER RESPONSIBILITIES**

Customer Management is responsible for the ultimate evaluation of the adequacy of this offering to address individual customer requirements and or the selection, implementation and adequacy of security procedures for their application.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Systems:** VSE System IPO/E 1.4.0 supports the same IBM 4300, S/370, and 30XX hardware as the VSE System IPO/E 3.1. (Processors: IBM 4321, IBM 4331 - all model groups with a minimum of 1MB of real memory, IBM 4341 Model Groups 9 - 12, IBM 4361 Processor, IBM S/370 mdls 138 - 158 with a minimum of 1MB of real memory, IBM 3031, 3032, 3033. Support for the IBM 3083 requires VM. Hardware feature requirements are the same as for VSE/AF.) New hardware is supported as described under the individual programs (see "Highlights of VSE/SP 1.1.0 by product").

VSE System IPO/E 1.4.0 requires a processor with a minimum of 1MB of real storage. Therefore, S/370 mdl 115 and 125 Processors can not utilize VSE System IPO/E 1.4.0

**Storage Requirements:** The minimum processor storage requirements for the VSE System IPO/E 1.4.0 are shown below.

VSE Environment	VM/VSE Environment
1.0MB	2.0MB

**Note:** Depending on the products used in a customer environment, the minimum processor storage requirement may be higher (e.g., due to SQL/DS, which requires a system containing at least 2.0MB of real memory).

Those customers who have processors with minimum real storage and who are now fully exploiting their memory should consider the increased memory needs of VTAM and CICS.

**DASD Requirements:** The number of Direct Access Storage Device (DASD) volumes required for the installation of VSE System IPO/E is dependent upon the DASD type and the product set being installed.

The minimum addressable DASD volumes required are shown below in Figure 1 for a VSE System IPO/E 1.4.0 system with VSE/SP 1.1.0 and Optional Products shipped only in PRODUCTION format. Figure 2 shows the minimum addressable DASD volumes required for the same system if any product is shipped in GENERATION format (Figure 2).

- All DASD volumes required for VSE System IPO/E installation and service must be of the same device type.
- The minimum volumes listed below do not include space for the Documented Support Product production-library sets.
- The VM/VSE feature requires 28,000 1K blocks of VM CMS mini-disk space for all DASD environments.

IBM DASD TYPE	MINIMUM VOLUMES PRODUCTION	NOTES
3310	5	
3330	5	1
3340	5	2, 3
3350	2	
3370	2	
3375	2	

Figure 1: Minimum VSE/System Package and Optional Product DASD Requirements with only PRODUCTION Products

**Notes:**

1. IBM 3330 mdl 1. 3330 mdl 11s are treated as 3330 mdl 1s.
2. IBM 3340 mdl 70 or 70F or 3344 (1-3344 = 4-3340s).
3. One additional 3340 volume is required for ACF/NCP/VS.

IBM DASD TYPE	MINIMUM VOLUMES GENERATION	NOTES
3310	6	4
3330	6	1, 4
3340	6	2, 3, 4
3350	2	4
3370	2	4
3375	2	4

Figure 2: Minimum VSE/System Package and Optional Product DASD Requirements if any GENERATION Products

**Notes:**

1. IBM 3330 mdl 1. 3330 mdl 11s are treated as 3330 mdl 1s.
2. IBM 3340 mdl 70 or 70F or 3344 (1-3344 = 4-3340s).
3. No additional 3340 volume is required for ACF/NCP/VS.
4. No data-secured file may be placed in the DASD space required for a generation library.

**Library/File Size Comparison:** The size of the minimum DASD layout in VSE System IPO/E 1.4.0 is larger than the layout for the VSE System IPO/E 3.1. This is due to two factors:

- All phases, modules, and macros necessary for normal use of each product are included in the production libraries. In the VSE System IPO/E 3.1, some of the parts of products needed for normal use were contained in the service libraries.
- The size of the user's POWER files, ICCF libraries, and ICCF files are increased substantially. This will minimize the need to expand these files during or after the installation of VSE System IPO/E 1.4.0.

**Other Hardware:** The following minimum hardware is required for the VSE System IPO/E 1.4.0. The VM/VSE feature has the same hardware requirements as the VM/SP System IPO/E, plus at least the virtual equivalent of the devices listed below:

- A VSE-supported console.
- A local terminal which supports a 24x80-character screen format. This terminal must be supported by VSE, CICS/VS, VSE/ICCF, and the telecommunications access method selected by the user.

**VSE System IPO/E V1.4.0 & VSE/SP 1.1.0 (cont'd)**

- A VSE-supported tape drive.
- A VSE-supported printer.

**SOFTWARE REQUIREMENTS**

VSE/SP 1.1.0 is a complete operating system with no prerequisite software. VSE System IPO/E 1.4.0 PRODUCTION and GENERATION products are ready for immediate use after installation. Products ordered in GENERATION format can be modified according to customer needs like in VSE System IPO/E 3.1.

VM/SP 2.1 is required if the VM/VSE feature is used in a VM/VSE System IPO/E 1.4.0 environment.

**COMPATIBILITY**

**Migration to VSE System IPO/E 1.4.0:** (Details are described in the *VSE System IPO/E 1.4.0 Planning Guide*, GC20-2003).

The migration to VSE System IPO/E 1.4.0 is considered as a release transition.

Migration assistance will be provided through Interactive Productivity Facility dialogs to migrate from VSE System IPO/E 2.1, VSE System IPO/E 3.0, and VSE System IPO/E 3.1 to VSE System IPO/E 1.4.0.

Non-VSE System IPO/E products with Interactive Productivity Facility dependent dialogs will run without modification on VSE System IPO/E 1.4.0 with the following exceptions: Explicit references to menu names in Interactive Productivity Facility may cause an error message due to the restructured menu hierarchy. Depressing a function key can be used to recover from this situation.

VSE/POWER provides support to migrate POWER punch, list and reader files via the POWER Offload (Poffload) facility.

Users of VSE/ICCF can migrate their VSE/ICCF user libraries using the facilities provided by the VSE/ICCF DTSUTIL program.

VSE/VSAM 1.3.0 provides compatibility and portability for VSAM data sets of previous releases as documented in chapter 10 of the *VSAM Programmer's Reference* (SC24-5145-2).

VSE System IPO/E 1.4.0 will coexist in networks with VSE/System IPO/E 3.1, 2.1 and other VSE releases and with SSX/VSE 1.2.

Interactive Productivity Facility provides dialog facilities to support the backup and restore of user program libraries.

VSE/Performance Tool (VSE/PT) Release 2 Modification Level 1 has been tested with VSE System IPO/E 1.4.0 and is available at PID for installation as a stand-alone program. The Technical Newsletter (TNL) (N20-0602) describes the installation and activation tasks.

**PERFORMANCE CONSIDERATIONS**

VSE System IPO/E 1.4.0 provides improved performance in the areas of system installation and service.

Response time and system performance is a function of the application and system configuration. Refer to individual product or component documentation for further details on the performance of the individual products.

**DOCUMENTATION**

(available from Mechanicsburg)

**VSE System IPO/E:**  
*Planning Guide* (GC20-2003) ... *Installation Guide* (GC20-2012) ...  
*Reference Manual* (GC20-2013) ... *VME/VSE Feature Guide*  
(GC20-2014) ... *Communication Guide* (GC20-2004) ... *Licensed  
Program Specifications for VSE/SP* (GH20-5347).

**Interactive Productivity Facility 1.4.5:**  
... *Reference Summary Card* (GX20-2383) ... *User's Guide* (SH20-  
5526) ... *Reference Manual* (SH20-2486).

**RPQs ACCEPTED:** No

**5667-124 - ACF/NCP V3 for 3705 and 3725  
ADVANCED COMMUNICATIONS FUNCTION for  
NETWORK CONTROL PROGRAM VERSION 3  
for the 3705 and 3725 COMMUNICATION CONTROLLERS**

**PURPOSE**

Advanced Communications Function for the Network Control Program (ACF/NCP) Version 3 for the 3705 and the 3725 is a program product for users of MVS/370 and MVS/XA (Compatibility Mode) that offers the capabilities of ACF/NCP Version 2 for the 3705 and the 3725, plus SNA network interconnection capability, enhanced recovery of lost resources, enhanced problem determination tools, error recording, and availability. Additionally, for the 3705, ACF/NCP Version 3 contains improved sysgen times previously incorporated for the 3725 in ACF/NCP Version 2.

Additional enhancements support functional enhancements for the 3725. ACF/NCP Version 3 is designed to operate in the 3705 and 3725 Communication Controllers, whether channel-attached to a host processor, or remotely connected to a host processor by an SDLC link to another controller. ACF/NCP Version 3 is generated using the ACF/System Support Programs (ACF/SSP) Version 2 Release 2 (5735-XXA).

**HIGHLIGHTS**

- Provides the capability for independent SNA networks to communicate via SNA network interconnection in conjunction with ACF/VTAM Version 2 Release 2.
- Allows forced deactivation of SNA resources and non-SNA lines.
- Extends support when applicable for 3863, 3864, 3865, and 3868 modems to reporting of received signal level and execution of LPDA commands on data multiplexed links and tail circuit attached links.
- Provides improved problem determination capabilities via the ability to trace the path of a session and to map physical addresses to logical names, in conjunction with the Network Logical Data Management (NLDM) licensed program, Release 2.
- For the 3705, enhancements are included which were previously supported for the 3725 in Version 2:
  - Reduced sysgen time due to removal of conditional assemblies.
  - Key control blocks may be extended above 64K boundary, which may allow additional devices to be included, if adequate storage is available.
- For the 3725 only, ACF/NCP Version 3 supports functional hardware improvements:
  - Additional storage protect support is implemented.
  - Up to 2 megabytes of storage is supported.
  - Links across an Intermediate Routing Node (IRN) may send up to 127 blocks of data in one direction before requiring a response, resulting in more efficient usage of high-speed links and satellite transmissions.
  - The Port Swapping function of the 3725 is supported.
  - The enhanced start/stop support announced October 4, 1983 for the 3725 is supported.

**DESCRIPTION**

- ACF/NCP Version 3 provides SNA network interconnection, the capability of connecting two or more networks through a gateway NCP node. With ACF/NCP Version 3 operating in conjunction with ACF/VTAM Version 2 Release 2, two end-points (LUs) in different networks can then be logically interconnected through the gateway NCP. Highlights of SNA network interconnection include:
  - Each network still preserves its own character, in terms of network elements, naming, control, evolution, and security.
  - Interconnected networks may have different partitioning of the 16-bit network address. Thus, a network of 16 subareas may be interconnected with a network of 64 subareas, for example.
  - All currently supported cross-domain LU-LU sessions are also supported in cross-network sessions. Ownership is within a network.
  - Addresses in one network are transformed into corresponding addresses of the other network. Through the use of the alias name translation function of the Network Communications Control Facility (NCCF) Version 2, each interconnected network may (optionally) have its own name structure.
  - BSC 3270 terminals may participate in cross-network sessions.
  - Networks may be interconnected by more than one gateway NCP.
  - One gateway NCP may be used for attaching up to 255 networks. The gateway NCP is capable of supporting sessions spanning any pair of networks connected to it.
  - Any number of networks may be connected together via interconnection. A cross-network session may go through a number of networks.
  - In addition to SNI functions, a gateway NCP may perform additional NCP functions consistent with available storage and performance capabilities.

- One gateway NCP may have up to eight SSCP owners at one time, each of which may or may not be gateway SSCPs.
- ACF/NCP V3 also provides end-to-end visibility of the configuration from one end of the session to another within a network in conjunction with NLDM.
- ACF/NCP V3 provides forced deactivation to operationally force the deactivation of a line. For some cases where 'hung' resources would previously require re-IPLing, the NCP to recover, the resources may be recoverable via command. ACF/TCAM supports both SNA and non-SNA forced deactivation of lines via PTF on Version 2 Release 4; ACF/VTAM Version 2 Release 2 supports forced deactivation of SNA links, BSC 3270 lines, and, in conjunction with Network Terminal Option Release 2.1, non-SNA Lines.
- ACF/NCP V3, in conjunction with the Network Problem Determination Application (NPDA) Version 3, provides additional support for 3863, 3864, 3865 and 3868 modems:
  - Extension of Link Problem Determination Aid (LPDA) capability to support 3865 modems with the data multiplexer feature and 3863 and 3864 modems attached by the tail circuit accessory.
  - Inclusion of the received signal-level measurement with LPDA data sent to NPDA V3.
  - Inclusion of support for remote modem self-test, with LPDA data sent to NPDA V3.
- For the 3725, ACF/NCP extends the functional support:
  - Storage Protection enhancements will offer more protection against inadvertent overlays of storage.
  - Storage support will be increased from one megabyte up to two megabytes of allowable storage.
  - Up to 127 blocks of data may be sent across an IRN link before a response is required, which will provide significantly improved performance for NCP-to-NCP traffic on 19.2K bps and higher-speed links. Previous IRN to IRN traffic required a response after only seven blocks.
  - The enhanced start/stop support announced October 4, 1983 for the 3725 is supported.
  - Support is included for Port Swapping. Port Swapping allows an operator to logically swap a defined port to an undefined port, improving recovery capability.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the IBM 3705-II, the IBM 3705-80, and the IBM 3725 Communication Controllers, either channel-attached to a host processor, or remotely connected to a host processor by an SDLC link to another controller.

**SOFTWARE REQUIREMENTS**

ACF/NCP Version 3 for the IBM 3705 and 3725 is generated using the ACF/System Support Program (ACF/SSP) Version 2 Release 2 licensed program (5735-XXA). ACF/NCP Version 3 for the IBM 3705 and IBM 3725 operates with MVS Release 3.8, MVS 3.8 with the System Extension licensed program, MVS 3.8 with the SP Version 1 licensed program, and MVS/SP Version 2 for Extended Architecture (XA) processors (24-bit mode).

Use of the Partitioned Emulation Programming (PEP) extension of ACF/NCP Version 3 for the IBM 3705 requires the Emulation Program for the IBM Communication Controllers.

Use of the Partitioned Emulation Programming (PEP) extension of ACF/NCP Version 3 for the IBM 3725 requires the Emulation Program for the IBM Communication Controllers.

ACF/NCP Version 3 supports the following releases of ACF/TCAM and ACF/VTAM, at the functional level of the access method:

- ACF/TCAM Version 2 Release 4
- ACF/VTAM Version 1 Release 3 (MVS only)
- ACF/VTAM Version 2 Release 1 (MVS only)
- ACF/VTAM Version 2 Release 2

**COMPATIBILITY**

ACF/NCP Version 3 for the 3705 and 3725 Communication Controllers supports and can communicate with:

Host-resident programs	3705	3725
• ACF/SSP V2 R2	X	X
• ACF/TCAM V2 R4	Note 5, 6	
• ACF/VTAM V1 R3	Note 1, 5	
• ACF/VTAM V2 R1	Note 1, 5	
• ACF/VTAM V2 R2 MVS	X	X
• EREP MVS	X	X

PROGRAM PRODUCTS

ACF/NCP V3 for 3705 and 3725 (cont'd)

• NPA-Host FDP (5798-CZR)	X	X
• NPDA V2	Note 2, 5	
• NPDA V3	X	X
• NCCF R2	Note 5	
• NCCF V2	X	X
• NLDM R1	Note 5	
• NLDM R2	X	X

Controller-resident programs: Operation of the following programs is supported with NCP Version 3 in the specified machine:

	3705	3725
• EP for the IBM Communication Controllers	X	X
• NTO Release 2.1	Note 3	
• NRF Release 1.5	Note 3	
• X.25 NPSI	Note 4	
• Non-SNA Interconnection	Note 7	

Notes:

1. MVS only, with appropriate PTF.
2. NPDA Version 2 support for the 3725 is provided via PTF.
3. NTO Release 2.1 and NRF Release 1.5 for ACF/NCP Version 3 will be ordered by new feature numbers for the 3705 and 3725. Feature numbers will be available at general availability.
4. Ability for the X.25 NCP Packet-Switching Interface (5668-981), to operate with ACF/NCP Version 3 is scheduled for 4Q84 for the 3705 and 4Q84 for the 3725.
5. Supported only at the identified product's functional level.
6. A TCAM PTF will be provided 2Q84 to support cross-network sessions and forced deactivation for SNA and non-SNA lines.
7. The Non-SNA Interconnection licensed program (5668-951) will be available for operation with ACF/NCP Version 3 for the 3725 1Q85.

The following levels of ACF/NCP may communicate with ACF/NCP Version 3:

- ACF/NCP V1 R2.1
- ACF/NCP V1 R3
- ACF/NCP V2 (3705 and 3725)
- ACF/NCP V3

In addition, ACF/NCP Version 3 can communicate with ACF/VTAME and ACF/VTAM V2R1 supporting an ICA under VSE.

Stage 1 program generation source decks for ACF/NCP Version 1 Release 3 and ACF/NCP Version 2 for the IBM 3705 or IBM 3725 with no or slight modifications may be used to generate ACF/NCP Version 3 for the corresponding Communication Controller. Modifications, if required, are not extensive and are relatively simple to implement. They include the addition and deletion of certain macros and macro operands. Details for Version 3 for the IBM 3705 are in the *ACF/NCP and SSP Installation and Resource Definition Guide (SC30-3224)*; details for Version 3 for the IBM 3725 are in the *ACF/NCP and SSP Installation and Resource Definition Guide (SC30-3226)*.

PLANNING CONSIDERATIONS:

The Network Control Program user will require ACF/NCP Version 3 for the 3705 and the 3725 (5667-124), ACF/SSP Version 2 Release 2 (5735-XXA), and the required access methods and operating systems to generate and operate ACF/NCP Version 3.

The 3705 or 3725 Partitioned Emulation Programming user will require, in addition, Emulation Program for the IBM Communication Controllers (5735-XXB).

For a SNA network interconnection environment, IBM recommends that NLDM Release 2 and NCCF Version 2 be present at every VTAM host that serves as a gateway node to assist problem determination for cross-network sessions. With these products installed, the network operator will have access to data used for network problem determination and problem source identification.

VM/370 support for BSC or start-stop terminals may coexist with the SNA terminal support provided by the partitioned emulation program (PEP) extension of ACF/NCP Version 3 with the Emulation Program for the IBM Communication Controllers under MVS. The loading and the management of the PEP is controlled by ACF/VTAM, ACF/TCAM, or the independent loader utility program in the guest MVS machine.

When deactivating or reloading the Communication Controller, the guest machine must be aware of the potential impact to users of EP lines if these lines are used by the VM/370 control program. The dynamic dump utility is usable under VM/370 provided the utility is run under a guest machine and the utility was installed using SMP.

**Performance and Storage Considerations:** Path lengths for ACF/NCP Version 3 for the 3705 and the 3725 should closely approximate those for ACF/NCP Version 2 when using the same

functions. Use of the SNA Network Interconnection support will result in increased path lengths for messages traversing the gateway.

For the 3705, storage requirements will increase over previous releases of ACF/NCP due to the elimination of conditional assemblies. The net increase in NCP storage will be less for the user who previously selected more options, than for the user who previously selected fewer options. Customers with 256K or less of storage should carefully review storage requirements before installation.

For the 3725, the elimination of conditional assemblies was included in Version 2.

The actual performance and storage impact (if any) to a customer will vary depending on particular hardware and network configuration and options selected.

DATA SECURITY, AUDITABILITY and CONTROL

ACF/NCP Version 3 enables the installation to establish and maintain the integrity of the data communication network. SNA network interconnection provides additional potential for network separation, which may increase security.

An enterprise may, for security reasons, wish to protect some nodes and their data flows from inadvertent or intentional access by other nodes. SNA network interconnection allows customers to configure nodes sharing similar security requirements into an isolated network, allowing cross-network communications through a defined interface, but preventing network management control from nodes outside that network.

In OS/VS environments, the ACF/VTAM Encrypt/Decrypt feature, and the Encrypt/Decrypt facility of ACF/TCAM can provide increased facilities to safeguard the information transmitted between logical units in the network.

The user is responsible for the selection, application, adequacy, and implementation of these facilities and for appropriate application and administrative controls.

**Education:** ACF/NCP courses will be updated to include ACF/NCP Version 3 for the 3705 and 3725. Also available is an SNA Network Interconnection Planning and Implementation Class, Course Number G3643.

**Ordering Information:** Customers may continue to order ACF/NCP Version 2 for the 3705 and ACF/NCP Version 2 for the 3725 after the availability of ACF/NCP Version 3. ACF/NCP Version 1 Release 3 and Release 2.1 may also be ordered for the 3705.

DOCUMENTATION  
(available from Mechanicsburg)

Available at announcement for both the 3705 and 3725:  
*Network Program Products: General Information (GC27-0657).*

Available January, 1984 for both the 3705 and 3725:  
*Network Program Products: Planning (SC27-0658).*

Available at FCS of Version 3 support for the 3705:  
*Advanced Communications Function for Network Control Program and System Support Programs: Messages and Codes (SC30-3169) ... Advanced Communications Function for System Support Programs: Diagnosis Reference (LY30-3060) ... Advanced Communications Function for Network Control Program Version 3 and System Support Programs Version 2 Release 2 for the IBM 3705: Installation and Resource Definition Guide (SC30-3224) ... Advanced Communications Function for Network Control Program Version 3 and System Support Programs Version 2 Release 2 for the IBM 3705: Resource Definition Reference (SC30-3199) ... Advanced Communications Function for Network Control Program Version 3 and System Support Programs Version 2 Release 2 for the IBM 3705: Diagnosis Guide (SC30-3225) ... Advanced Communications Function for Network Control Program Version 3 for the IBM 3705: Diagnosis Reference (LY30-5554) ... Advanced Communications Function for Network Control Program Version 3 and for System Support Programs Version 2 Release 2 for the IBM 3705: Customization (LY30-5556) ... Advanced Communications Function for Network Control Program Version 3 for the IBM 3705: Reference Summary and Data Areas (LY30-5555).*

Available at FCS of Version 3 support for the IBM 3725:  
*Advanced Communications Function for Network Control Program Version 3 and System Support Programs Version 2 Release 2 for the IBM 3725: Installation and Resource Definition Guide (SC30-3226) ... Advanced Communications Function for Network Control Program Version 3 and System Support Programs Version 2 Release 2 for the IBM 3725: Resource Definition Reference (SC30-3227) ... Advanced Communications Function for Network Control Program Version 3 and System Support Programs Version 2 Release 2 for the IBM 3725: Diagnosis Guide (SC30-3228) ... Advanced Communications Function for Network Control Program Version 3 for the IBM 3725: Diagnosis Reference (LY30-5557) ... Advanced Communications Function for Network Control Program Version 3 for the IBM 3725: Customization (LY30-5559) ... Advanced Communications Function for Network Control Program Version 3 for the IBM 3725: Emulation Program for the IBM 3725: Reference Summary and Data Areas (LY30-5558).*

PROGRAM PRODUCTS

5668-002 - DASD MIGRATION AID RELEASE 1.1

PURPOSE

The Direct Access Storage Device (DASD) Migration Aid program provides support for the new 3380 and 3375 Direct Access Storage, new high-speed, large capacity direct access disk storage devices. The Migration Aid is designed to help reduce the effort required to perform DASD migration.

The Migration Aid is designed to capture all required data set attributes from the devices' Volume Tables of Contents (VTOC). Furthermore, by identifying the amount of space currently allocated and the original secondary space allocation, internal space calculation routines can help project the data sets' space requirements on the new device.

HIGHLIGHTS

- Data Set Characteristics report with target device space calculations.
- Identification of data sets that do not meet user specified space utilization goals on the current and/or target device.
- Independent Space Calculation routines (TSO or batch). A one-step approach provides information to help determine the best data set blocking factors and total space requirements on the target device.
- Creation of customized JCL and utility statements to allocate space, copy data sets to the target device, and update the catalog.
- Mass conversion support:
  - Full volume Data Set Characteristics report.
  - Creation of customized JCL and utility statements for all supported data sets in current volumes.
- Procedure Library tools to:
  - Identify all affected data set JCL statements.
  - Generate a jobstream to update all affected JCL statements.
- All JCL and utility statements generated by the migration aid are placed under user control for review, modification and execution.

New with Release 1.1:

- Preservation of Resource Access Control Facility (RACF) discrete protection for certain types of data sets.
- Reblocking of migrated load modules, in the MVS/XA Data Facility Product (DFP) environment.
- Handling of special data sets (unsupported data set organization, unknown record format or a blocksize of zero).
- User specification of multiple compatible catalogs (virtual storage access method, VSAM, and integrated catalog facility catalogs) for migration selection criteria (filters).
- User specification of multiple output volumes and corresponding space thresholds.

The Migration Aid is composed of four parts:

- Presentation of current data set information and generation of JCL statements to place data on the target devices.
- Independent Space Calculation routines.
- Procedure Library Search and Update functions.
- Procedure Library utilities.

DEVICES SUPPORTED

The Migration Aid provides support for the following device type migrations:

FROM	3350		TO		3340			
	3380	3375	Native	Compat	3330-1	3330-11	3344	3850
3380	Yes	C	C	C	C	C	C	C
3375	Yes	Yes	C	C	C	C	C	C
3350 Native	Yes	Yes	Yes	C	C	C	C	C
3350 Compat	Yes	Yes	Yes	Yes	Yes	Yes	C	Yes
3330 mdl 11	Yes	Yes	Yes	Yes	Yes	Yes	C	Yes
3330 mdl 1	Yes	Yes	Yes	Yes	Yes	Yes	C	Yes
3340/3344	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2314/2319	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2305 mdl 2	Yes	Yes	Yes	C	C	C	C	C

C - Caution: Data sets with blocking factors larger than the target device track size are not supported by the Migration Aid.

CUSTOMER RESPONSIBILITIES

New customers are responsible for ordering and installing DASD Migration Aid Release 1.1 and any prerequisite programs.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The DASD Migration Aid can be utilized on IBM processors with the minimum configuration required to support the host operating system. Main Storage of 200K bytes is usually required for execution.

SOFTWARE REQUIREMENTS

The DASD Migration Aid is designed to operate with OS/VS1 Release 7.0, OS/VS1 Basic Programming Extensions (BPE, 5662-257), OS/VS2 MVS Release 3.8 and all subsequent releases including System Extensions and System Product, and MVS/XA unless otherwise stated. The 3380 and 3375 require the MVS/System Product-JES3 Release 1 (5740-XYN), or MVS/System Product-JES2 Release 1 (5740-XYS), MVS 3.8 3380/3375 PRPQ (5799-BFF) with Data Facilities Device Support (5740-AM7), MVS/370 Data Facility Product (5665-295), or MVS/XA Data Facility Product (5665-284). OS/VS1 users of the 3375 require Data Facilities Device Support (5740-AM6) with OS/VS1 Basic Programming Extensions (5662-257).

Prerequisites for the 3380 and 3375 need be present in the system only at the time when an actual or test migration of data sets to it is attempted; all other functions may be used without the device and its supporting software being installed. Sort, OS/VS Sort/Merge (5740-SM1) or equivalent, must be installed. The following IBM utility programs, supplied with the host operating system, must be installed on the system.

- IEHMOVE
- IEBUPDTE
- IEHPROGM
- IEBISAM
- IDCAMS
- IEBTPCH
- IEBCOPY

The following programs are required to install and maintain the Migration Aid:

- OS/VS Assembler and macro library
- OS/VS Assembler H Version 2 (5668-962) is required in the MVS/XA environment.
- IEBGENER
- System Modification Program Extended (SMP/E, 5668-949) or SMP/4 (with PTF UR03129).

Data sets, that have not been allocated as unmovable, using the following access methods are supported:

- BDAM
- BSAM/QSAM
- ISAM
- OSAM
- PAM
- VSAM

Multi-volume data sets must be cataloged.

COMPATIBILITY

DASD Migration Aid Release 1.1 is a functional update to the current release of the DASD Migration Aid and is upward compatible for all prior functions.

SECURITY

DASD Migration Aid Release 1.1 complies with and conforms to the data security and auditability controls of the systems it supports. The target of source data may be either RACF or password protected, which would require a user to be RACF-authorized or to supply the password. User management is responsible for evaluating, selecting, applying and implementing such features and for the appropriate administrative and application controls.

DOCUMENTATION

(available from Mechanicsburg)

Licensed Program Specifications (GC26-3974) ... General Information (GC26-3972 ... Use and Diagnosis (SC26-3973).

MVS SYSTEM INTEGRITY APPLIES: Yes

LICENSED PROGRAM MATERIALS AVAILABILITY

This licensed program will be available without source licensed program materials. It will be available with object code.

PROGRAM PRODUCTS

**DOCUMENT INTERCHANGE FACILITY/CENTRAL  
VERSION 1 RELEASE 1 (5668-003)  
DOCUMENT INTERCHANGE FACILITY/DISTRIBUTED  
VERSION 1 RELEASE 1 (5668-004)**

**PURPOSE**

IBM offers a variety of products associated with word and text processing activities. Among these are:

- 8100 Information System with the DOSF/8100 (Distributed Office Support Facility) program product
- 3730 Distributed Office Communication System
- Document Library Facility
- Document Composition Facility (SCRIPT/VS)
- Advanced Text Management System-III (ATMS-III)
- Storage and Information Retrieval System (STAIRS/VS)
- Distributed Office Support System.

Individually, these products provide facilities for the creation, storage, revision and production of a wide variety of documentation items.

**DESCRIPTION**

Acting as a functional link, the Document Interchange Facility allows an enterprise to take advantage of these products within the same installation. Using the communications capabilities of the Customer Information Control System/VS (CICS/OS/VS or CICS/DOS/VS), the Document Interchange Facility/Central executes as a CICS/VS application, invoking the Document Library Facility through a supplied batch program. Documents created on an 8100 System with DOSF or a 3730 Distributed Office Communication System can be stored in a library of the Document Library Facility and formatted using the SCRIPT/VS formatter of the Document Composition Facility. Formatted documents may be printed on a system printer, saved in a library or returned to the DOSF/8100 or 3730 for local printing.

The Document Interchange Facility consists of two complementary program products:

Document Interchange Facility/Central - Operates as a transaction-initiated CICS/VS application in a host computer. It processes user requests from 8100 or 3730 controllers to 'IMPORT' documents to the Document Library Facility, to format documents using the SCRIPT/VS formatter of the Document Composition Facility and to retrieve documents from the Document Library Facility.

Document Interchange Facility/Distributed - Operates in the DOSF/8100 or 3730 controller and provides easy to use panels to prompt for information needed to submit requests to the Document Interchange Facility/Central.

**HIGHLIGHTS**

- Documents are created on the 8100 system with DOSF or the 3730 system using the 3732 Text Display Station.
- Documents may be filed in a library of the Document Library Facility.
- Documents sent to the Document Library Facility may optionally be translated into a form suitable for the SCRIPT/VS formatter of the Document Composition Facility.
- A user-provided translate routine can be used in place of the IBM-supplied routine. For example, a user-provided routine could convert controls to a set of Generalized Markup Language tags.
- Documents formatted by SCRIPT/VS can be directed to a system printer, stored in a library of the Document Library Facility or returned to the DOSF/8100 or 3730 for local printing.
- Advanced SCRIPT/VS functions, such as multiple-column formatting or footnote management, can be used by embedding appropriate SCRIPT/VS Generalized Markup Language tags or control words within the text of the documents created on the DOSF/8100 or 3730.
- Documents may be retrieved from a library of the Document Library Facility by document name (with or without translation) and placed in the appropriate DOSF/8100 or 3730 operator's permanent storage.
- Retrieved documents can be those previously transferred by the Document Interchange Facility to the Document Library Facility or those placed there by other applications.
- A list of documents stored in the Document Library Facility may be obtained for local printing.
- Documents may be deleted by name from a library of the Document Library Facility by any authorized text operator.

An added advantage of having documents filed in a library of the Document Library Facility is accessibility by other text-oriented applications, such as the use of ATMS-III for continual revision and production, user-provided data extraction and search routines, and for repetitive batch printing for quantity output.

**CUSTOMER RESPONSIBILITIES**

The customer must provide the proper operating environment by installing the required operating system, CICS/VS program product, Document Library Facility, DOSF/8100, 8100 or 3730 system, and supporting machine configuration.

Customer personnel must be trained and knowledgeable on the above products, as well as on any other products to be used in conjunction with the Document Interchange Facility.

The customer will develop procedures to insure data security, develop backup procedures, determine the overall tasks to be accomplished and install and operate the Document Interchange Facility. If necessary, the customer may wish to add special translate routines for documents being transferred between the DOSF/8100 or 3730 and the Document Library Facility.

**SPECIFIED OPERATING ENVIRONMENT FOR DOCUMENT INTERCHANGE FACILITY/CENTRAL**

**HARDWARE REQUIREMENTS**

The minimum requirement to execute the Document Interchange Facility/Central is an IBM S/370 mdl 125 or higher or other IBM processor with a main and external storage capacity and peripheral equipment as required for, and supported by, CICS/OS/VS or CICS/DOS/VS. Floating-point hardware is required for the Document Library Facility. A 3704 or 3705 Communications Controller is also required for a 3730 controller attached using telecommunications facilities rather than a channel. With a 4331 processor, the Integrated Communications Adapter may be used in place of a 3704 or 3705.

**SOFTWARE REQUIREMENTS**

The source code language for the Document Interchange Facility/Central is Assembler. It runs under control of CICS/OS/VS (5740-XX1) or CICS/DOS/VS (5746-XX3) Version 1 Release 5 and subsequent releases unless otherwise indicated.

Operation in an OS/VS environment requires OS/VS1 Release 7.0 or OS/VS2 MVS Release 3.8 together with VSAM and JES2 or JES3. A user SVC is supplied for installation in an OS/VS1 environment. Operation in a DOS/VSE environment requires DOS/VSE with VSE/Advanced Functions Release 2 (5746-XE8), VSE/VSAM (5746-AM2) and VSE/POWER (5746-XE3).

In addition, the release of ACF/VTAM Version 1 or ACF/VTAM Version 2 or ACF/VTAME (5746-RC7), as required by CICS/VS Release 1.5, is required. ACF/NCP/VS (5748-XX1) is required for the 3704 or 3705.

The Document Library Facility (5748-XXE) Release 2 is required. If document formatting at the host is to be done by the SCRIPT/VS formatter, the Document Composition Facility (5748-XX9) Release 2 is also required.

**SPECIFIED OPERATING ENVIRONMENT FOR DOCUMENT INTERCHANGE FACILITY/DISTRIBUTED**

**HARDWARE REQUIREMENTS**

- One IBM 8100 Information System as required to support the DOSF/8100 program product, and at least one IBM 3732 Text Display Station with keyboard, and at least one IBM 3736 Printer, -or-
- One IBM 3730 Distributed Office Communication System with Configuration Support #9171 and feature codes #9275 and #9285 with at least one IBM 3732 Text Display Station with keyboard and at least one print device which can be an IBM 3736 Printer or the IBM 3791 Line Printer Feature. The host attachment is by either the IBM 3791 Local Channel Attachment Feature (#1515) to a byte or block multiplexer channel or the IBM 3791 SDLC Communications Feature (#6301, 6302, or 6303) to an IBM 3704 or 3705 Communications Controller or a 4331 processor Integrated Communications Adapter.

**SOFTWARE REQUIREMENTS**

Document Interchange Facility/Distributed is written in IBM 3790 and IBM 3730 programming statements. If executed on an IBM 8100, the DOSF/8100 (5761-XR1) program product is required. The Program Validation Services (PVS) Release 11 or later, and Subsystem Support Services (SSS) programming support must be available.

**DATA SECURITY**

Control of access to Document Interchange Facility/Central is provided by CICS/VS. Authorized users of the DOSF/8100 or 3730 will have access to Document Interchange Facility/Distributed. Document security is provided by using those facilities already available in the Document Library Facility, the DOSF/8100 program product and the 3730. Access to libraries, or to the documents stored therein, may be protected by passwords. Documents stored in DOSF/8100 or 3730



PROGRAM PRODUCTS

**Document Interchange Facility (cont'd)**

permanent storage may also be protected by get and/or delete codes. Customer management is responsible for the implementation, application and adequacy of these controls.

In MVS, the Resource Access Control Facility (RACF) program product (5740-XXH) can be utilized to control authorized access to the libraries of the Document Library Facility, as well as to control access to CICS/VS transactions and address space.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Document Interchange Facility: General Information Manual (GH20-2440) ... Document Library Facility: General Information Manual (GH20-9158) ... Program Summary (GH20-9176) ... Document Composition Facility: General Information Manual (GH20-9158) ... Program Summary (GH20-9175) ... DOSF/8100: General Information Manual (GC27-0546) ... 3730 Distributed Office Communication System: System Description (GA33-3022) ... Advanced Text Management System-III: General Information Manual (GH20-2404) ... STAIRS/VS: General Information Manual (GH12-5115) ... Distributed Office Support System: General Information Manual (GH12-5124)*

RPQs ACCEPTED: No

MVS SYSTEM INTEGRITY APPLIES: Yes

PROGRAM PRODUCTS

**DOWNSTREAM LOAD UTILITY  
RELEASE 1 (5668-006)**

**PURPOSE**

The Downstream Load Utility program product provides the function needed to load data into the 3644 Automatic Data Unit and/or the 8775 Display Terminal and/or equivalent devices such as the 7426 Terminal Interface Unit. The 3644 and the 8775 mdls 1 and 2 can be attached to the 4331 processor via the Loop Adapter Feature. The 8775 mdls 11 and 12 can be attached to the 4331 processor via the Communication Adapter (Feature #1601) or to the 4300 and S/370 processors via the 3704 or 3705 Communications Controller.

These devices require transmission of load data from the processor for the 3644 Automatic Data Unit (not supported by OS/VS1, MVS/370 or MVS/XA) and the downstream loadable function microcode for Enhanced Function, Enhanced Function with Magnetics or Multiple Partitions and Scrolling for the 8775 Display Terminal. They also require a mechanism to install distributed load data in system libraries. Downstream Load Utility supports both the receipt of load data for inclusion into the system or private library, and the transfer of the data to the device via ACF/VTAME with VSE, or via ACF/VTAM Version 1 Release 3 with OS/VS1 or ACF/VTAM Version 2 (VSE, OS/VS1, MVS/370 or MVS/XA) on demand. The use of existing system libraries, procedures and services allows the user to manage his configuration and application in a familiar fashion.

**HIGHLIGHTS**

Downstream Load Utility provides for the following functions to support the load requirements for the 3644 and IBM 8775:

- Two types of load data will be applied by Downstream Load Utility to the system libraries prior to its transmission to the device.
  - Distributed control storage load for the CSL Load (3644) and Enhanced Function Load (8775).
  - User defined data (3644 only) for the PTL load.
- 3644 Control Storage Load (CSL): The purpose of CSL is to provide the 3644 with its required Control Storage microcode. The loading takes place automatically upon unit power-on or after a power line disturbance (PLD).
- 3644 Parameter Table Load (PTL): The purpose of PTL is to provide the 3644 with user defined operational characteristics. After a successful CSL load the 3644 contains a default PTL and is operational. A user-generated PTL is constructed by the 3644 Parameter Table Generation Facility based upon user defined inputs and is required to personalize the 3644.
- 8775 Microcode Load: The 8775 requests the load of the downstream loadable microcode as part of its power on sequence. The load if required occurs at physical unit activation (for example, shortly after power on) of the 8775 display.
- Load Data Distribution: Both 3644 CSL and 8775 downstream loadable microcode are distributed in DTR format. 3644 PTL is created at the host processor through user defined input to the 3644 Parameter Table Generation Facility.

**CUSTOMER RESPONSIBILITIES**

Downstream Load Utility requires the VSE/Advanced Functions or OS/VS1, MVS/370 or MVS/XA release most current at the time of first customer shipment of Downstream Load Utility, and ACF/VTAME or ACF/VTAM as shown in the DSLU Support Summary Table under "Software Requirements". At least one tape unit must be available for program distribution and maintenance. Any system-supported tapes or DASD may be used with Downstream Load Utility. Sufficient I/O devices must be available to support the requirements for system input, system output, system residence and system data sets.

DASD space required for the program product is less than two cylinders of 3340 space in both the core image library and the source statement library. Additional DASD space is required in the program libraries for both IBM distributed device microcode and "Parameter Table Load" data from the IBM 3644 Parameter Table Generation Facility program (GEN3644).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Downstream Load Utility operates on the IBM 4300 or S/370 processors with either of the following:

- The IBM Loop Adapter feature (4331/21) to support the load requirements of:
  - The IBM 3644 Automatic Data Unit.
  - The IBM 8775 Display Terminal mdls 1 and 2, with the downstream loadable functions.

The IBM 3644 and the IBM 8775, mdls 1 and 2, attach either via the directly attached loop or via the data link attached loop to the IBM 4331 Processor.

- The Communication Adapter (feature #1601) (4331/21) or
- The IBM 3705 Communication Controller (4300 or S/370) to support the load requirements of the IBM 8775 mdls 11 and 12 with downstream loadable functions.
- At least one tape unit supported by VSE/Advanced Functions.
- Sufficient DASD space.

**SOFTWARE REQUIREMENTS**

DSLU requires:

- Either the VSE/Advanced Functions release most current at the time of first customer shipment of DSLU and ACF/VTAME, upgraded by a PTF to support DSLU, or ACF/VTAM Version 2.
- Or the OS/VS1 release most current at the time of first customer shipment of DSLU and ACF/VTAM Version 1 Release 3 or ACF/VTAM Version 2.

For the IBM 3644, the program product IBM 3644 Parameter Table Generation Facility (GEN 3644), 5668-998, is required.

**DOCUMENTATION**

(available from Mechanicsburg)

*Downstream Load Utility Installation Guide and Reference (SC33-6127) ... DSLU Program Summary (GC33-6125) ... DSLU Licensed Program Specifications (GC33-6126) ... DSLU Diagnose Reference (LY33-9099).*

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## PROGRAM PRODUCTS

**COMMUNICATION ORIENTED MESSAGE SYSTEM  
OS/VS (CORMES) REL.1.0  
5668-007****PURPOSE**

The Communication Oriented Message System OS/VS (CORMES) is designed to build the central "paperless" message exchange system in an organization connecting terminal users and application programs of different functions. It provides communication links:

- For the exchange of information between terminal users (action messages).
- For the interaction between application programs and terminal users (action messages).
- For triggering the execution of online application programs based on the occurrence of prespecified events (trigger messages).

CORMES operates under the Operating Systems OS/VS1 Release 6.7/7.0 and OS/VS2 MVS Release 3.7 (collectively referred to as OS/VS) or subsequent releases unless otherwise identified.

For data base management, the system uses the data base facilities of the Information Management System/Virtual Storage (IMS/VS) Version 1, Program Number 5740-XX2, Release 1.5 or subsequent releases unless otherwise identified.

For data communication, CORMES uses the facilities of the S/370 Customer Information Control System/Virtual Storage (CICS/VS) Version 1, Program Number 5740-XX1, Release 4 or subsequent releases unless otherwise identified.

**HIGHLIGHTS****Terminal User Services**

- Easy-to-use terminal functions to create, display, modify and distribute action messages.
- Routing of action messages from one user to another.
- Linkage to online application programs to process a user-selected action message.

**Application Program Services:**

- User macros to simplify the creation of action and trigger messages in user-written programs and their transfer to the central message file.
- Triggering of online application program execution according to prespecified events: A point in time, a time interval, a queue length or a combination of these.
- CORMES as a framework for the implementation of interactive application programs.

**System Services**

- Monitoring of the individual message queue of each terminal user by due date or by the number of received messages.

**CUSTOMER RESPONSIBILITIES**

This section briefly discusses the activities the user has to perform to make CORMES operational. It gives a rough guide for assessing the total installation effort. The assumption is that a system running under OS/VS with IMS/VS and CICS/VS has already been installed.

The installation procedure allows an easy installation of CORMES, including the sample, by use of object code facility. The distributed source code will be used for the final adaptation to the existing system environment, if necessary.

The major implementation steps are:

- Installation of CORMES according to the distribution tape and installation description.
- Execution of the supplied sample to verify the installation. This sample can also be used as a tool for training terminal users.
- Optionally, assembly of all CORMES online programs to include customer requirements.
- Modification and reassembly of existing programs for CORMES communication (according to the rules defined by CORMES) by use of macros and examples provided.
- Exchange of the sample data sets and tables by data sets and tables that describe the customer system.

The required changes within existing user programs have been reduced to a minimum. In addition, macros are provided to simplify the program interactions. Support is provided for Assembler, PL/I and COBOL programs.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

For compilation and/or execution of CORMES, an IBM S/370, a 3031, 3032 or 3033 Processor or a 4300 Processor (OS/VS1 only) with a main storage capacity large enough to run IMS/VS and CICS/VS is required.

For CORMES, additional storage is required: For the first terminal 16,500 bytes and for each additional terminal 3,000 bytes; for the first application program 11,800 bytes and for each additional program 1,200 bytes.

For the data bases and data sets, the same devices are used as supported by the basic software of OS/VS, CICS/VS, and IMS/VS.

One magnetic tape device is required for the installation.

At least one 1920-character or larger 3270 Display Station, attached to the appropriate control unit, must be available.

The online address space requirements for CORMES may vary widely, according to the number of active terminals. A minimum installation might require address space for a combined CICS/VS and IMS/VS user-task partition.

**SOFTWARE REQUIREMENTS**

CORMES is written in Assembler language and uses the macro language facility. Application programs that interact with CORMES can also be written in command-level languages.

CORMES is designed for an online OS/VS environment and requires the following programs:

- OS/VS1 Release 6.7/7.0 or OS/VS2 MVS Release 3.7
- CICS/VS Version 1, Program Number 5740-XX1, Release 4
- IMS/VS Version 1, Program Number 5740-XX2, Release 1.5

Subsequent releases of the above are also supported unless otherwise provided by IBM.

**DOCUMENTATION:** (available from Mechanicsburg)

Title	Order Number
Licensed Program Design Objectives	GH12-5053
General Information Manual	GH12-5127

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## PROGRAM PRODUCTS

**SYSTEM PRODUCTIVITY FACILITY  
SPF (5668-009)**

No longer available, effective September 30, 1982.

**PURPOSE**

The System Productivity Facility (SPF) is a program product which assists in program development. SPF is designed to take advantage of the characteristics of IBM 3270 display terminals and increases productivity in an interactive environment for users of both structured and conventional programming techniques.

The System Productivity Facility replaces the Structured Programming Facility program products (5740-XT8, 5748-XT3). The name has been changed to reflect the expansion of the product capabilities beyond structured programming. SPF includes significant new functions that simplify the development of interactive applications. New services are provided to display predefined screen images, build and maintain permanent tables of user information and generate output files for job submittal or other processing.

**HIGHLIGHTS**

- SPF consists of a comprehensive set of dialog management services and the program development facility.
- The dialog manager includes a new panel display service with enhanced function and improved usability over the previous Structured Programming Facility display capability.
- New functions added to SPF will simplify the development of interactive applications. These applications can execute in online environments. These SPF services provide the ability to:
  - Define and control symbolic variables.
  - Display predefined screen images and messages.
  - Build and maintain permanent tables of user information.
  - Generate output files for job submittal or other processing.
  - Interface to edit and browse, and log hardcopy output.
- Conversion utilities are provided in the program development facility to convert old format selection menus, tutorials and messages to the new panel and message formats.
- SPF consists of two major components: The dialog manager and the program development facility. The dialog manager provides control and services for running interactive applications.
- The dialog manager allows totally new applications to be developed, each with its own primary option menu. Applications may be independent, entered via separate command procedures or linked via menu options that transfer from one application to another.
- The SPF dialog manager provides control facilities to:
  - Traverse a hierarchy of selection menus and invoke the appropriate dialog functions.
  - Transfer in and out of the tutorial and control the sequence of tutorial pages based on user inputs.
  - Manage the physical display image in single screen or split screen mode.
  - Interpret program function (PF) key usage for system defined functions.
- Online tutorial can be entered in either of two ways:
  - As a selectable option from a menu or
  - Indirectly from any non-tutorial panel when the user presses the 'Help' PF key.
- Advantages of the new panel and message formats include:
  - Communication of user inputs (from panels) and substitution of parameters (in messages) via symbolic variables rather than positional calling sequence parameters.
  - Ability to verify user inputs in panel definitions.
  - Ability to test and set variables in panel definitions.
  - Improved control over field attributes, including specification of padding characters and justification.
  - Replacement of LIST/RETURN keywords with TRANS keyword in which the source and translated values are paired.
  - Simplification of selection menu and tutorial panel formats.
- The significant program development facilities include:
  - Support for multi-level programming libraries. Facilities maintenance and tracking of program segments under development at varying version and modification levels.
  - Full screen, context editing. Allows additions and changes to multiple lines in a single interaction. Simple one-character edit

commands are used for inserting, deleting, duplicating or rearranging lines of source data.

- Forward, backward and sideways scrolling of source data or listings, plus the ability to locate information by character string or line number.
- Interface to utilities for specification and maintenance of libraries, files and data sets.
- Interface to standard language processors for execution in the foreground or batch.
- Document preparation support, including text editing features and a menu interface to the SCRIPT/VS Document Composition Facility.
- Online tutorial for instruction and reference which is especially valuable for the occasional or novice user.
- The program development facility supports both structured and conventional programming techniques. Features which are especially oriented toward structured programming include:
  - Ease of segmentation changes. One segment (member) can easily be split into multiple segments or multiple segments can be merged into one.
  - Ease of indentation changes. Single statements or blocks of statements can easily be shifted left or right by a specified number of column positions.
  - Insert in context. A 'DO-END' pair, for example, may be coded on two consecutive lines and then space can be opened between the two lines to allow insertion of a block of code.
  - Visual verification aids. A block of code may be temporarily excluded from display so that the space which it occupies on the screen is closed up. This facilitates visual verification of the control structure, particularly when the length of a segment exceeds the screen size.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The System Productivity Facility is designed to operate on the following IBM machines: 303X, 4300 and S/370.

**MVS**

The machine requirements are the same as those for MVS with the Time Sharing Option (TSO).

Approximately 512K bytes of the pageable link pack area (PLPA) are required for SPF program occupancy. The virtual storage requirements for each user's region will vary depending upon the application being executed, the size of tables and data sets and the use of "split-screen". The minimum region size is 512K bytes, but a larger region (at least 1024K bytes) is recommended.

Approximately 20 cylinders of direct access storage are required for the panel, message and skeleton libraries distributed with SPF. This number assumes IBM 3330 disk storage. An equivalent amount of space is required for other types of devices.

**VM**

The machine requirements are the same as those for VM/370 with the Conversational Monitor System (CMS).

Approximately 512K bytes (8 segments) of a discontinuous shared segment (DCSS) area are required for SPF program occupancy. The virtual storage requirements for each user's virtual machine will vary depending upon the application being executed, the size of tables and files and the use of "split-screen". The minimum virtual machine size is 512K bytes, but a larger virtual machine (at least 1024K bytes) is recommended.

Approximately 20 cylinders of direct access storage are required for the panel, message and skeleton libraries and EXECs distributed with SPF. This number assumes IBM 3330 disk storage. An equivalent amount of space is required for other types of devices.

Execution of SPF also requires a disconnected virtual machine which communicates with each user's machine via the VM Communication Facility (VMCF).

**TERMINALS****MVS**

SPF requires an IBM 3270 type display terminal with at least 24 lines and 12 PF Keys.

SPF supports the following IBM display stations:

3275 mdls 2 and 12  
3276 mdls 2, 3, 4, 12, 13 and 14

PROGRAM PRODUCTS

SPF (cont'd)

- 3277 mdl 2 (local or remote attachment)
- 3278 mdls 2, 3, 4 and 5 (local or remote attachment)
- 3279 All mdls (local or remote attachment), when operated in 4-color compatibility mode

The following IBM keyboards are supported:

For 3275 or 3277 Display Stations:

- 78-Key Operator Console (feature #4632)
- 78-Key EBCDIC Typewriter (feature #4633)
- 78-Key ASCII Typewriter (feature #4635)
- 78-Key EBCDIC Typewriter/APL (feature #4638), when operated with APL switch off.

For 3276, 3278 or 3279 Display Stations:

- 75-Key EBCDIC Typewriter (feature #4621)
- 75-Key ASCII Typewriter (feature #4624)
- 87-Key EBCDIC Typewriter (feature #4627)
- 87-Key ASCII Typewriter (feature #4628)
- 87-Key EBCDIC Typewriter/APL (feature #4626), when operated with APL switch off.
- 87-Key EBCDIC Typewriter/Text (feature #4629), when operated with TEXT switch off.

The standard character set (94 graphics plus blank and null) is supported on 3276, 3278 and 3279 Display Stations.

The following are supported, but not required:

- Audible alarm (feature #1090)
- IBM 3268, 3284, 3286, 3287, 3288 and 3289 printers
- 3277 dual-case character set (RPO #8K0366)

Installation of the audible alarm feature is strongly recommended to enhance usability. The alarm is sounded whenever a warning or error message is displayed.

The IBM 3268, 3284, 3286, 3287, 3288 and 3289 printers, if used, are supported via the "DSPRINT" TSO command processor, which must be installed if output is directed to one of these printers.

VM

SPF requires an IBM 3270 type display terminal with at least 24 lines and 12 PF Keys.

SPF supports the following IBM display stations:

- 3275 mdl 2
- 3275 mdl 12 (via VM/VCNA)
- 3276 mdls 2, 3, and 4
- 3276 mdls 12, 13 and 14 (via VM/VCNA)
- 3277 mdl 2 (local or remote attachment)
- 3278 mdls 2, 3, 4 and 5 (local or remote attachment)
- 3279 All mdls (local or remote attachment), when operated in 4-color compatibility mode

The following keyboards are supported:

For 3275 or 3277 Display Stations:

- 78-Key Operator Console (feature #4632)
- 78-Key EBCDIC Typewriter (feature #4633)
- 78-Key EBCDIC Typewriter/APL (feature #4638), when operated with APL switch off.

For 3276, 3278 or 3279 Display Stations:

- 75-Key EBCDIC Typewriter (feature #4621)
- 87-Key EBCDIC Typewriter (feature #4627)
- 87-Key EBCDIC Typewriter/APL (feature #4626), when operated with APL switch off.
- 87-Key EBCDIC Typewriter/Text (feature #4629), when operated with TEXT switch off.

The standard character set (94 graphics plus blank and null) is supported on 3276 and 3278 Display Stations.

The following are supported, but not required:

- Audible alarm (feature #1090)
- 3277 dual-case character set (RPO #8K0366)

Installation of the audible alarm feature is strongly recommended to enhance usability. The alarm is sounded whenever a warning or error message is displayed.

SOFTWARE REQUIREMENTS

The System Productivity Facility is designed for use on the OS/VS2 (MVS) operating system with TSO environment, and on the VM/370 operating system with CMS and VM/SP. The program operates with the current releases of MVS and the VM operating systems.

MVS

SPF operates as a TSO command processor under the Time Sharing Option of VS2 Release 3.8 (MVS). The BPAM and BSAM access methods are required by SPF for reading and writing data sets, and TSO/TCAM or TSO/VTAM are required for terminal communication.

The following teleprocessing access methods are supported:

- TCAM 10 (available with MVS)
- ACF/TCAM Version 2, Releases 2 and 3 5735-RC3
- VTAM 2 (available with MVS)
- ACF/VTAM Version 1 Releases 2 and 3 5735-RC2
- ACF/VTAM Version 2 5665-280

The SPF program development facility provides interfaces to the following IBM processing programs for foreground and background execution:

- VS2 Assembler (available with MVS)
- TSO Assembler Prompter (foreground only) 5734-CP2
- COBOL Compiler and Library 5740-CB1
- TSO COBOL Prompter (foreground only) 5734-CP1
- COBOL Interface Debug (foreground only) 5734-CB4
- FORTRAN IV G1 Compiler 5734-FO2
- TSO FORTRAN Prompter (foreground only) 5734-CP3
- FORTRAN Interactive Debug (foreground only) 5734-FO5
- PL/I Checkout Compiler 5734-PL2
- PL/I Optimizing Compiler 5734-PL1
- PASCAL Compiler 5796-PNQ
- Linkage Editor (available with MVS)

The appropriate processing programs and TSO prompters must be installed to use the foreground and background options.

An interface to SCRIPT/VS is also provided to allow formatting, display and printing of text maintained in SPF libraries or other data sets. Use of this feature requires installation of the following IBM program product:

- Document Composition Facility (SCRIPT/VS) with the Foreground Environment Feature 5748-XX9

Internal interfaces are provided to the following IBM programs. These programs are not required to operate SPF. However, if an IBM 3268, 3284, 3286, 3287, 3288 or 3289 printer is used for SPF output, the appropriate DSPRINT command processor must be installed on the system.

- OS/VS2 MVS 3270 Extended Display Support - Session Manager, Release 2 5740-XE2
- TSO/TCAM Command Processor "DSPRINT" 5798-AYF
- TSO/VTAM Data Set Print (DSPRINT) 5798-CPF
- TSO/VS2 Programming Control Facility (PCF) 5798-BBJ
- TSO Programming Control Facility - II (PCF2) 5798-CLW

All the program-numbered products listed above can be ordered separately under IBM licensing agreements.

VM

SPF operates as a CMS command under VM/370 Release 6. It uses the VM Communication Facility for inter-machine communication and uses the full-screen display support of the following program product which must be installed:

- VM/System Product (VM/SP) 5664-167

If SPF is to be used with SNA 3270 Displays, the following program product must be installed:

- VM/VCNA 5735-RC5

VM/VCNA requires a VS1/BPE guest system with ACF/VTAM or a VSE system with VTAME or ACF/VTAM.

The SPF program development facility provides interfaces to the following IBM processing programs for foreground and batch execution:

- VM/370 Assembler (available with VM)
- COBOL Compiler and Library 5740-CB1
- COBOL Interactive Debug (foreground only) 5734-CB4
- FORTRAN IV G1 Compiler 5734-FO2
- FORTRAN Interactive Debug (foreground only) 5734-FO5
- PL/I Checkout Compiler 5734-PL2
- PL/I Optimizing Compiler 5734-PL1
- PASCAL Compiler 5796-PNQ

The appropriate processing programs must be installed to use the foreground and batch options.

An interface to SCRIPT/VS is also provided to allow formatting, display and printing of text maintained in SPF libraries or CMS files. Use of this feature requires installation of the following IBM program product:

PROGRAM PRODUCTS

**SPF (cont'd)**

Document Composition Facility  
(SCRIPT/VS) with the  
Foreground Environment Feature 5748-XX9

Guide	SC34-2036	SC43-2049
Licensed Program		
Specifications	SC34-2035	GC34-2050
Program Logic Manual	LY25-0006	LY25-0010

Internal interfaces are provided to the following IBM program. This program is not required to operate SPF, but must be installed if spool output is to be sent to another node on the network.

RSCS Networking 5748-XP1

All the program-numbered products listed above can be ordered separately under IBM licensing agreements.

**COMPATIBILITY**

All existing function in the Structured Programming Facility TSO (5740-XT8) and CMS (5748-XT3) will be carried forward in SPF.

**INSTALLATION RESPONSIBILITIES**

**MVS**

The installation of SPF requires a properly configured IBM S/370 or 303X, appropriate terminals and other required devices and MVS with the Time Sharing Option (TSO). Also, appropriate processing programs and TSO prompters must be installed to use the SPF foreground and background options, and the Document Composition Facility must be installed to use the SCRIPT/VS utility.

To install SPF, operations personnel must be knowledgeable in OS/VS JCL, TSO and the System Modification Program (SMP). Installation procedures are described in the *SPF Installation and Customization Guide*.

If SPF is to be used with TSO/TCAM, a TCAM MCP generation is required to obtain full-screen support in the TSO/TCAM environment. This MCP generation is required to eliminate interference between the full screen I/O operations used by SPF and the line-oriented I/O operations used by TSO. No other changes are required to TSO or TCAM.

A dialog developer must be familiar with MVS, TSO and appropriate programming languages, and should review the *SPF Dialog Development Guide*. A user of the SPF Program Development Facility must be familiar with MVS and TSO, and should review the *SPF Program Reference Manual*.

Special SPF training or courses are not required for programming personnel familiar with the IBM 3270, the programming and machine systems and the language processors in use.

**VM**

The installation of SPF requires a properly configured IBM S/370, 303X or 4300 processor, appropriate terminals and other required devices and VM/370 with the Conversational Monitor System (CMS) and the VM/SP program product. Also, appropriate processing programs must be installed to use the SPF foreground and batch functions, and the Document Composition Facility must be installed to use the SCRIPT/VS utility.

To install SPF, operations personnel must be knowledgeable in VM/CMS and the computer system. Installation procedures are described in the *SPF Installation and Customization Guide*.

A dialog developer must be familiar with VM/CMS and appropriate programming languages, and should review the *SPF Program Development Guide*. A user of the SPF Program Development Facility must be familiar with VM/CMS and should review the *SPF Program Reference Manual*.

Special SPF training or courses are not required for programming personnel familiar with the IBM 3270, the programming and machine systems and the language processors in use.

**DATA SECURITY**

SPF runs in the environments produced by TSO in MVS and by CMS in VM/370 and is subject to the controls provided by these environments. SPF runs as a TSO Command Processor with or without the Resource Access Control Facility (RACF). SPF also provides an interface to the standard MVS TSO Password Protection mechanism. Customer management is responsible for the selection, implementation and adequacy of these facilities.

**DOCUMENTATION** (available from Mechanicsburg)

**At Announcement:**

General Information Manual for SPF-MVS	GC34-2039
General Information Manual for SPF-VM	GC34-2046

**At FCS:**

	MVS	VM
Program Reference Manual	SC34-2038	SC34-2047
Installation and Customization Guide	SC34-2037	SC43-2048
Dialog Development		



## PROGRAM PRODUCTS

**INTERACTIVE INSTRUCTIONAL  
AUTHORING SYSTEM  
5668-011****PURPOSE**

The Interactive Instructional Authoring System is an IBM Program Product that provides the capability to create (author) and maintain computer based training courses. These courses will run under Interactive Instructional Presentation System (5668-012), a companion product which is a prerequisite.

**DESCRIPTION**

For the course author, three methods of creating course materials are available:

- Course Structuring Facility
- Simulation Exercise Facility
- Coursewriter Language

The Course Structuring Facility provides simplified course development and course organization facilities for both the new and the experienced author.

Specific fill-in-the-blanks worksheets allow for entering, analyzing, and structuring the following:

- TEXT - Tutorial information.
- QUESTIONS - True/false, matching, multiple choice, single or multiple constructed answers.
- SCREEN FORMATS - Enables author to use special terminal screen displays to simulate other terminal applications as part of a training course.

The Simulation Exercise Facility provides a means of creating a series of computer based training exercises which students can access through topic menus. Facilities to simulate online applications are included.

Using the Coursewriter language, the author is free to decide on the instructional strategies to be implemented. Language codes allow the author to enter lines of text, ask questions, evaluate responses, and provide remedial text for incorrect student responses. Experienced authors may write their own macros (frequently used course statements in skeletal form).

The system also includes commands for author use in storing, moving, and deleting course material as well as inserting new material into already existing text.

The entry of course material can be accomplished in either batch processing mode or at the terminal, interactively.

Computer Based Training courses on advanced authoring support facilities are provided as a part of the Authoring System.

An interactive method of creating full screen formats for subsequent use in courses is provided.

**CUSTOMER RESPONSIBILITIES**

Before installation of the Interactive Instructional Authoring System the customer must install the prerequisite product, Interactive Instructional Presentation System (5668-012). Then the customer must install Interactive Instructional Authoring System and:

- Register authors and courses for development as required.
- Administer course creation and maintenance.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Interactive Instructional Authoring System is designed to operate on all processors capable of supporting the prerequisite product - Interactive Instructional Presentation System (5668-012). Machine requirements vary depending on operating environment. The Interactive Instructional Authoring System requires a properly configured IBM S/370, 303X or 4300 processor. Storage requirements given below are estimates for planning purposes. (Note, K = 1024).

**VTAM, TCAM**

The versions of the Interactive Instructional Authoring System that support the VTAM and TCAM environments will be pre-generated for each environment. The pre-generated version will utilize 456K bytes of virtual storage for VS1 and VS2, in addition to the storage requirements of the host system, and will include provision for:

20 Course Files  
200 Courses  
7 WorkFiles  
100 Users

These parameters can be changed by the customer at execution time through the use of control cards. Working storage (real storage) for the default system with all 100 users on the system simultaneously (assuming 85% of the users are students) is estimated to be less than 200K bytes in addition to that required by the teleprocessing access

method and other components of the host system. Utilization of system resources, and therefore working storage, will increase as the number of active authors increases.

**IMS/VS, CICS/VS, TSO, CMS**

The Interactive Instructional Authoring System under IMS/VS, TSO or CMS will require the following S/370 virtual storage for the duration of each transaction:

280K Administrator  
280K Author  
280K Student

Under CICS/VS, a shared program storage area of 260K bytes is required. Each transaction requires an additional 20K bytes for the duration of that transaction.

**Input/Output Devices:** Sufficient direct access storage must be provided to satisfy the requirements of the online data sets. This will be approximately 35 cylinders of 3330 space for all host environments except IMS/VS. Approximately 60 cylinders of 3330 space are required under IMS/VS. Additional space for course materials will be required.

Approximately 45 cylinders of 3330 DASD space will be required for the storage of courses delivered with the Interactive Instructional Authoring System.

DOS based installations of this product do not support 23XX DASD.

**Distribution and Maintenance:** Installation and maintenance of the instructional system requires the availability of one tape drive.

**Terminals Supported:** The Interactive Instructional Authoring System provides support for IBM 3277, IBM 3275, IBM 3276, IBM 3278 and IBM 3279 terminals. Screen sizes of 24x80, 32x80 and 43x80 are supported in those environments supporting and identifying the appropriate models. Typewriter, data entry, APL and text keyboards are supported in those environments that permit identification of the keyboard type. SDLC, BSC and local IBM protocols are supported as permitted by each environment. Support for IBM 3279 terminals is for IBM 3278 functions. Color support is provided only via the 4-color default mode of the 3279. Support for IBM 3278 mdl 5 is in default mode (24x80). Programmable Symbol Set is not supported.

The Interactive Instructional Authoring System provides support for non-3270 type terminals only in line-at-a-time mode. The IBM 2741 mdl 1 is supported in those environments with appropriate support. CPT-TWX (mdl 33/35) Line Control Type is supported in those environments with appropriate support.

It is the user responsibility to assure the equivalence at the software interface of other terminals as well as the suitability of non-hardcopy terminals using hardcopy interfaces.

Since update transactions are employed under IMS, non-checking terminals are not supported.

**SOFTWARE REQUIREMENTS**

The Interactive Instructional Presentation System, a prerequisite product, runs in a variety of teleprocessing environments. That product in turn provides the operating environment for Interactive Instructional Authoring System. See the pages for Interactive Instructional Presentation System for a description of appropriate operating environments.

**COMPATIBILITY**

Courses running under the predecessor product, Interactive Instructional System (5748-XX6), will run without change.

Users planning simultaneous operation of this product and its predecessor should carefully review the pertinent operations guides for information on special installation and operational restrictions when using this mode of operation.

Courses using 3270 dynamic formatting operation codes are not supported by the instructional system in the IMS/VS environment.

**PERFORMANCE CONSIDERATIONS**

The performance of the instructional system in a virtual storage environment is dependent on the system resources available, the programs that operate concurrently and their relative priorities, system and application data set placement, and system timing. Performance also depends on the paging characteristics and storage reference patterns of the system and its courses, the allocation of data sets to particular devices, and the particular data being processed.

For specific online performance and response time requirements, attention must be given to ensuring that adequate real resources (main storage, processor computing capability, channels, direct access devices, etc.) are available. To verify specific performance (particularly on systems with a large number of concurrent terminal users), benchmarking the instructional system should be planned.

## PROGRAM PRODUCTS

**Interactive Instructional Authoring System (cont'd)**

Courses that utilize 3270 native mode facilities (light-pen, PF keys, field definitions, etc.) will not operate under CMS unless necessary extensions to diagnose code 58 function have been added to the VM/370 system.

The necessary extensions are available in each of the following programs:

- VM/System Extensions Program Product, 5748-XE1
- VM/Basic Systems Extensions Program Product, 5748-XX8
- VM/System Product, 5664-167

**DOCUMENTATION:** (available from Mechanicsburg)

The following IBM publications provide further information regarding the characteristics of the Interactive Instructional Presentation System and its companion product, the Interactive Instructional Authoring System:

Interactive Instructional Presentation System Interactive Instructional Authoring System General Information Manual	GH20-2446
Interactive Instructional Presentation System Interactive Instructional Authoring System Administrator's Guide	SH20-2449
Interactive Instructional Authoring System Course Authoring Guide	SH20-2450
Interactive Instructional Authoring System Simulation/Exercise Facility Authoring Guide	SH20-2451
Interactive Instructional Presentation System Interactive Instructional Authoring System (VM/370-CMS): Operations Guide	SH20-2459
Interactive Instructional Presentation System Interactive Instructional Authoring System (OS/VS-TSO): Operations Guide	SH20-2454
Interactive Instructional Presentation System Interactive Instructional Authoring System (OS/VS-CICS): Operations Guide	SH20-2452
Interactive Instructional Presentation System Interactive Instructional Authoring System (DOS/VS-CICS): Operations Guide	SH20-2456
Interactive Instructional Presentation System Interactive Instructional Authoring System (OS/VS-VTAM): Operations Guide	SH20-2455
Interactive Instructional Presentation System Interactive Instructional Authoring System (DOS/VS-VTAM): Operations Guide	SH20-2457
Interactive Instructional Presentation System Interactive Instructional Authoring System (OS/VS-TCAM): Operations Guide	SH20-2453
Interactive Instructional Presentation System Interactive Instructional Authoring System (IMS/VS): Operations Guide	SH20-2458
Interactive Instructional Presentation System Logic Manual	LY20-2506
Interactive Instructional Presentation System Interactive Instructional Authoring System Logic Manual	LY20-2507
Interactive Instructional Authoring System Basic Author Training for the Course Structuring Facility Student Materials	GH20-2447
Interactive Instructional Authoring System Extended Author Training for the Course Structuring Facility Student Materials	GH20-2448

RPQs ACCEPTED: No

**PROGRAM PRODUCTS**
**INTERACTIVE INSTRUCTIONAL PRESENTATION  
 SYSTEM  
 5668-012**
**DESCRIPTION**

The Interactive Instructional Presentation System is an IBM Program Product that provides terminal based training and instructional capability by utilizing available IBM Data Base/Data Communication Systems (IMS/VS and CICS/VS), Interactive Systems (CMS and TSO), and Terminal Access Methods (VTAM and TCAM). No modification is necessary to the programs of the host system. Interactive Instructional Presentation System (5668-012) is a prerequisite for its companion product, Interactive Instructional Authoring System (5668-011) which is used to create course material for delivery under Interactive Instructional Presentation System.

The Interactive Instructional Presentation System provides an environment in which users can maintain, administer and deliver instructional materials via an online training system. They can use their existing data processing equipment and teleprocessing terminal network for training or instructional applications while at the same time running other programs.

Interactive Instructional Presentation System is a follow-on product to Interactive Instructional System (5748-XX6) and is compatible at the language level with that product (see "Compatibility" section). Courses developed under Interactive Instructional System will run without change under Interactive Instructional Presentation System.

Through the use of specific terminal commands, an administrator can view the record(s) of a particular student, a group of students or all students as they relate to course registrations, performance in a course and course completions.

Depending on the options specified during student registration, printed reports may be obtained to aid authors in improving their courses during and after the course validation cycle.

Students can use any terminal identified for the Interactive Instructional Presentation System; however, they can only take the course(s) for which they are registered. The students' progress through the course is based on their keyed responses and the logic flow of the course as determined by the course author.

Student commands allow the student to:

- Ask for optional help or hint statements which the author may have included in the course.
- Move around the course at will, provided the author agrees with this approach and has supplied the proper keywords to enter.
- Access a glossary for definitions of important words.
- Page backward or forward through previously presented material.
- Send comments directly to the author.

Additional commands permit maintenance of the courses at the Coursewriter language level.

**CUSTOMER RESPONSIBILITIES**

Before installation of the Interactive Instructional Presentation System, the customer must meet the "Hardware Requirements" as specified in this document and ensure that the host telecommunications system is fully operational.

Then, the Interactive Instructional Presentation System must be installed and the customer must:

- Register courses and students as required.
- Load the course materials into the system, and
- Administer course offerings and schedules.

Course materials may be purchased or authored by the customer.

**Note:** Customer authoring of course materials requires the availability of the companion product "Interactive Instructional Authoring System" (5668-011) on the processor(s) used for authoring.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

The Interactive Instructional Presentation System is designed to operate on all sufficiently configured IBM Virtual Storage processors capable of supporting the host environments depicted in Figure 1. Machine requirements vary depending on operating environment. The Interactive Instructional Presentation System requires a properly configured IBM S/370, 303X or 4300 processor. Storage requirements given below are estimates for planning purposes. (Note, K = 1024.)

**VTAM, TCAM**

The versions of the Interactive Instructional Presentation System that support the VTAM and TCAM environments will be pre-generated for each environment. The pre-generated version will utilize 456K bytes of virtual storage for VS1 and VS2, in addition to the storage requirements of the host system, and will include provision for:

- 20 Course Files
- 200 Courses
- 7 Work Files
- 100 Users

These parameters can be changed by the customer at execution time through the use of control cards. Working storage (real storage) for the default system with all 100 users on the system simultaneously (assuming 85% of the users are students) is estimated to be less than 200K bytes in addition to that required by the teleprocessing access method and other components of the host system. Utilization of system resources, and therefore working storage will increase as the number of active authors increases.

**IMS/VS, CICS/VS, TSO, CMS**

The Interactive Instructional Presentation System under IMS/VS, TSO or CMS will require the following S/370 virtual storage for the duration of each transaction: ]

- 280K Administrator
- 280K Author
- 280K Student

Under CICS/VS, a shared program storage area of 260K bytes is required. Each transaction requires an additional 20K bytes for the duration of that transaction.

**Input/Output Devices:** Sufficient direct access storage must be provided to satisfy the requirements of the online data sets. This will be approximately 35 cylinders of 3330 space for all host environments except IMS/VS. Approximately 60 cylinders of 3330 space are required under IMS/VS. Additional space for course materials will be required. Approximately 10 cylinders of 3330 DASD space will be required for the storage of courses delivered with the Interactive Instructional Presentation System.

DOS based installations of this product do not support 23XX DASD.

**Distribution and Maintenance:** Installation and maintenance of the instructional system requires the availability of one tape drive.

**Terminals Supported:** The Interactive Instructional Presentation System provides support for IBM 3277, IBM 3275, IBM 3276, IBM 3278 and IBM 3279 terminals. Screen sizes of 24x80, 32x80 and 43x80 are supported in those environments supporting and identifying the appropriate models. Typewriter, data entry, APL and text keyboards are supported in those environments that permit identification of the keyboard type. SDLC, BSC and local IBM protocols are supported as permitted by each environment. Support for IBM 3279 terminals is for IBM 3278 functions. Color support is provided only via the 4-color default mode of the 3279. Support for IBM 3278 mdl 5 is in default mode (24x80). Programmable Symbol Set is not supported.

The Interactive Instructional Presentation System provides support for non-3270 type terminals only in line-at-a-time mode. The IBM 2741 mdl 1 is supported in those environments with appropriate support. CPT-TWX (Model 33/35) Line Control Type is supported in those environments with appropriate support.

It is the user's responsibility to assure the equivalence at the software interface of other terminals as well as the suitability of non-hardcopy terminals using hardcopy interfaces.

Since update transactions are employed under IMS, non-checking terminals are not supported.

**SOFTWARE REQUIREMENTS**

The Interactive Instructional Presentation System permits the user to manage use of transaction processing and the training facilities. It is written in Assembler language and can use any of the following IBM S/370 facilities to present courses to students.

The Interactive Instructional Presentation System will operate with the version, release and/or levels of the host system current at the initial availability of the Interactive Instructional Presentation System. It will also operate with subsequent host system releases unless otherwise identified.

**Note:** DOS based installations require DOS/VSE Release 2 and do not support 23XX DASD.

- Data Base/Data Communication Systems (DB/DC)
  - Information Management System/Virtual Storage (5740-XX2)

PROGRAM PRODUCTS

**Interactive Instructional Presentation System (cont'd)**

- Customer Information Control System/OS/VS (5740-XX1)
- Customer Information Control System/DOS/VS (5746-XX3)

For operating system support refer to IMS/VS and CICS/VS programming systems support in the appropriate IMS/VS and CICS/VS documentation.

- Interactive Systems
  - Conversational Monitor System
  - Time Sharing Option with TCAM or VTAM (MVS only)

For interactive system support refer to the CMS and TSO programming systems support in the appropriate CMS and TSO documentation.

- Terminal Access Methods
  - Virtual Telecommunications Access Method
  - Telecommunications Access Method

For terminal access method support refer to VTAM and TCAM programming systems support in the appropriate VTAM and TCAM documentation.

The following figure portrays facilities and access methods used during instructional system operation.

S/370 Facility	Teleprocess Facility	Access Method	
		DIRECT	SEQUENTIAL
IMS/VS	IMS	IMS	QSAM
CICS/OS/VS	CICS	CICS	CICS
CICS/DOS/VS	CICS	CICS	CICS
VM/370	CMS Macros*	CMS Macros	CMS Macros
TSO	TSO	BDAM	QSAM
VTAM/OS/VS	VTAM	BDAM	QSAM
VTAM/DOS/VS	VTAM	DTFDA, VSAM**	DTFDI, DTFSD, DTFMT
TCAM	TCAM	BDAM	QSAM
BATCH DOS/VS	DTFDI	DTFDA, VSAM**	DTFDI, DTFSD, DTFMT
BATCH OS/VS	QSAM	BDAM	QSAM

\* = CP Diagnose 57 for 3277 Display Station  
 \*\* = VSAM is intended primarily for use on FBA devices

Figure 1. System/370 Facility and Access Methods

**COMPATIBILITY**

Courses running under the predecessor product, Interactive Instructional System 5748-XX6, will run without change.

Users planning simultaneous operation of this product and its predecessor should carefully review the pertinent operations guides for information on special installation and operational restrictions when using this mode of operation.

Courses using 3270 dynamic formatting operation codes are not supported by the instructional system in the IMS/VS environment.

Courses that utilize 3270 native mode facilities (light-pen, PF keys, field definitions, etc.) will not operate under CMS unless necessary extensions to diagnose code 58 function have been added to the VM/370 system.

The necessary extensions are available in each of the following programs:

- VM/System Extensions Program Product, 5748-XE1
- VM/Basic Systems Extensions Program Product, 5748-XX8
- VM/System Product, 5664-167

**PERFORMANCE CONSIDERATIONS**

The performance of the instructional system in a virtual storage environment is dependent on the system resources available, the programs that operate concurrently and their relative priorities, system and application data set placement and system timing. Performance also depends on the paging characteristics and storage reference patterns of the system and its courses, the allocation of data sets to particular devices and the particular data being processed.

For specific online performance and response time requirements, attention must be given to ensuring that adequate real resources (main storage, processor computing capability, channels, direct access devices, etc.) are available. To verify specific performance (particularly on systems with large number of concurrent terminal users), benchmarking the instructional system should be planned.

**DOCUMENTATION:** (available from Mechanicsburg)

The following IBM publications provide further information regarding the characteristics of the Interactive Instructional Presentation System and its companion product, the Interactive Instructional Authoring System:

Interactive Instructional Presentation System Interactive Instructional Authoring System General Information Manual	GH20-2446
Interactive Instructional Presentation System Interactive Instructional Authoring System Administrator's Guide	SH20-2449
Interactive Instructional Authoring System Course Authoring Guide	SH20-2450
Interactive Instructional Authoring System Simulation/Exercise Facility Authoring Guide	SH20-2451
Interactive Instructional Presentation System Interactive Instructional Authoring System (VM/370-CMS): Operations Guide	SH20-2459
Interactive Instructional Presentation System Interactive Instructional Authoring System (OS/VS-TSO): Operations Guide	SH20-2454
Interactive Instructional Presentation System Interactive Instructional Authoring System (OS/VS-CICS): Operations Guide	SH20-2452
Interactive Instructional Presentation System Interactive Instructional Authoring System (DOS/VS-CICS): Operations Guide	SH20-2456
Interactive Instructional Presentation System Interactive Instructional Authoring System (OS/VS-VTAM): Operations Guide	SH20-2455
Interactive Instructional Presentation System Interactive Instructional Authoring System (DOS/VS-VTAM): Operations Guide	SH20-2457
Interactive Instructional Presentation System Interactive Instructional Authoring System (OS/VS-TCAM): Operations Guide	SH20-2453
Interactive Instructional Presentation System Interactive Instructional Authoring System (IMS/VS): Operations Guide	SH20-2458
Interactive Instructional Presentation System Logic Manual	LY20-2506
Interactive Instructional Presentation System Interactive Instructional Authoring System Logic Manual	LY20-2507
Interactive Instructional Authoring System Basic Author Training for the Course Structuring Facility Student Materials	GH20-2447
Interactive Instructional Authoring System Extended Author Training for the Course Structuring Facility Student Materials	GH20-2448

RPQs ACCEPTED: No

**5668-870 - 4730 PBM CUSTOMIZATION IMAGE BLDR.  
4730 PERSONAL BANKING MACHINE  
CUSTOMIZATION IMAGE BUILDER****PURPOSE**

The 4730 Personal Banking Machine (PBM) Customization Image Builder provides a method for the customer to create and/or modify a customization image for the 4730 Personal Banking Machine. The program product consists of the customization image builder program and a collection of sample input source files. The financial institution selects one or more of the samples provided, and then uses the program to process the sample file and to create an image for the 4730

**HIGHLIGHTS**

- Easy to customize by modifying sample images provided.
  - Unnecessary to structure or write user program using macros.
  - User changes fields in easy-to-read sample source image by expressing alternate customization options in decimal or mnemonic values.
  - User-selected full-screen editor for changes.
- Customization Image Builder outputs are self-documenting and aid security.
  - Customized image, ready to transmit.
  - New, easy-to-read record of selected options in customized image.
  - Image audit code (optional) as basis for image security verification system.

**CUSTOMER RESPONSIBILITIES**

The following are customer responsibilities:

- Provision of specified operating environment.
- Program installation.
- Modification of sample source images to meet customer requirements.
- Transmission of image to 4730.
- Problem determination.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Customization Image Builder can run on any IBM hardware configuration that supports one of the operating systems listed below under "Software Requirements". The program is distributed on magnetic tape at 1600 or 6250 bits per inch; therefore, a magnetic tape drive is required to load the program. The program requires approximately 40,000 bytes of virtual storage in addition to the storage required by the operating system.

Direct access storage is required for the program input (the image source file), and for the program outputs (the listing file and the image file). The sizes of these files depend on the 4730 options that are specified in the image. The source and listing files may require from one to several hundred thousand bytes each. The image file may require up to 20K bytes.

**SOFTWARE REQUIREMENTS**

**Required Programs:** The Customization Image Builder requires one of the following standard operating systems at the level current when the Customization Image Builder is available, or at a later level:

- VSE/Advanced Function
- SSX/VSE
- OS/VS1
- OS/VS2 MVS
- MVS/XA

**Optional Programs:**

- It is expected that most installations will use a display terminal and a full-screen editor program to modify the sample image source files that are supplied with the Customization Image Builder program. The Customization Image Builder does not provide the editing function.
- Additional programming is required to transmit the image file that is produced by the Customization Image Builder to the 4730. The customization image builder does not provide the loading function. At the time of Limited Availability of Customization Image Builder, the then current release of the 4700 Finance Communication System Host Support program will contain facilities to store and manage the output customization image file, and to transmit it to the 4730. However, user coding will be required to transmit the customization image from an intermediate 4701 Finance Communication Controller to a 4730(s).

- The DES data encryption program BDKDES, or equivalent, allows the Customization Image Builder to calculate an audit check code for the image. The program BDKDES is available as a feature of the 4700 Finance Communication System Host Support program.

**SECURITY, AUDITABILITY and CONTROL**

Customization Image Builder utilizes the security and auditability features of the S/370, 303X, 308X, or 43XX processors. User management is responsible for evaluating, selecting, applying, and implementing such features and for the appropriate administrative and application controls.

**DOCUMENTATION**

(available from Mechanicsburg)

*Program Summary* (GC31-0028) ... *General Information* (GC31-0029) ... *Program Reference and Operations Manual* (SC31-0026) ... *Licensed Program Specifications* (GC31-0027).

**MVS INTEGRITY**

IBM will accept APARs describing any situation where the installation of this program introduces an exposure to the system integrity of MVS. Refer to the IBM Programming Announcement on MVS System Integrity dated October 21, 1980. This program is intended to run unauthorized.

RPQs ACCEPTED: No

**5668-871 - 4730 PBM NETWORK MONITOR  
4730 PERSONAL BANKING MACHINE  
NETWORK MONITOR**

**PURPOSE**

The 4730 Personal Banking Machine (PBM) Network Monitor, a licensed program operating with S/370 Computers (including 303X and 308X) and 4300 Processors, provides monitor and control functions for a network of 4730 Personal Banking Machines. The PBM Network Monitor maintains a record of the current status of each 4730 and provides continuous control of 4730 operations. It operates interactively as either a CICS or an IMS application program that uses online data files for 4730 status data collection.

**HIGHLIGHTS**

- Facilitates continuous operation of the 4730 network and provides for continuous network monitoring.
- Automates the function of controlling the 4730.
- Separates the 4730 monitor and control functions from the user-written financial applications.
- Provides for accurate and current 4730 status information enabling an operator to quickly identify 4730 problems and expedite servicing.
- Provides for flexibility in defining the 4730 network.
- Provides for monitor and control functions to be performed at multiple sites.
- Supports remote monitor sites for intermediate processor/controller-based systems.
- Provides a complete audit trail of 4730 environment changes.
- Provides for user access to the 4730 environment data.
- Provides 4730 message security facilities.
- Supports the use of color in displays capable of color display.
- Provides a user-friendly monitor and control interface.

**DESCRIPTION**

The 4730 Personal Banking Machine Network Monitor program product provides 4730 monitor and control functions, thereby permitting the user to direct his programming efforts to developing application programs supporting 4730 financial transactions. The functions and facilities provided are:

- Automated Functions: PBM Network Monitor has automated many of the tasks associated with monitoring and controlling the 4730s such as:
  - Performing initialization and startup procedures to open the 4730 for business.
  - Performing recovery action to reopen the 4730 after certain closures such as servicing or communication failure.
  - Logging 4730 events, such as status changes, and PBM Network Monitor actions to a data base; and selectively printing to an online monitor printer. This function provides a record of changes to a 4730, as well as all of its components, and alerts the operator to situations that need attention.
  - Notifying an operator when supplies need replenishing or containers, such as the envelope and check depositories, are nearly full and should be emptied.
  - Soliciting status from idle 4730s.
  - Periodically changing communication encryption keys.

By automating the device reporting functions necessary to manage the 4730s, the operator may now dedicate his attention to those functions required to monitor the availability and status of the 4730s under his control.

- Status Monitoring: This includes online operator commands to solicit current status from the 4730, request several different views of the current status of a network of 4730s or components of a 4730, and view online event history data of a 4730. The availability of accurate and current 4730 status information can assist an operator to quickly identify 4730 problems and expedite servicing.
- Network Control: This includes the ability for a 4730 network operator to open and close a 4730, change the 4730's date and time, reconfigure 4730 components, and acquire the 4730 supply and usage totals. These totals include the currency and depository counts. All of these functions can be performed for either a single 4730 or for a group of 4730s.
- Monitor and Control Operator Interface: Monitor and control functions are presented to the operator through a set of logically connected menus and screens. PBM Network Monitor is designed to accommodate both the novice and the more experienced operator. An extensive use of menus, which guide the operator

~~from one screen to the next, helps accelerate operator training. (As the operator becomes more proficient, a direct, command-line access to the desired screen is provided.)~~ PBM Network Monitor allows the user to partition network control operations among more than one operator and more than one monitor site. These monitor sites may be either located at the host computer or at various locations throughout the 4730 network.

- Security Control: This includes the ability to manage 4730 message security and access security. Message security is accomplished using DES encryption to verify data content in messages exchanged between the PBM Network Monitor and the 4730 Personal Banking Machine. This function is available to user application programs which may call PBM Network Monitor encryption and decryption routines to authenticate messages received from and sent to the 4730. Access security facilities verify the identity of the 4730 Personal Banking Machine prior to allowing it to gain access to a customer's system.
- Network Definition: This includes the ability to define and change the 4730 network structure and the 4730 startup and administrative servicing options. Each 4730 in the network can be identified by user naming conventions and organized into the network using user unique logical structure. Changes can be accomplished online without disrupting daily operations. These facilities allow the installation to customize the network structure as well as control the amount of resources associated with 4730 startup sequence.
- Remote Application Interface: This includes an interface that allows the PBM Network Monitor to monitor and control 4730s that are indirectly attached through an intermediate processor, such as the 4701 Finance Communication System Controller. It also includes functions to support receipt of device status and operational information that is collected by user-written device control applications in the intermediate processor during periods of offline operation.
- User Application Interfaces: This includes encryption and decryption service routines that may be called by the customer's programs. These routines perform authentication of messages received from and sent to the 4730. The PBM Network Monitor also provides an interface that allows the user application to gain access to the 4730 currency denominations, currency counters and the depository counts. The PBM Network Monitor provides support for invoking user-written programs designed to interact with an operator at the 4730 Personal Banking Machine. With access to these PBM Network Monitor facilities, user financial applications can more easily perform settlement functions and make records available for internal auditing purposes.
- Change Phrase Maintenance: This includes the ability to allow the 4730 network operator to alter information that is displayed or printed at the 4730 by entering simple instructions. These phrase changes are managed automatically by the PBM Network Monitor and can apply to either a single 4730 or to a group of 4730s.

**CUSTOMER RESPONSIBILITIES**

The following are customer responsibilities:

- Provision of specified operating environment.
- Install PBM Network Monitor and run sample program.
- Customize installation-dependent tables.
- Define the 4730 network.
- Provide financial application programs.
- Choose IMS or CICS security features.
- Staff and train monitor and control operators.
- Problem determination.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM PBM Network Monitor can run on any hardware configuration that supports one of the operating systems listed below under "Software Requirements". The program is distributed on magnetic tape at 1600 or at 6250 bits per inch; therefore, a magnetic tape drive is required to load the program.

The PBM Network Monitor consists of approximately 100 modules; each module is approximately 20,000 bytes. For each concurrent transaction that may be scheduled in the IMS or CICS installation, no more than five PBM Network Monitor modules will be in virtual storage at the same time. Auxiliary storage space is required for approximately 5 megabytes of PBM Network Monitor application data.

**4730 Personal Banking System Network Monitor (cont'd)****SOFTWARE REQUIREMENTS**

**Required Programs:** The PBM Network Monitor requires one of the following standard operating systems at the level current when PBM Network Monitor is available, or at a later level:

- VSE/Advanced Functions
- OS/VS1
- OS/VS2 (MVS)
- MVS/XA

In addition, one of the following data base/data communication systems, at or later than the indicated release level, is required:

- IMS/VS Version 1 Release 2
- CICS/OS/VS Version 1 Release 5
- CICS/VSE Version 1 Release 5

**Support Program Requirements:** The IBM 4730 Personal Banking Machine Network Monitor includes tables which can be customized by each installation. If the user chooses to customize the information in these tables, the user must compile and link edit the tables after modification.

PBM Network Monitor is supported by the following program products for the specified operating system:

- VSE
  - DOS/VS COBOL Compiler and Library
  - DOS/VS SORT/MERGE
- OS
  - OS/VS COBOL Compiler and Library
  - OS/VS SORT/MERGE Release 5

**SECURITY, AUDITABILITY, and CONTROL**

PBM Network Monitor utilizes the security and auditability features of the S/370, 303X, 308X, or 43XX processors. User management is responsible for evaluating, selecting, applying, and implementing such features and for the appropriate administrative and application controls.

**DOCUMENTATION**

(available from Mechanicsburg)

*Program Summary (GC31-0032) ... General Information (GC31-0033) ... Licensed Program Specifications (GC31-0034) ... Network Operations Guide (SC31-0035) ... Installation Manual (SC31-0036) ... Diagnosis Guide and Reference (SC31-0037).*

**RPQs Accepted:** Yes

**MVS INTEGRITY**

IBM will accept APARs describing any situation where the installation of this program introduces an exposure to the system integrity of MVS. Refer to the IBM Programming Announcement on MVS System Integrity dated October 21, 1980. This program is intended to run unauthorized.

**LICENSED PROGRAM MATERIALS AVAILABILITY**

**Restricted materials:** No. This program will be available without source licensed program materials. It will be available with object code. The sample program will be available in both object code and source code.



**5668-896 - APPLICTN PROTOTYPE ENVIR. R1.0, 1.1  
APPLICATION PROTOTYPE ENVIRONMENT  
RELEASES 1.0 and 1.1**

**PURPOSE**

Application Prototype Environment provides a set of building blocks and design tools for interactive development of VS APL applications. It is intended to be used both by the professional programmer, and by knowledge workers (such as managers, planners, educators, scientists, and engineers) who have some knowledge of APL.

The professional programmer will use Application Prototype Environment to develop prototypes of commercial DP applications, or to build complete applications with VS APL as a base. The knowledge worker will use it to create small applications. Help screens and tutorials are provided within the program.

Application Prototype Environment Release 1.0 operates under VM/SP. Application Prototype Environment Release 1.1 operates under VM/SP and MVS/TSO.

Application Prototype Environment incorporates and extends certain functions of the IFP Application Prototype Environment (5785-RAB) for the above environments.

**HIGHLIGHTS**

Three full-screen interactive dialogs in Application Prototype Environment allow the user to:

- Design a panel (screen) to be used as part of the application.
- Design a graphics chart as part of a panel.
- Define a file to be used by the application.

An object library allows application functions to be stored outside the Application Prototype Environment workspace when not required, and to be retrieved when needed by the application. This allows large applications to run in a small workspace.

Full-screen browse and editing facilities are provided.

Help panels and tutorials can be invoked throughout the design of an application to assist the user.

**DESCRIPTION**

With Application Prototype Environment, an application is built in two phases:

- A specification phase, in which the layout of display panels, charts and files is defined.
- An operational phase, using a set of building blocks that describe the operational characteristics of an application.

**Specification Phase:** In this phase, the panels and charts for the application are designed. Panels can contain fixed text and fields to enter, display and modify data. Charts are defined as panel areas to display data in graphics form, for example, line graphs, bar charts, pie charts.

Field lengths and positions, field types, field colors, fixed text, labels, chart types, etc., are described as part of the panel design.

Application Prototype Environment prompts the application designer for the above information during the specification phase. The layout of the designed panel is displayed at different stages of the definition.

The specification phase is also used to define files, access path and access method, length and type of fields in physical records, cross-references, names of variables, etc., in an interactive dialog.

**Operational Phase:** Application Prototype Environment provides a series of functions that describe the communication of data in the application. This includes panel functions to read data from a display, write data on a display, and placing data on a display for modification. A set of declaration functions support the retrieval of information from the application.

**Object Library:** The object library provides the capability to store functions and data external to the APL workspace, and to load them dynamically during program execution. This capability:

- Allows the user to keep a single workspace image for APL applications.
- Eliminates the need to keep copies of functions in different workspaces.
- Ensures that an application always uses the master copy of a function.
- Simplifies installation and maintenance procedures.

**Browse and Edit:** These facilities provide:

- Independent scrolling of variables.
- Dynamic display of variables within fields.
- Capability to perform editing on the variables shown in a scroll field.

**CUSTOMER RESPONSIBILITIES**

Installation of a licensed program is the responsibility of the customer.

VM/SP and MVS/SP provide facilities designed to prevent unauthorized use of data.

Customer management is responsible for the selection, application and implementation of all security features, and for appropriate application and administrative controls. Where natural language text and/or data is to be transmitted via public communication facilities, management may wish to consider the use of encryption.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM machines:

**Release 1.0:** Any IBM processor supported by:

- VM/SP Release 2 or subsequent release.

**Release 1.1:** Any IBM processor supported by:

- VM/SP Release 2 or subsequent release.
- MVS/SP Version 1 Release 3 or subsequent release.
- MVS/SP Version 2 Release 1.1 or subsequent release.

Application Prototype Environment is designed to operate in an APL workspace of minimum 512K bytes. This minimum will increase if user code is to be resident, or if large quantities of data are required by the user to be kept in the APL work area.

IBM terminals supported by Application Prototype Environment:

- 3277-2
- 3278-2, 3, 4, 5
- 3279-2, 3
- 3290
- 3287 Printer for hard-copy graphics

Chart design requires:

- IBM 3278 mdl 3 or 4 with ECSA and PS features, or
- IBM 3279 mdl S3G or 3X, or
- IBM 3290.

One terminal with APL feature is required for maintenance functions, and one tape drive is required for installation.

**SOFTWARE REQUIREMENTS**

Application Prototype Environment requirements are:

- Operating System
  - For Release 1.0:
    - VM/SP Release 2
  - For Release 1.1
    - VM/SP Release 2
    - MVS/TSO: MVS/SP Version 1 Release 3 (MVS/370) or MVS/SP Version 2 Release 1.1 (MVS/XA)
- VS APL language, Release 4.0 with PUT 8211
- Graphical Data Display Manager (GDDM Release 2, 5748-XXH) with Presentation Graphics feature (PGF). (Support of 3290 or MVS/XA requires GDDM Release 3.)

Subsequent releases and modifications are supported unless otherwise stated.

**COMPATIBILITY**

The IFP Application Prototype Environment and the Application Prototype Environment program product may coexist without conflict.

**CONVERSION**

Conversion from the IFP to the Application Prototype Environment program product is a minor effort.

The conversion steps are:

1. Expunge all IFP functions and variables from the workspace.
2. Copy in the Application Prototype Environment program product workspace.
3. Save the new workspace.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Guide and Reference Manual (SH19-6388) ... Licensed Program Specifications (GH19-6389) ... Reference Card (GH19-6390) ... General Information Manual (GH19-6391).*



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PROGRAM PRODUCTS

**Application Prototype Environment (cont'd)**

**SECURITY/INTEGRITY**

IBM will accept APARs describing any situation where the installation of Application Prototype Environment (5668-896) causes an exposure to the system integrity of MVS. This program is not intended to run in an authorized state at any time and should, therefore, represent no threat to the system integrity of MVS.

**RPQs ACCEPTED:** No

## PROGRAM PRODUCTS

**VS FORTRAN INTERACTIVE DEBUG  
5668-903****PURPOSE**

VS FORTRAN Interactive Debug provides FORTRAN programmers with the ability to debug programs conversationally at a terminal using high-level language.

**DESCRIPTION**

VS FORTRAN Interactive Debug operates under TSO and CMS through a comprehensive set of subcommands which enable programmers to control, monitor, and modify executing FORTRAN programs. Program locations can be referred to by FORTRAN statement labels or by ISN numbers; and FORTRAN variables can be accessed or have values changed by specifying the corresponding symbolic FORTRAN variable names.

VS FORTRAN Interactive Debug does not require any compile-time option. Any program compiled under VS FORTRAN Release 3 or higher will be debuggable (unless compiled with NOTEST and NOSDUMP). Programs compiled at a level of optimization above 0 are debuggable with restrictions. The FORTRAN programmers will just specify DEBUG as a run-time option.

**HIGHLIGHTS**

- Full- or split-screen support using ISPF dialog management.
- Scrollable log of the debug session.
- Ability to run under split-screen mode of ISPF and view the listing of the executing programs. A program function key will position on the currently executing statements. This facility requires the use of PDF.
- Setting breakpoints at statements.
- Displaying and changing values of variables.
- Tracing the execution of FORTRAN programs.
- Tracing back subroutines and the last ten transfers prior to the execution of the current statements.
- Correcting invalid arguments passed to FORTRAN library routines.
- Conditional execution of Debug subcommands.
- Providing information (HELP) about using the VS FORTRAN Interactive Debug product.
- Providing an execution frequency count for each FORTRAN source statement.
- Allowing the user to monitor a specified condition or a change in value of a variable.
- Dynamic control of the FORTRAN Extended Error Handling Facility.
- Listing all breakpoints and WHEN conditions.
- Subset mode allowing the user to enter many system commands.
- Controlling the execution by halting the program on each FORTRAN statement, branch, or ENTRY and RETURN.
- Allowing the manipulation of files, and giving the capability to allocate files on different data sets or to edit results from disk before the end of the program.
- Allowing comments to be entered as a notepad facility.
- Providing the possibility of suspending normal terminal I/O to enter Debug commands.
- Providing the ability to give at execution time a list of programs to be run at normal execution speed (not debuggable) in order to improve the performance.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VS FORTRAN Interactive Debug operates on all IBM hardware/system configurations supported by the IBM Time Sharing Option of MVS and the CMS component of VM SP/CMS.

The TSO Terminal Monitor program Command Scan, and the service routines GETLINE, PUTLINE, and PUTGET are assumed to reside in the time sharing link pack area, and do not figure into the user region requirement.

**SOFTWARE REQUIREMENTS**

VS FORTRAN Interactive Debug operates under the Time Sharing Option of OS, MVS/370, MVS/XA (in the 24-bit addressing mode) and the CMS component of VM/SP. It operates on and in conjunction with programs compiled by the VS FORTRAN Compiler (5748-FO3). The VS FORTRAN Library (5748-LM3) is required. In order to operate in full-screen mode, ISPF (5668-960) and PDF (5664-172 for VM/CMS or 5665-268 for TSO) must be available.

**COMPATIBILITY**

No changes are required to the FORTRAN source program to use the VS FORTRAN Interactive Debug. The user merely indicates at execution time on the parameter area that the DEBUG option is to be used. This will signal to the library that the VS FORTRAN Interactive Debug has to be loaded.

VS FORTRAN Interactive Debug will operate with programs containing debug packets. The debug packets are not themselves debuggable.

VS FORTRAN Interactive Debug is designed for use only with modules compiled by VS FORTRAN. Users who must debug modules compiled by FORTRAN G1 must use FORTRAN Interactive Debug Version 1 Release 2.2 (5734-FO5) with those modules.

VS FORTRAN Interactive Debug does not have a batch debugging capability. All debugging must be performed interactively.

**PERFORMANCE CONSIDERATIONS**

**Compile Time:** Compile time with SDUMP using the default options (without NOSDUMP) will be faster than with the Test Option. Since no special compile-time options need to be specified for the VS FORTRAN Interactive Debug to be used, recompilation will usually not be necessary.

**Execution Time:** When not in debug mode, the execution time of a program compiled without NOSDUMP option will be faster than that of the same program compiled with the TEST option.

VS FORTRAN Interactive Debug will require the latest level of VS FORTRAN in order to get the best performance. A program compiled with VS FORTRAN Release 3 (without the VS FORTRAN Release 3.0 enhancement) will be debuggable but with degraded performance.

**DOCUMENTATION**

(available from Mechanicsburg)

*VS FORTRAN Compiler and Library for CMS and TSO, and VS FORTRAN Interactive Debug General Information (GC26-4114) ... VS FORTRAN Interactive Debug for CMS and TSO Guide and Reference (SC26-4116) ... VS FORTRAN Interactive Debug for CMS and TSO Installation (SC26-4117) ... VS FORTRAN Interactive Debug for CMS and TSO Reference Summary (SX26-3742) ... VS FORTRAN Interactive Debug for CMS and TSO Diagnosis (SY26-3944) ... VS FORTRAN Programming Guide (SC26-4118).*

**RPQs ACCEPTED:** No



PROGRAM PRODUCTS

**IGES PROCESSOR  
RELEASE 1  
5668-904**

**PURPOSE**

The IGES Processor, a program product, will help perform the job of transferring engineering data between a CADAM® system and another system via the Initial Graphics Exchange Specification (IGES Standard). Data transfer is done in a two-step process. First, the user on the sending system transfers CAD/CAM data to the IGES file. Second, the user on the receiving system transfers data from the IGES file to the CAD/CAM data model format. The IGES Processor provides IGES to CADAM and CADAM to IGES data transfer support.

®CADAM is a registered trademark of CADAM INC.

**SPECIAL SALES INFORMATION (not applicable)**

**HIGHLIGHTS**

- Supports a subset of the IGES ANSI Standard Version 1.0 for data interchange.
- Supports transmission to and receipt of data from CADAM.
- CADAM two-dimensional data is supported.
- User options provided for translation.
- Error reports available for data incompatibility.

**DESCRIPTION**

The IGES Processor translates an IGES file into CADAM system entities by reading the IGES file, converting it into an external file, and then processing this internal file entity-by-entity to build a CADAM system model. The entities are geometric, annotation, and structural data. The reverse process is used to create the IGES files.

The program flags entities that it cannot translate for any reason so that the user may identify such entities and take appropriate action.

Figures 1 and 2 list the IGES ANSI Standard Version 1.0 entities that the IGES Processor converts and the corresponding CADAM system entities to which they are converted. Figures 3, 4, and 5 describe how CADAM entities are mapped to IGES entities when IGES files are created.

Entities handled by the IGES Processor may be classified in four groups according to how the IGES Processor selects a matching CADAM entity or entities. These four groups are listed below and identified in Figure 1 in the column labeled "Relation".

**One-to-one:** The IGES entity is translated into an equivalent or similar CADAM system entity.

**One-to-many:** The IGES entity is translated into several CADAM system entities collectively equivalent or similar to the IGES entity.

**Many-to-one:** Several IGES entities are translated into a single CADAM system entity.

**Approximation:** The CADAM system has no true equivalent to the IGES entity, so the IGES entity is translated to a CADAM system entity that is a visually close approximation to the IGES entity. For example, the CADAM system has no parabolic segment, so an IGES parabolic segment is translated to a CADAM system spline.

In a few cases, the CADAM system has more than one meaningful equivalent to an IGES entity. In these cases, the user has the ability to override the Processor's default choice of a CADAM system entity, and to specify an alternate. The list of IGES entities for which the user can override the Processor's default is given in Figure 2.

**IGES TO CADAM**

Relation	IGES Type	IGES Entity Name	CADAM System Entity Names	GEOM Interface Module Names
One-to-One	100	Circular Arc	Circle, Arc	CADARC, CADCIR
	104	Full Ellipse	Ellipse	CADELP
	110	Line	Line	CADLN
	116	Point	Point	CADPT
	202	Angular Dimension	Angular Dimension	CADANG
	206	Diameter Dimension	Diameter Dimension	CADIAM
	208	Flag Note	Balloon	CADBLN
	212	General Note	Supertext	CADSUP
	222	Radius Dimension	Radius Dimension	CADRAD
	404	Drawing	Drawing	CADST, CADFIL
410	View	View	BEGVU, ENDVU	
One-to-Many	102	Composite Curve	Basic Geometry	CADLN, CADPT, CADARC, CADMPL, CADSP4, CADCIR
	106	Copius Data	Depends on IGES Form #	CADMPL, CADPT
	210	General Label	Supertext, Section Arrow	CADLN, CADSUP, CADSCT
Many-to-One	216	Linear Dimension	Parallel	CADHVP
	218	& Ordinate Dimension	Dimension	CADHVP
Approximation	104	Conic Arc, Form #1 Ellipse Segment	Spline	CADSP4
	104	Conic Arc, Form #2 Parabolic Segment	Spline	CADSP4
	104	Conic Arc, Form #3 Hyperbolic Segment	Spline	CADSP4
	112	Parametric Spline	Multipoint Line	CADMPL
	214	Leader	Section Arrow	CADSCT
	308	Subfigure Definition	Detail	BEGDET, ENDDT
	408	Subfigure Instance	DITTO	DITTO
	402	Associativity Instance	Set	BEGPG, ENDPG

Figure 1. This table lists the IGES ANSI Standard Version 1.0 entities that the IGES Processor converts and shows the CADAM system entities to which they are converted. IGES entities are identified by numbers used in the National Bureau of Standards specification. CADAM system entities are identified by module names used in the *Installation and Programmers Guide for the Geometry Interface Module (SH20-2099)*.

PROGRAM PRODUCTS

IGES Processor (cont'd)

IGES Entity Type	IGES Entity Name	CADAM System Entity (default)	GI*	CADAM Sys Ent Name	Override	GI*
202	Angular Dimension	Angular Dimension	CADANG	Lines Arc and Super-text	CADMPL, CADLN, CADARC, CADCIR, CADSUP	
206	Diameter Dimension	Diameter Dimension	CADIAM	Lines, Super-text	CADMPL, CADCIR, CADLN, CADSUP	
216	Linear Dimension	Parallel Dimension	CADHVP	Lines, Super-text	same as above	
222	Radius Dimension	Radius Dimension	CADRAD	Lines, Super-text	same as above	
208	Flag Note	Balloon	CADBLN	Lines, Super-text	same as above	
210	General Label	Supertext, Arrow	CADARO, CADSUP	Lines, Super-text	same as above	
214	Leader	Arrow	CADARO	Lines	CADMPL, CADLN, CADCIR	

Figure 2. This table lists the IGES ANSI Standard Version 1.0 entities for which the IGES Processor allows the user to override its default choice of CADAM system entity and to use an alternate choice. IGES entities are defined by numbers used in the National Bureau of Standards specification. CADAM system entities are identified by module names used in the *Installation and Programmers' Guide for the Geometry Interface Module (SH20-2099)*.

\* Geometry Interface Module Name

CADAM ENTITIES TO IGES

GEOMETRIC ENTITIES: The following list describes which CADAM geometric entity is mapped to which IGES entity.

CADAM Entity	CADET Module	IGES Entity	IGES Type	Note
Point	CADPT	Point	116	
Line	CADLN	Line	110	
Circle	CADCIR	Circular Arc	100	
Arc	CADARC	Circular Arc	100	
Ellipse	CADEPS	Conic Arc	104	
Splines	CADSP	Spline Curve		
-CADAM Flange Angle	KIND=1	CTYPE=3	112	
-CADAM Flange Angle	KIND=2	CTYPE=3	112	
-Offset Flange Angle	KIND=3	CTYPE=3	112/406/106	1
-Offset Flange Angle	KIND=4	CTYPE=3	112/406/106	

Figure 3. Geometric entities in CADAM and the IGES entities created.

Note 1. Offset vector information provided as a property (406).

ANNOTATION ENTITIES: The following list describes which CADAM annotation entities are mapped to which IGES entities.

CADAM Entity	CADET Module	IGES Entity	IGES Type
Dimension Parallel	CADIM	Linear	216
Dimension Offset	ITYPE=0	Linear	216
Dimension Angle	ITYPE=1	Linear	216
Dimension Radius	ITYPE=2	Angular	202
Dimension Diameter	ITYPE=3	Radius	222
Dimension Curve	ITYPE=4	Diameter	206
Spline Horizontal	ITYPE=5	Copius Data	106
Spline Vertical	ITYPE=6	Linear	216
Spline Normal	ITYPE=0	Linear	216
Arrow	ITYPE=1	Ordinate	218
Arrow	CADARO	General Label	210
Balloon	CADBIN	General Note	212
Balloon	CADBIN	Circular Arc	100
Balloon	CADBIN	Leader	214
Breakline	CADBRK	Copius Data	106
Delta	CADDLT	Composite Curve	102
Delta	CADDLT	General Note	212
Dot	CADDOT	Copius Data	106
Note	CADNTE	General Note	212
Rectangle	CADREC	Copius Data	106
Rivet	CADRVT	Point	116
Rivet	CADRVT	Subfigure	308/408
Section Arrow	CADSCT	Leader	214
Super Text	CADSUP	General Note	212
Triangle	CADTRI	Copius Data	106
Textline	CADTXL	General Label	210
Text	CADTXT	General Note	214

Figure 4. CADAM Annotation entities and corresponding IGES entities created when producing an IGES file.

STRUCTURE ENTITIES: The following describes how CADAM Dittos and Permanent Groups are mapped to IGES structure entities.

CADAM Entity	CADET Module	IGES Entity	IGES Type
Set	ELNAME, GRPNME	Associativity Instance	402
Detail	BEGDET, ENDDT	Subfigure Definition	308
Ditto	DITTO	Subfigure Instance	408
Symbol	CADSYM	Subfigure Definition and Instance	408
Attribute	ATTRIB	Property	406

Figure 5. CADAM Structure-type entities and corresponding IGES entities created by the IGES Processor when creating an IGES file.

CUSTOMER RESPONSIBILITIES

Detailed information on installation tasks is provided in the *IGES Processor Program Description/Operations Manual (SJ20-5630)*. The principal installation tasks are the following:

- Install the FORTRAN and CADAM system products.
- Unload the program from the distribution tape.
- Build the load module containing the IGES Processor, FORTRAN library, and CADAM system modules.
- Execute the sample data and check results.

**IGES Processor (cont'd)**

The IGES Processor is a functional replacement for the Initial Graphic Exchange Specification (IGES) Translator (5796-PRK). As previously announced, the IGES Translator will receive Central Service until November, 1984.

**BRANCH OFFICE RESPONSIBILITIES (not applicable)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum machine requirements for the IGES Processor is the following:

- IBM 4321 or larger Processor with 1 megabyte of memory.
- IBM 3310 mdl A2 or 3340 mdl A2 Direct Access Storage Facility or equivalent, consistent with operating system support.
- One 9-track tape drive.

**SOFTWARE REQUIREMENTS**

The prerequisite licensed programs for the IGES Processor are:

- VM/SP Release 1.1 (5564-167), or MVS Release 3.8 (5752-VS2), or VS/1 Release 7.0 (5652-VS1).
- Current level of CADAM System Data Management licensed program, Release 19 (5796-ATC) at availability.
- Current level of CADAM System Geometry Interface licensed program, Release 19 (5796-ATJ) at availability.
- FORTRAN IV Library Mod II (5374-LM3).

**COMPATIBILITY (not applicable)****CONVERSION (not applicable)****DATA SECURITY**

The IGES Processor runs under OS/VS1, MVS, VM/SP and is subject to the controls those systems provide. User management is responsible for evaluating, selecting, applying and implementing such features and for the appropriate administrative and application controls.

**PERFORMANCE CONSIDERATIONS (not applicable)****DOCUMENTATION**

(available from Mechanicsburg)

*IGES Processor Program Description Manual (SH20-5630).*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where the installation of the IGES Processor (5668-904) causes an exposure to the system integrity of MVS. This program is not intended to run in an authorized state at any time and should, therefore, represent no threat to the system integrity of MVS.

**RPQs ACCEPTED: No**



## PROGRAM PRODUCTS

**GRAPHICAL DISPLAY AND QUERY FACILITY  
(GDQF) RELEASE 1  
5668-905****PURPOSE**

The Graphical Display and Query Facility (GDQF) is a program product that may be used to view CADAM\* models, APT Geometry (PUNCH) files, or Graphic Data Files (GDF) on a 3270-family Display device. GDQF may also be used to prepare output for the 3287 and 4250 Printers.

**SPECIAL SALES INFORMATION (not applicable)****HIGHLIGHTS**

- Easy-to-use, full-screen menus
- 3-dimensional rotation and viewing commands
- Multiple view-ports to display different models simultaneously
- Comprehensive online help and tutorial assistance
- Display CADAM\* and APT Geometry models
- Display plot files from CADAM\*, CATIA\*\*, and CBDS2
- Merge displayed data with SCRIPT (DCF) onto hardcopy devices
- Supports 3278 (with light-pen), 3279 (with light-pen), 3290 and 3277GA terminals
- Batch and foreground support for the 3287 and 4250 Printers
- Operates under VM/SP Release 2

\* CADAM is a registered trademark of CADAM, INC.

\*\* CATIA is a registered trademark of Dassault Systemes.

**DESCRIPTION**

GDQF allows a CADAM user to view geometry or CADAM plot files with equal ease. The data may be scaled automatically to fit the screen, panned (left, right, up, and down) and re-sized larger or smaller.

GDQF provides the APT user with a facility for viewing APT-created geometry. Previously, there was no IBM facility for viewing this data. The ability to view the geometry, before running a numerical control tool, will be a valuable asset to numerical control part programmers.

For CADAM, CBDS2 and CATIA users, GDQF provides the ability to preview plot files before sending them to the plotter. GDQF utilizes the GDDM GDF format for plot files so that the plot files may also be processed by other IBM GDDM-based graphics applications.

For APT models, the GDQF program provides full 3-dimensional viewing control with an easy-to-use human interface. The viewer may change his viewpoint with six rotational commands, may ask for perspective or parallel projections, and can see different objects in multiple colors. In addition, GDQF provides the ability to split the screen and to view, for example, CADAM data side-by-side with APT data on the same screen.

The *User's Guide* is written for the enduser and provides numerous examples for the terminal user. To provide online assistance, a comprehensive help and tutorial facility is also provided with GDQF. There are two levels of messages, a short format and a long format. The short format gives a brief description of the status or error. The long format may be requested by the user for more detailed information about the message. If the user still requires more detailed information, the HELP/Tutorial facility may be invoked.

After data is viewed or pre-viewed, the data may be prepared for inclusion in documents that will be eventually printed on the 4250 Printer. Any data viewed on a screen can be merged with SCRIPT (DCF) files and then printed on the 4250 Printer. This ability to merge text and graphics is provided by the Composed Document Printing Facility. GDQF provides plotter support via the industry standard plotting interface, and a customer may link-edit installation-specific plotter support that is not provided through GDQF.

GDQF also provides foreground and batch support for commonly-used utilities. Printing and plotting functions may be invoked from a batch machine, thereby freeing the user terminal for other jobs.

**CUSTOMER RESPONSIBILITIES**

Detailed installation tasks are described in the *Graphical Display and Query Facility Installation and Customization Guide* (SH20-5631). The principal installation tasks are:

1. Install GDDM Release 3.
2. Install ISPF Release 1.
3. Unload the GDQF installation tape.
4. If CADAM models are to be viewed, install the prerequisite programs.
5. Build the GDQF libraries.

6. If plot files from CADAM, CATIA, or CBDS2 are to be viewed or plotted, build the appropriate modules as described in the *Installation and Customization Guide*.
7. If the 4250 Printer is to be used, install the 4250 Printer support.
8. Verify the installation using the sample data.

The *User's Guide* contains information that a terminal user will require to use the interactive and batch facilities of GDQF. The *Installation and Customization Guide* contains information necessary to install and customize GDQF for a particular installation. The *Utilities and Subroutines Manual* contains information necessary to use and call the utilities provided with GDQF.

**BRANCH OFFICE RESPONSIBILITIES (not applicable)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum machine configuration for GDQF is the following:

- IBM S/370 mdl 135, 3031, or 4321 or larger Processor with a minimum of 1,024K memory.
- An IBM 3270-family device, for console.
- One IBM 3330 mdl 1, 3340 mdl A2, 3310 mdl A2 or 3370 mdl A1 Direct Access Storage Facility.
- One 9-track tape drive.
- An IBM 3278, 3279 or 3290 Display with programmed symbols support, or 3277GA.

A minimum virtual machine size of 3 megabytes is required if the CADAM models are not accessed. A minimum of 3.5 megabytes is required if CADAM models are accessed. Larger virtual machine sizes may be required to display larger models.

An IBM 4250 or 3287 Printer is required for hardcopy printed output.

Performance of GDQF depends on many factors, such as processor and memory size, terminal supported, and hardcopy device supported. For configuration guidance, consult your local IBM representative.

**SOFTWARE REQUIREMENTS**

The prerequisite licensed programs for GDQF are:

- Virtual Machine System Product (5665-167) Release 2
- Interactive System Productivity Facility (5668-960) Release 1
- Graphical Display Data Manager (5748-XXH) Release 3

For viewing of CADAM models, the following CADAM programs at Release 19 are prerequisites:

- CADAM Geometry Interface (5796-ATJ)
- One of the following is required to load CADAM data into the system:
  - CAD Only Interactive (5796-ATA)
  - CAD/CAM Interactive (5796-ATB)
  - Data Management (5796-ATC)
- To view CADAM plot files, CADAM hardcopy (5796-ATD) is required.
- To link-edit and install CADAM products, FORTRAN IV library (5734-LM3) is required.

Due to interface conventions with the CADAM Geometry Interface, data displayed by GDQF may not be identical in format to the data as displayed by CADAM.

For printing on the IBM 4250, the following is a prerequisite:

- Composed Document Printing Facility (5668-997)

For merging SCRIPT files with graphics on the 4250, the following is required:

- Document Composition Facility (5748-XX9) Release 3

**COMPATIBILITY (not applicable)****CONVERSION (not applicable)****DATA SECURITY**

GDQF utilizes the security and auditability of VM/SP. User management is responsible for evaluation, selecting, applying and implementing such features, and for the appropriate administrative and application controls.



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PP 5668-905.2

Jul 83

New

PROGRAM PRODUCTS

**GDQF R1 (cont'd)**

**PERFORMANCE CONSIDERATIONS**

Performance of GDQF depends on many factors, such as processor and memory size, terminal supported, and hardcopy device supported. For configuration guidance, consult your local IBM representative.

**DOCUMENTATION**

(available from Mechanicsburg)

*Graphical Display and Query Facility User's Guide (SH20-5631) ...  
Graphical Display and Query Facility Installation and Customization  
(SH20-5632) ... Graphical Display and Query Facility Utilities and  
Subroutines (SH20-5633).*

RPQs ACCEPTED: No

**COPICS CUSTOMER ORDER SERVICING (COS)  
SHIPPING MANAGEMENT  
5668-906****PURPOSE**

COPICS COS Shipping Management (SHIPPING) uses the order data and provides online and batch functions required to control the shipping process from selection of customer orders for shipment to invoicing. SHIPPING is functionally integrated into COPICS, especially in COPICS COS Data Management and Order Management, and COPICS Inventory Accounting. It may be implemented without having installed any of these COPICS products.

**SPECIAL SALES INFORMATION**

- Customers and prospects for integrated offerings within the COPICS implementation architecture, mainly in the manufacturing and process industries.
- Organizations with a need for engineering, construction, repair/maintenance, service for equipment, installations and buildings. These organizations may be industries like airlines, distribution, utilities, public sector and government.

**DESCRIPTION**

This program has been designed around the COPICS DL/I Manufacturing Data Base architecture to operate in an integrated mode with the other COPICS products.

Within its overall architecture and applications framework, the Communication-Oriented Production Information and Control System (COPICS) includes Customer Order Servicing functions designed to assist end-users in:

- Entering orders completely, quickly and correctly.
- Servicing customer requests for delivery information.
- Changing existing order schedules, quantities and/or specifications.
- Maintaining order status.

These facilities are provided by the COPICS International Field Programs COS Data Management (5785-DCN) and COS Order Management (5785-DCP).

Thus, with these programs, the user is able to create and maintain customer order data and hold it available for subsequent programs in the area of customer order servicing. SHIPPING uses this order data and provides additional online and batch functions required to control the shipping process of a company from selection of customer orders for shipment to invoicing.

Shipping Management is relevant to Manufacturing, Process and Distribution Companies, and with minimum effort can be extended to cover inter-company as well as customer orders.

Although functionally integrated into COPICS, COS Shipping Management can be implemented without any other COPICS product.

**HIGHLIGHTS**

SHIPPING supports different user environments and shipping methods. For example, in a single user environment, both normal and rush orders can be processed using multiple shipment methods, including:

- Company transport
- Forwarding agencies
- Railcar
- Postal Services
- Customer pick-up

The Shipping process consists of several discrete phases, some of which may be inappropriate in some companies. COS Shipping thus allows alternative implementations within the following broad framework:

- Selection of customer orders for shipment
- Delivery planning
- Picking control
- Packing control
- Load control
- Processing of the shipping results

In addition, functions are provided to perform a number of miscellaneous tasks, including the maintenance of infrequently needed text data to be included in shipping documentation. This will comprise freight and other cost information for invoicing purposes, the number and type of pallets used, etc.

In addition to these maintenance functions, Shipping uses online interface functions to ease the handling of Communications-Oriented Message System (CORMES) messages.

SHIPPING is offered within the COPICS Implementation program. It has been designed around the COPICS DL/I Manufacturing Data Base architecture to operate in an integrated mode with the other products offered within that program. COPICS Implementation is the IBM Manufacturing Industry program for implementing COPICS. It is based

on the use of DL/I-DOS/VS or IMS/VS as the data base manager and CICS/VS as the communications manager.

**CUSTOMER RESPONSIBILITIES**

To implement COPICS COS/Shipping Management, the customer must have installed appropriate machines and programs (see "Specified Operating Environment") and establish procedures to provide the data necessary to fulfill his requirements.

The installation of COPICS COS/Shipping Management is supported by a sample. The programs are available in source code form (for customization purposes).

Users should review the data base definitions and screen design for compatibility with their objectives.

The major installation steps for the user who has already installed DL/I-DOS/VS or IMS/VS and CICS/VS are:

- Print the program tape and review its contents and job control statements.
- Catalog, provided software includes:
  - COBOL programs
  - DL/I-DOS/VS or IMS/VS DBDs and PSBs
- Review the supplied CICS/VS table entries for compatibility with the user's system.
- Run the sample problem which loads the data bases.
- Run the batch and online programs against the sample data base.
- Confirm the successful operation of all programs before making modifications and loading user data.
- Establish recovery procedures for data base integrity.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This program product is designed to operate on an IBM S/370, 30XX or 43XX Processor which supports DL/I-DOS/VS or IMS/VS in a CICS/VS environment. The minimum storage requirement is 512K bytes of memory. The specific user operating environment will determine the actual storage requirements, depending on the number of transactions, number of terminals, and so on. At least one 1,920-character IBM 3270 Visual Display Unit and an IBM 3287 mdl 2C Printer is also required.

**SOFTWARE REQUIREMENTS****DOS/VS Version:**

This program is written in ANS-COBOL and requires the use of the DOS/VS COBOL Compiler and Library (5746-CB1) Version 1 Release 2.5 for installation and error correction.

It is designed to operate with the following programs:

- DOS/VSE (5745-030) Version 1 Release 2
- VSE/Advanced Functions (5646-XE8) Version 1 Release 2
- DL/I-DOS/VS (5746-XX1) Version 1 Release 5
- CICS/DOS/VS (5746-XX3) Version 1 Release 5
- DOS/VS Sort/Merge (5746-SM2) Version 1 Release 3

**OS/VS Version:**

This program is written in ANS-COBOL and requires the use of the COBOL Compiler and Library (5740-CB1) Version 1 Release 2.3 for installation and error correction.

It is designed to operate with the following programs:

- OS/VS1 (5652-VS1) Version 1 Release 7
- IMS/VS-DB (5740-XX2) Version 1 Release 2
- CICS/OS/VS (5740-XX1) Version 1 Release 5
- OS/VS Sort/Merge (5740-SM1) Version 1 Release 5

For both versions, the program is designed to operate optionally in conjunction with:

- COPICS Customer Order Servicing/Data Management (5785-DCN)
- COPICS Customer Order Servicing/Order Management (5785-DCP)
- COPICS Inventory Accounting (5785-GBE)
- CORMES (5746-XXM for DOS/VS, 5668-007 for OS/VS)

**Note:** Where release numbers are specified for operating systems and licensed programs in this section, the above statements also apply to subsequent releases and modification levels unless otherwise provided by IBM.



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PP 5668-906.2

Oct 83

New

PROGRAM PRODUCTS

**COPICS COS Shipping Management (cont'd)**

**DOCUMENTATION**  
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*Product Information Notice (GH19-6379) ... General Information Manual (GH19-6369) ... User's Guide and Reference Manual (SH19-6371) ... Operations Guide (SH19-6370).*

**LICENSED PROGRAM MATERIAL AVAILABILITY**

All modules of this program will be available with source licensed program material.

RPQs ACCEPTED: No

**COPICS FACILITIES DATA MANAGEMENT  
RELEASE 1 Modification Level 0  
5668-907**

**PURPOSE**

COPICS Facilities Data Management is designed to bring the Resource/Facility Data Base (containing details of work centers and machines) and Tool Data Base (containing details of tools and tool kits) directly to manufacturing engineering and production engineering departments, along with all other functions which require access to this information. Through the use of online video display terminals, the user can create and maintain work center and machine, and tool and tool kit data as well as make inquiries against it.

COPICS Facilities Data Management allows manufacturing engineering and production engineering departments to manage effectively the changes that affect work centers, machines, tools and tool kits. These changes are due to a number of factors such as:

- Adding new machines
- Changing the capacity of work centers or machines
- Changing the standard cost rates of work centers or machines
- Changing which machines are contained within a work center
- Adding new tools and tool kits
- Changing which tools (or how many) are contained within tool kit

Facilities Data Management is offered within the COPICS Implementation program. It has been designed around the COPICS DL/I Manufacturing Data Base architecture to run in an integrated mode with the other products offered within that program. COPICS implementation is the IBM Manufacturing Industry Marketing program for implementing COPICS, and is based on the use of DL/I-DOS or IMS/VS-DB as the data base manager and CICS/VS as the communications manager.

**HIGHLIGHTS**

- Online creation and maintenance of the Resource/Facility Data Base, including checks of the input data
- Online creation and maintenance of the Tool Data Base, including validity checks of the input data
- Sequencing of machines contained within a work center
- Sequencing of the alternates to a work center or machine
- Specification of variation of standard cost rates of a work center or machine by time
- Specification of variation of capacity of a work center or machine, and variation of number of machines within a work center, by time
- Sequencing of tools contained within a tool kit
- Sequencing of the alternates to a tool or tool kit
- Migration of the respective data bases from the format supported by COPICS Facilities Data Control program (5798-CZH)
- Online inquiries on all data created. These include:
  - Resource (work center and machine) information
  - Usage of work centers by:
    - Department
    - Cost center
  - Usage of machines by:
    - Department
    - Cost center
    - Work center or work center and subgroup
  - Alternate resources
  - Alternate resource where-used
  - Tool information
  - Usage of tools by:
    - Tool kit
    - Group number or group number and subgroup
  - Alternate tools
  - Alternate tool where-used
- The COPICS-CORMES Interface is provided to facilitate the creation of 'action messages' by COPICS Facilities Data Management for distribution and control by the CORMES program. When CORMES is installed, 'action messages' are created when:
  - A work center is created
  - A work center is deleted
  - Capacity records are created, changed, or deleted.

**CUSTOMER RESPONSIBILITIES**

To implement COPICS Facilities Data Management, the customer must have installed appropriate machines and programs (see "Specified Operating Environment") and establish procedures to provide the data necessary to fulfill his requirements.

The installation of COPICS Facilities Data Management is supported by a sample. The programs are available in source code form (for customization purposes). COPICS Facilities Data Management uses

and updates two data bases: Resource/Facility and Tool. Users should review the data base definitions and screen designs for compatibility with their objectives. The major installation steps for the user who has already installed DL/I-DOS/VS or IMS/VS-DB and CICS/VS are:

- Print the program tape and review its contents and job control statements.
- Catalog, provided software includes:
  - COBOL programs
  - DL/I-DOS/VS or IMS/VS-DBDs and PSBs.
- Review the supplied CICS/VS table entries for compatibility with the user's system.
- Run the sample problem which loads the data bases.
- Run the batch and online programs against the sample data bases.
- Confirm the successful operation of all programs before making modifications and loading user data.
- Establish recovery procedures for data base integrity.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

COPICS Facilities Data Management is designed to operate on an IBM S/370, 30XX or 43XX Processor which supports DL/I-DOS/VS or IMS/VS-DB in a CICS/VS environment. The minimum configuration is 512K bytes of memory. Disk storage to hold the necessary DL/I data bases is also required. At least one 1,920-character IBM 3270 Visual Display Unit is required. The specific user operating environment will determine the actual storage requirements, depending on the number of transactions, number of terminals, and so on.

Furthermore, the following is required:

- One IBM 3340 Direct Access Storage Facility, or an equivalent device supported by DL/I-DOS/VS or IMS/VS
- One IBM 1403 Printer mdl NO1, or an equivalent device supported by the operating system, with at least 132 print positions, and
- One tape unit 9-track, 1600 bpi or 6250 bpi for installation purposes only.

**SOFTWARE REQUIREMENTS**

**DOS/VS Version:** This program is written in ANS-COBOL and requires the use of the DOS/VS COBOL Compiler and Library (5746-CB1) Version 1, Release 2.5 for installation and error correction. It is designed to operate with the following programs:

- DOS/VSE (5745-030) Version 1, Release 2
- VSE/Advanced Functions (5746-XE8) Version 1, Release 2
- DL/I-DOS/VS (5746-XX1) Version 1, Release 5
- CICS/DOS/VS (5746-XX3) Version 1, Release 5
- DOS/VS Sort/Merge (5746-SM2) Version 1, Release 3

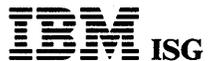
**OS/VS Version:** This program is written in ANS-COBOL and requires the use of the OS/VS COBOL Compiler and Library (5740-CB1) Version 1, Release 2.3 for installation and error correction. It is designed to operate with the following programs:

- OS/VS1 (5652-VS1) Version 1, Release 7
- IMS/VS (5740-XX2) Version 1, Release 2
- CICS/OS/VS (5740-XX1) Version 1, Release 5
- OS/VS Sort/Merge (5740-SM1) Version 1, Release 5

For both versions, the program is designed to operate in conjunction with the following optional programs:

- COPICS Product Cost Calculation II (5785-GBD)
- COPICS Online Routing (5746-XX1 for DOS/VSE and 5740-XYX for OS/VS, Version 1, Release 1.1)
- COPICS Shop Order Load Analysis and Reporting (5665-908)
- CORMES (5746-XXM for DOS/VS and 5668-007 for OS/VS)
- CAPOSS-E (5746-M41 for DOS/VS and 5740-M41 for OS/VS1)

**Note:** Where release numbers are specified for operating systems and licensed programs in this section, the above statements also apply to subsequent releases and modification levels unless otherwise provided by IBM.



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PP 5668-907.2  
Oct 83

PROGRAM PRODUCTS

**COPICS Facilities Data Management (cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*Product Information Notice (GH19-6373) ... General Information Manual (GH19-6357) ... User's Guide and Reference Manual (SH19-6362) ... Operations Guide (SH19-6363).*

**RPQs ACCEPTED: No**

**COPICS SHOP ORDER ANALYSIS and REPORTING**  
**RELEASE 1 Modification Level 0**  
**5668-908**

**PURPOSE**

The planning and control of the manufacturing process is characterized, as all complex processes, by a multi-level structure of planning, control, and execution.

Within this overall architecture, manufacturing activity planning is subdivided into discrete functional areas that span from the long-term resource requirements planning required to validate the master production schedule, through the release of manufacturing or shop orders, to monitoring and controlling the actual work performed on the factory floor.

COPICS Shop Order Load Analysis and Reporting represents the implementation of one of these levels within a general manufacturing activity planning system, and is designed to support the production planner activities associated with release, planning and control of shop orders.

These planning and control activities can be thought of as a bridge between the planning and execution functions of the manufacturing process, and include aspects of both environments.

**HIGHLIGHTS**

Together with material requirements planning and manufacturing order release functions, this program translates the master production schedule into work center schedules for open and released orders and calculates the resultant load on company resources. It assists the production planner in analyzing potential problem areas and in assessing alternatives. It facilitates that any resultant order, schedule, quantity or other change is updated in the shop order data base and subsequently is reflected in a revised material plan (for instance, by using COPICS Advanced Functions/Material Requirements Planning, 5785-GBF).

Within COPICS, 'opening' an order includes allocating component materials, firming the due date and quantity, and copying the relevant routing or process information into a shop order data base. This activity is performed by COPICS Shop Order Release II (5798-DCQ), or by a user-written shop order release program. 'Releasing' an order authorizes work to begin. When an order is completed, this fact can be recorded either through functions provided within COPICS Shop Order Release II, or within COPICS Plant Monitoring and Control System, Programs 5798-DFR and 5798-DFT, or a user-written plant monitoring and control system.

The manufacturing plan represented by these shop orders can thus be seen as a short/medium-term plan, usually covering a few weeks or a few months into the future.

COPICS Shop Order Load Analysis and Reporting uses forward and backward scheduling:

- Forward scheduling, from the order release date, determines the arrival time of work in the work centers for use in load planning and analysis.
- Backward scheduling, from the order due date, calculates the required dates of operations for use in establishing dispatch list priorities.

This technique of scheduling assumes average manufacturing lead times, and is sometimes referred to as infinite capacity scheduling.

The efficiency of work centers and work flow are measured using input/output control techniques.

**DESCRIPTION**

Primary functions are:

- To schedule open and released shop orders, operation by operation, backward from due date, and forward from the order release date.

Shop orders are forward and backward scheduled to set start and finish dates for all operations under control of this program, and to calculate the delay or slack associated with each order. This process is performed at regular intervals to maintain a prioritized schedule of manufacturing orders, taking into account work-in-process order and operation completions, and new or changed orders.

- To provide a load profile against each work center based on the forward schedule dates.

After the start and finish dates have been established for each operation, during forward scheduling, the resultant loads against individual work centers are calculated for a user-specified period into the future. These load profiles can be displayed. They show the daily or weekly loads and highlight any overloads and underloads. The cumulative effects of the latter are also shown, together with a projection of how long the situation will prevail, if corrective action is not taken. The load profile for any period can then be further analyzed to show the orders which make up the total. Thus,

an acute overload situation can be analyzed to determine whether the orders causing the overload can be replanned or whether additional short-term capacity should be supplied. The information for the display and analysis of load profiles is presented in numerical data form. Programs are also provided to display and analyze the load profiles in color-graphical form. These displays, using a 3279 Visual Display Unit, allow the user to assimilate very quickly the make-up of the load profiles and to determine whether any specific situation requires more detailed analysis.

Three color-graphical displays are provided:

- The profile of the total load compared with the available capacity.
- The make-up of the total load by orders, giving the number of days in delay.
- The total load, showing open, released and in-process orders.

- To provide an input/output control system, by maintaining historical and projected loads, and comparing the actual throughput of work with the planned input.

Information is provided to control the flow of work through the work centers by comparing the actual output with the planned input. In addition, the actual queue sizes are displayed which can be compared to the planned queue time for the work center, so that the production planner can see if work is building up at a particular work center or if a work center is likely to be starved of work.

The information for the display and analysis of the flow of work through the work centers is presented in numerical data form. Programs are also provided to display and analyze this information in color-graphical form. These displays, using a 3279 Visual Display Unit, allow the user to assimilate very quickly the trends of workloads and queue sizes and to determine whether any specific situation requires more detailed analysis.

Three color-graphical displays are provided:

- The historical trend of actual workload received compared to that released for a work center.
- The historical trend of the distribution of queue sizes across all work centers scheduled by this program.
- The historical trend of the queue size for an individual work center.

- To highlight deviations in planned manufacturing lead times.

A batch report can be produced showing statistics of the lead times used in the material planning system compared with the actual manufacturing lead times achieved. Any deviations are highlighted and this information can be used to revise the lead times in materials planning: If COPICS Advanced Functions/Material Requirements Planning is used, this will be done the next time this program is run.

- To prepare suggested job dispatch lists for each work center, based on the dates derived from backward scheduling.

The preparation of work center dispatch lists is a function of shop floor supervision. COPICS Shop Order Load Analysis and Reporting provides information which can be used as a starting point to plan the day-to-day activities at each work center. All operations in process and planned at each work center may be displayed in priority sequence. This priority sequence is determined as follows:

- The status of operations.
- The start date of the operation determined during backward scheduling.
- The external priority of the operation's associated order.

- To report work done against individual operations and orders by quantity and/or by time.

This information reflects the latest position of orders as they progress on the shop floor. The system allows for the reporting of any scrap quantities. An entire order with its operations and accumulated feedback data can be displayed so that urgent orders can be progressed. The ability to report feedback of work done is provided via online terminals. This feedback facility provided can be regarded as a first step in implementing a full production recording system. A more complete system of feedback reporting is provided by COPICS Plant Monitoring and Control System.

- Online rescheduling of single or multiple orders which have changed since the last batch regenerative scheduling run.

This function is provided so that the production planner can ensure that the projected work center loads are current, and that the operation schedules reflect the latest order status.

- Maintain basic Work Center data.

This function creates and maintains all Work Center data required by this program to perform scheduling and build load profiles.

## PROGRAM PRODUCTS

**COPICS Shop Order Load Analysis & Reporting (cont'd)**

- Color Graphic Displays.

This program offers the optional use of Color Graphics, a medium particularly well suited to complex and dynamic situations. Through use of this medium, the projections of work center loads, the historical trends of both the actual work done and the queue sizes measured, are clearly and quickly assimilated.

It is assumed that the shop orders are organized according to the Shop Order Data Base as described in the *Program Description and Operations Manual* (SB11-5807).

This program is offered within the COPICS Implementation program. It has been designed around the COPICS DL/I Manufacturing Data Base architecture to operate in an integrated mode with the other products offered within that program. COPICS Implementation is the IBM Manufacturing Industry program for implementing COPICS. It is based on the use of DL/I DOS/VS or IMS/VS-DB as the data base manager and CICS/VS as the communications manager.

**CUSTOMER RESPONSIBILITIES**

To implement COPICS Shop Order Load Analysis and Reporting, the customer must have installed appropriate machines and programs (see "Specified Operating Environment") and establish procedures to provide the data necessary to fulfill his requirements.

The installation of COPICS Shop Order Load Analysis and Reporting is supported by a sample. The programs are available in source code form (for customization purposes). COPICS Shop Order Load Analysis and Reporting uses and updates four data bases: Shop Order, Work Center Load, Resource/Facility, and Standard Text. Users should review the data base definitions and screen designs for compatibility with their objectives. The major installation steps for the user who has already installed DL/I-DOS/VS or IMS/VS-DB and CICS/VS are:

- Print the program tape and review its contents and job control statements.
- Catalog, provided software includes:
  - COBOL programs.
  - DL/I-DOS/VS or IMS/VS DBDs and PSBs.
- Review the supplied CICS/VS table entries for compatibility with the user's system.
- Run the sample problem which loads the data bases.
- Run the batch and online programs against the sample data bases.
- Confirm the successful operation of all programs before making modifications and loading user data.
- Establish recovery procedures for data base integrity.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This program is designed to operate on an IBM S/370, 30XX, or 43XX Processor which supports DL/I-DOS/VS or IMS/VS-DB in a CICS/VS environment. The minimum configuration is 512K bytes of memory. Disk storage to hold the necessary DL/I data bases is required. At least one 1,920-character IBM 3270 Visual Display Unit is required. An IBM 3287 mdl 2C Printer is optional. The execution of graphic displays requires the use of at least one IBM 3279 Visual Display Unit mdl 3B with program symbols. The specific user operating environment will determine the actual storage requirements, depending on the number of transactions, number of terminals, and so on.

**SOFTWARE REQUIREMENTS**

**DOS/VS Version:** This program is written in ANS-COBOL and requires the use of the COBOL/VS Compiler and Library (5746-CB1) Version 1, Release 2.5 for installation and error correction. The program is designed to operate with the following programs:

- DOS/VSE (5745-030) Version 1, Release 2
- VSE/Advanced Functions (5746-XE8) Version 1, Release 2
- DL/I-DOS/VS (5746-XX1) Version 1, Release 5
- CICS/DOS/VS (5746-XX3) Version 1, Release 5
- DOS/VS Sort/Merge (5746-SM2) Version 1, Release 3

**OS/VS Version:** This program is written in ANS-COBOL and requires the use of the COBOL/VS Compiler and Library (5740-CB1) Version 1, Release 2.3 for installation and error correction. It is designed to operate with the following programs:

- OS/VS1 (5652-VS1) Version 1, Release 7
- IMS/VS-DB (5740-XX2) Version 1, Release 2
- CICS/OS/VS (5740-XX1) Version 1, Release 5
- OS/VS Sort/Merge (5740-SM1) Version 1, Release 5

For both versions, the program is designed to operate in conjunction with the following optional programs:

- COPICS Plant Monitoring and Control System (5798-DFR and 5798-DFT)

- COPICS Facilities Data Management (5668-907)
- COPICS Shop Order Release (5798-DCQ)
- CORMES, (5746-XXM for DOS/VS, 5668-007 for OS/VS)
- Graphical Data Display Manager/Presentation Graphics Feature (GDDM/PGF) (5748-XXH) Version 1, Release 2

**Note:** Where release numbers are specified for operating systems and licensed programs in this section, the above statements also apply to subsequent releases and modification levels unless otherwise provided by IBM.

**DOCUMENTATION**

(available from Mechanicsburg)

*Product Information Notice* (GH19-6372) ... *General Information Manual* (GH19-6358) ... *User's Guide and Reference Manual* (SH19-6361) ... *Operations Guide* (SH19-6360).

RPOs ACCEPTED: No

**PROGRAMMABLE STORE SYSTEM  
LANGUAGE and HOST SERVICES - DOS/VSE and OS/VS  
VERSION 1 RELEASE 1 (5668-912)**

**PURPOSE**

The Language and Host Services (LHS) program supports the 3650 and 3680 Programmable Store Systems. It is a replacement for support previously available with 3650/3680 PSS SPSS II (PP) and Host Support (SCP).

**DESCRIPTION****HOST SERVICES SUPPORT**

Host Services supports the 3650 Programmable Store System and 3680 Programmable Store System residing in a Host S/370, 43XX or 30XX. It consists of the following basic components: Controller Configuration Facility, Terminal Configuration Facility, Data Base Facility and Data Communication Facility. Host Services supplies the support to maintain PSS system libraries, tailor and transmit controller and terminal programs from a host to a 3651 or 3684, generate microcode tables for use in a 3651 or 3684 Controller and the POS terminals, create file format controls and allocate space for files, and provide problem determination aids. It also provides support to retrieve data files, dump files and PDS members. Either BTAM or BSC or VTAM for SDLC provides transmission to and from the store controller.

**LANGUAGE SUPPORT**

SPSS II is the user program facility for the Programmable Store System. Programs written with SPSS II can support the 3561 mdls 25 or 75 Store Controllers or 3684 Point-of-Sale Control Unit mdls 1 and 2. Devices executing the Subsystem Programming Preparation Support II programs are the 3651 mdls 25 or 75, 3683, 3684, host communications, 3275-3 Display Station, 3653 mdl 1P and 3663 mdls 1P and 3P.

SPSS II provides the following additional services:

**SPSS II Assembler Language:** SPSS II provides Assembler language (F) instructions supported as macros. These instructions are assembled at the host processor and executed at the store controller or the programmable terminal or both. Arithmetic, logical and branching instructions are included in the set.

**SPSS II Macros:** The SPSS II macros, along with assembler instructions, are assembled together at the host processor, then transmitted as a program to the store controller. SPSS II programs are executed in the 3651 mdls 25 and 75, 3684, or the programmable terminal.

- SPSS II supervisory macros are provided to define: (1) the message routing path between a terminal program and a controller program, (2) to initialize a user program for execution and, (3) allocate system resources and control blocks.
- SPSS II controller-to-controller communications macros are provided to control the Auxiliary Communications Adapter available on the 3651 mdl 75.
- SPSS II Debug Macros are included to provide a diagnostic tool to the SPSS II programmer.
- SPSS II macros are provided that execute in the programmable terminal, perform various terminal functions and control terminal operations.

**Post-Processor:** SPSS II provides a Post-Processor as a stand-alone program, executing in the host S/370, 43XX or 30XX. It uses the SPSS II program assembly listing as input, and produces a reformatted and edited assembly listing as output.

**CUSTOMER RESPONSIBILITIES**

The customer must create a unique macro library for SPSS II, for the Controller Configuration Facility macros, and for the Terminal Configuration Facility macros. The user must then install the macros supplied with these three facilities in the library.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

A minimum IBM 3650 or 3680 Programmable Store System requires support from:

- (1) One IBM S/370, 43XX or 30XX with one of the following operating systems, BTAM or VTAM, and the system assembler.
  - DOS/VSE
  - VSE/SP
  - OS/VS1
  - OS/VS2 (MVS/370 and MVS/XA)
- (2) LHS Version 1 Release 1 requires 50K bytes of virtual storage over and above the virtual storage required for Access Method Services. (More memory is required depending on the amount of data to be processed from the LHS unique data sets and the number of controllers communicating with the transmission facility of LHS.)

- (3) An IBM 3704, 3705 or 3725 Communications Controller in emulation mode (EP) or network control mode (NCP), or a S/370 ICA or 43XX CA using BTAM-ES or ACF/VTAM.
- (4) A telecommunications access method (BTAM for BSC or ACF/VTAM for SDLC).
- (5) The Virtual Storage Access Method (VSAM).
- (6) The IBM 3651 mdl A25, B25, A75, B75, C75 or D75 Store Controller or 3684 Point-of-Sale Control Unit mdl 1 or 2.
- (7) An IBM 3653 mdl 1 or 1P, 3663 mdl 1P or 3P, 3275 mdl 3 Display Station, or a 3683 Point-of-Sale Terminal.

Additional terminal devices may be added. (See appropriate Machine pages.)

**DOCUMENTATION**

(available from Mechanicsburg)

*SPSS II Language Guide (SC30-3220) ... SPSS II Language Reference (SC30-3221) ... SPSS II Language Messages and Codes (SC30-3222) ... 3650 Programmer's Guide (SC30-3215) ... 3650 Macro Reference (SC30-3216) ... 3680 Programmer's Guide (SC30-3217) ... 3680 Macro Reference (SC30-3218) ... 3650/3680 Commands and Messages (SC30-3219) ... Licensed Program Specifications (GC30-9563).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** Yes



**DATA INTERFILE TRANSFER, TESTING and  
OPERATIONS UTILITY for VSE and VM  
5668-917**

**PURPOSE**

Data Interfile Transfer, Testing and Operations Utility for VSE and VM licensed program (hereinafter referred to as DITTO for VSE and VM or simply DITTO) is a general-purpose utility program for card, magnetic tape, disk, and diskette input/output devices for use in both the VSE/Advanced Functions and VM/CMS environments. It provides the facility to list, scan, display, copy, alter, and create files or portions of files. The wide range of user-oriented functions is intended to aid programmer testing, reduce the need for separate specialized utility programs, and provided greater operational productivity. DITTO offers the user an efficient and easy-to-use tool for testing and file-handling in both a batch and interactive environment.

**DESCRIPTION**

- Processing control functions which allow changes to the card end-of-data delimiter, dump output format, printed output formatting, language for messages, and header page suppression.

A profile capability is also provided to allow the user to preset this control information to individual or installation defaults.

- File-to-File functions including diskette file, SAM (Sequential Access Method), ISAM (Indexed Sequential Access Method), VSAM (Virtual Storage Access Method), and, under VM/CMS, CMS file support, providing the user with the ability to create diskette, SAM, ISAM, VSAM or CMS files from cards, tapes, diskette, or other SAM, ISAM, VSAM or CMS files. The user may also change blocking factors and file locations. These functions may be performed on a complete file or portions of a file.

A function to allow direct updating of VSAM file data is also provided.

- Device-to-Console functions, allowing the user to display small amounts of tape, disk, or diskette data directly on a console for scanning and verification purposes.
- Card functions to list and copy, also permitting interpretation of punched output and pre-punched cards.
- Tape functions to scan, alter, list, copy and compare tape files or portions of tape files.

A tapemap function is also available to list in compact form information about the contents of a tape including tape usage statistics.

- Disk functions to scan, alter, list, and display data stored on Direct Access Storage Devices on a physical address basis.

Disk functions support both count-key-data (CKD) and fixed block architecture (FBA) devices.

For data stored on FBA devices in control intervals (CI) which span one or more physical blocks, DITTO allows the user a physical view of the data on either an individual block basis or on a CI basis, depending on the specification of a CISIZE parameter.

- Disk VTOCs can also be listed or sorted either by name, creation or expiration date, or by extents (including free areas). VTOC entries can also be scratched or renamed.
- Buffer functions allow creation of simple test data on tape, SAM, ISAM, VSAM, and diskette files directly from data in an in-core buffer according to user specifications.
- A documentation function provides a program-generated document of the DITTO functions and associated parameter requirements. Additionally, under VM/CMS, a help file is available for use with the CMS HELP command.

Operations may be performed in (interactive) online mode from a VSE system console, a VSE/ICCF terminal, or a VM/CMS terminal. In batch mode, operations are controlled via job control statements. In online operation, multiple parameters may be entered in a single operator command, thus reducing console message time. Control card parameters are free form and variable-length format.

A tape error correction routine allows the user to correct records in error directly on the console before copying onto an output file.

Tape, Disk, and Diskette scanning functions are provided to search records for a given scan argument.

**Enhancements in Comparison to VSE/DITTO (5746-UT3)**

- Ability to run in the VM/CMS environment as well as under VSE. Under VM/CMS it is possible to run a large subset of the functions available under VSE. Both batch and online execution modes are supported.
- Full screen display mode for record display and alteration functions. This support includes data scrolling and locate functions to rapidly find the data of interest.

- A tape-to-tape compare function to compare the contents of two different files. If an inequality is found, the input and output records will be printed out.
- A VSAM Record Load function to allow direct alteration of VSAM file records.
- Further control function extensions are provided to allow the user to specify:
  - Dump formats of UPDOWN or ACROSS (new horizontal format)
  - Print length of 80 or 132. The shorter length is especially useful on VSE/ICCF screens to avoid overlapped output lines.
  - Print destination for VM/CMS users to allow redirection of print output to the screen (as in VSE/ICCF).
- Significant ease-of-use improvements, for example:
  - SET function defaults can be set and changed via a profile.
  - Horizontal Dump format for printouts and full screen displays.
  - The VTOC display function is extended to provide additional information about the files on the disk including expiration dates, and is presented in a more compact format.
  - The Disk Record Scan function is extended to also show the offset of the data found in the record and to provide printouts of each record where a hit is found.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

DITTO is designed to operate on all IBM processing units supported by VSE and/or VM/SP, that is, IBM S/370, 303X, 308X, and 4300 Processors.

DITTO can be used with the following devices:

Card	IBM 1442, 2501, 2520, 2540, 2560, 2596, 3504, 3505, 3525, 5424, and 5425.
Tape	IBM 2401, 2420, 3410, 3411, 3420, 3430, and 8809.
Disk	IBM 2311, 2314, 3310, 3330-1, 3330-11, 3340/44, 3350, 3370, 3375, and 3380 (under VM/SP only).
Console	Any console eligible device (screens in Printer/Keyboard or Display Operator Console mode only).
Screens	IBM 3270 (full screen functions only).
Printer	All printers supported by VSE or VM.

**Specific Requirements**

- IBM 3524 Card Punch features: VSE/DITTO supports either the Two-Line Print feature (#8339) or the Multi-Line Print feature (#5273) for punched output. For interpreting pre-punched cards, in addition to one of the above print features, the Punch Card Read feature (feature #1533) is required.
- IBM 2560 Multi-Function Card Machine features: Punched output can be interpreted, if the 2560 is equipped with the Card Print feature (#1575, #1576, or #1577).

DITTO for VSE and VM has program space requirements ranging from 70K up to a maximum of 120K. Buffer space for I/O areas are used beyond the program space. Buffer space requirements range from 0 to 128K (for two 64K buffers) depending on the function and devices used. Therefore, total space requirements range from 70K to 220K.

**SOFTWARE REQUIREMENTS**

DITTO for VSE and VM is designed to operate under VSE/Advanced Functions Release 3.0 and 3.5 (5746-XE8) or later, or VM/SP Release 1.0 (5664-167) or later.

If VSAM functions are to be used, VSE/VSAM (5746-AM2) Release 2.0 or later must be installed. For the dynamic allocation of SAM files under VSE, the VSE/VSAM Space Management for SAM feature is required.

**INSTALLATION**

For VSE systems:

DITTO will be shipped in private libraries. The distribution medium is tape in RESTORE format. DITTO is installed by invoking the INSTALL COMPONENT function of the VSE Maintain System History Program (MSHP).

For VM/CMS systems:

DITTO will be shipped as a set of modules, text, source and exec files. The distribution medium is tape in VMFPLC2 format. DITTO is installed by use of the VMFPLC2 LOAD command.

**COMPATIBILITY**

DITTO for VSE and VM is compatible with the existing program product VSE/DITTO (5746-UT3) as regards functions already available with this product.



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Jul 83

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PROGRAM PRODUCTS

**DITTO (cont'd)**

**Source Materials:** Source materials for DITTO for VSE and VM will not be made available to customers. A Restricted Materials Amendment to the agreement for IBM licensed programs must be signed prior to a customer receiving any licensed program materials for this licensed program.

**PERFORMANCE CONSIDERATIONS**

Performance is equal to that of VSE/DITTO Release 3 when measured within the same or comparable environments and conditions.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information (GH19-6103) ... Licensed Program Specifications (GH19-6105) ... Program Reference and Operations Manual (SH19-6104) ... Reference Summary (SX11-6106).*

**RPQs ACCEPTED: No**

**CROSS SYSTEM PRODUCT/QUERY  
5668-918**

**PURPOSE**

Cross System Product/Query is an interactive query/report writer for use by the business professional and the data processing professional. It provides access to Virtual Storage Access Method (VSAM) files through easy-to-use, menu-oriented dialogs or through a non-procedural query language. In either query mode, Cross System Product/Query allows the user to select and view VSAM data in simple tabular form. A menu-oriented dialog then assists the user in formatting the information for report generation. The query language of Cross System Product/Query is a subset of the Structured Query Language (SQL).

**SPECIAL SALES INFORMATION**

Cross System Product/Query is a member of the Cross System Product set of programs, and makes use of Cross System Product/Application Development library facilities for storage of data and query specifications. Cross System Product/Query is a companion product to Cross System Product/AD, and is intended to be marketed with Cross System Product/AD. Cross System Product/Query reduces the skill requirement for one-time query and report generation, and significantly expands the report writing capabilities of Cross System Product/AD.

Cross System Product/Query is a complementary product to Query Management Facility/VSE (QMF/VSE) in the DOS/VSE and SSX/VSE environments. Cross System Product/Query should be used by customers who need online access to operational information stored in VSAM files. Customers installing QMF/VSE and/or SQL/DS may also use Cross System Product/Query as a supplemental query facility against those VSAM files not planned for conversion to SQL/DS.

QMF/VSE is the query-report writing offering for customers with relational data bases installed in the VSE environment. QMF/VSE is a full function and easy-to-use product designed to work with SQL/DS. Since it is ultimately desirable for most customers to install a data base management system, Cross System Product/Query externals have been designed taking SQL/DS and QMF/VSE into consideration. In particular, Cross System Product/Query supports a subset of the Structured Query Language, and uses the same terminology as QMF/VSE where possible.

Cross System Product/Query provides the customer with dual growth paths:

- For those users who desire the efficiencies of a data base manager, or who require additional query capability, the addition of SQL/DS and QMF/VSE will be a natural progression. This growth path is also available to customers with MVS and VM systems through the use of QMF with DB2 or SQL/DS.
- For users who wish to progress beyond query into more general application development, Cross System Product/AD can be used with minimal additional learning.

**HIGHLIGHTS**

- Menu-oriented dialogs for query and report generation.
- SQL query specifications.
- Results online or printed.
- Direct access to VSAM data.
- Tabular view of data.
- Saved query capability.
- Stored query results for later use by Cross System Product/Query and other applications.
- Access to Cross System Product/AD data definitions.

**DESCRIPTION**

Cross System Product/Query supports a dynamic interaction between users and their existing data. Through Cross System Product/Query, the user can view selected data on a terminal. If desired, the data can be selected, formatted and printed as a report. Further, the user may create a copy of the selected data in a new file. User interactions can be minimal to accommodate simple data requirements with little effort, or involve more sophisticated query facilities which accommodate complex information requirements. These include the ability to specify selection conditions, invoke built-in functions, sort the output, and collect the data into convenient groups for reporting purposes.

**Modes of Use:** Cross System Product/Query supports two levels of user interface: Menu and command level.

The menu interface to Cross System Product/Query is primarily for the non-DP user and/or occasional user. The menu interface is a full-screen, prompted interface providing dialogs, each of which support a Cross System Product/Query service.

Cross System Product/Query also offers a command interface. Through this interface, a subset of the SQL SELECT statement and the Cross System Product/Query display commands are available. The

primary users of this interface are envisioned to be skilled users and frequent users of Cross System Product/Query.

**Direct Access to VSAM Data:** Once a file is defined through the Cross System Product/AD data definition facility, it can be accessed by a Cross System Product/Query user. Cross System Product Query supports access to the following VSAM file organizations:

- ESDS
- KSDS
- RRDS

**Tabular View of Data:** Cross System Product/Query supports a tabular view of flat files. Data is defined and accessed in terms of data tables and operations on data tables. The two-dimensional tables, which are a structured part of the relational model, normally have a fixed number of columns and a variable number of unnumbered rows. The relational model can effectively support a broad range of user data requirements. Views may be defined on tables such that user logical tables need not conform to actual VSAM files.

**Query Specification:** Cross System Product/Query provides a rich set of query capabilities. In particular, through the query facility, the user can:

- Access one or two files at a time.
- Collect all records meeting a condition or only unique records.
- Use SQL built-in functions:

SUM  
AVG  
MIN  
MAX  
COUNT

- Create derived data using calculations:

ADD  
SUBTRACT  
MULTIPLY  
DIVIDE

- Use record selection criteria:

EQUAL/NOT EQUAL  
LESS THEN/LESS THAN OR EQUAL  
GREATER THAN/GREATER THAN OR EQUAL  
LIKE  
BETWEEN  
IN

- Test for multiple conditions using conjunctions:

AND  
OR  
NOT

- Order the results of a query (SORT).
- Sample the results of a query.
- Store the results of a query.

**Report Specification:** With Cross System Product/Query, query output can be displayed or printed. The report specification dialog provides considerable flexibility in formatting this output. Reports can be tailored directly to users needs. In particular, Cross System Product/Query provides the following functions.

- Titles
- Headings and footings
- Default date and page numbering
- Control break and control break text
- Summing for totals and subtotals
- Multiple copies
- Field editing
- Outlining
- Reordering of columns
- Include and exclude columns
- Column spacing

**Saved Query Capability:** Once a query is created and run, either through the menu or command interface, the user can save the query specification for execution at a subsequent session. At the time the query is saved, the formatting information is also retained. When a saved query is run, formatting takes place as if the stored format specifications had been entered from the terminal. To modify the display/report format, the user merely uses the menu support to modify the display to fit requirements. The updated query may also be saved.

Besides these capabilities, a saved query can be edited, renamed or erased.

**Stored Results:** The results of a query can be saved in a VSAM ESDS data set and used in subsequent queries or processed by other applications.

## PROGRAM PRODUCTS

**Cross System Product/Query (cont'd)**

Access to Cross System Product/AD Data Definitions: Cross System Product/Query uses the Cross System Product/AD development library as the source of the data definitions for creating a query. Therefore, the same file definitions used to create application programs can be used for query.

Online HELP: Upon request, Cross System Product/Query will provide online reference information. This includes end-user-oriented explanations of menu entries, command syntax and Cross System Product/Query error messages.

**CUSTOMER RESPONSIBILITIES**

The customer must perform the following tasks:

- Provide adequate system resources.
- Install the prerequisite program products.
- Install Cross System Product/Query.
- Install optional program products (such as VSE/POWER, etc., or equivalents).

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Cross System Product/Query is designed to operate on any IBM S/370, 4300 or 3000-series system with one megabyte or more of memory.

Any display terminal supported by Cross System Product/AD and the underlying software environment operating in 3270 single-byte character mode may be used with Cross System Product/Query.

**SOFTWARE REQUIREMENTS****CICS/DOS/VS:**

Cross System Product/Query requires the following configuration of software:

- VSE/SP 1.1 or DOS/VSE SCP with VSE Advanced Functions Release 2 or later.
- CICS/DOS/VS Release 1.5 or later.
- Cross System Product/Application Development (5668-944) Release 1.1.
- Cross System Product/Application Execution (5668-945) Release 1.1.
- Virtual Storage Access Method (VSAM) Release 2 or later.
- ACF/VTAM or ACF/VTAME or BTAM-ES.

**SSX/VSE:**

- SSX/VSE Release 1.3 or later.
- Cross System Product/Application Development (5668-944) Release 1.1.
- Cross System Product/Application Execution (5668-945) Release 1.1.

**COMPATIBILITY**

Cross System Product/Query externals have been designed taking SQL/DS and QMF/VSE into consideration. In particular, Cross System Product/Query supports a subset of the SQL SELECT command and, where possible, uses the same terminology as QMF/VSE.

Queries are not portable to either QMF/VSE or SQL/DS. The similarity in language, however, should allow the user to quickly respecify queries once data is available under SQL/DS.

**CONVERSION (not applicable)****DATA SECURITY**

The two primary aspects of security in Cross System Product/Query are:

- Controlling access to Cross System Product/Query itself, and
- Controlling access to the data.

Access to Cross System Product/Query itself is via CICS/DOS/VS. At most installations, Cross System Product/Query users will be required to first signon to CICS/DOS/VS by entering a valid user identification (userid) and password. Userids and passwords are usually controlled and assigned by the installation's system administrator.

Access to the data is through Cross System Product/AD libraries which are also controlled by the system administrator. Each library defines one or more existing VSAM files. If desired, the libraries can be defined so that particular fields within the files are inaccessible.

**PERFORMANCE CONSIDERATIONS**

Cross System Product/Query can be used for query/report writing on a 4321 or a one-megabyte 4331 supporting a limited number of

terminals. Customers who plan to use Cross System Product/Query in conjunction with Cross System Product/AD for query, application development and concurrent application execution will require two megabytes or more of memory. Query/report writing with volume workloads also require two megabytes or more of memory and additional system capacity.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information (GH24-5048) ... Installation and Administration on CICS/DOS/VS Systems (SH24-5049) ... Installation and Administration of SSX/VSE Systems (SH24-5050) ... User's Guide and Reference (SH24-5051) ... Messages (SH24-5052) ... Problem Diagnosis Guide (SH24-5053) ... Licensed Program Specifications (GH24-5047).*

RPQs ACCEPTED: No

## PROGRAM PRODUCTS

**INFORMATION/VM-VSE  
5668-919****PURPOSE**

The Information/VM-VSE product is a consolidated collection of IBM technical data of interest to data processing staffs responsible for planning, installing, supporting and tuning IBM systems, subsystems and components appropriate to the VM/370 and VSE environments.

When used in conjunction with Information/System, it provides data processing personnel with keyword access to a wide range of selected technical information regarding IBM products.

**SPECIAL SALES INFORMATION**

See pages for Information/System (5735-OZS).

**HIGHLIGHTS OF INFORMATION/SYSTEM with  
INFORMATION/VM-VSE**

- Interactive retrieval facility for keyword searches of the data.
- Designed for ease-of-use.
- Load program to load the Information/VM-VSE product into the user system.
- Capability to insert user data.
- Ability to optionally print selected screens or entries.

**DESCRIPTION OF INFORMATION/SYSTEM**

Information/System in conjunction with Information/VM-VSE is a productivity tool designed for use by data processing personnel supporting a VM/370 or VSE environment. It consists of an interactive information retrieval facility designed to provide access to the Information/VM-VSE files via previously assigned keywords, and of the appropriate programs for loading the data base.

Design objectives of Information/System and the companion Information/VM-VSE product are to:

- Make the data available to the user online and on the user's system.
- Simplify and speed keyword searches of information.
- Integrate IBM technical information from many sources.
- Broaden the amount of technical information available to users.
- Keep the information up to date by addition of new data and by purging the out-of-date material.
- Enable users to add information to Information/VM-VSE.

The Information/System interactive retrieval facility provides the user with a set of commands to access the data provided by Information/VM-VSE through display terminals. The retrieval facility provides a keyword search function through which the user can search documents by specifying one or more previously assigned keywords connected by Boolean operators ('and', 'or', 'not'). The search can include all the document types or can be restricted only to selected types (e.g., EWS, PTF cover letters). The user can display the complete stored text of the documents or the titles only.

The user also has the option to search all of Information/VM-VSE or to limit the search only to any new entries added since the previous distribution tape.

Other Functions of Information/System include:

- Sequential display of contiguous data entries of Information/VM-VSE.
- A PRINT command to allow the user to print a section of a document or entire documents for later reference.
- A keyword glossary to expedite and facilitate the search process.
- A FIND command to locate specific words inside a pre-identified document.
- A HELP facility is built into Information/VM-VSE to describe error conditions and to suggest corrective actions.

**HIGHLIGHTS OF INFORMATION/VM-VSE**

- Online, consolidated collection of technical information from many IBM sources.
- Periodic updates to the Information/VM-VSE product to provide current information.
- Self-instruction and usage assistance information.

**DESCRIPTION OF INFORMATION/VM-VSE**

Technical information from a number of development, system and support locations worldwide is edited, structured and incorporated into Information/VM-VSE.

Types of information in Information/VM-VSE include:

- Selected IBM system support center flashes, memos, question and answer logs and technical articles produced by the support organization responsible for the subject element. Selected lengthy articles are abstracted and ordering information is included. (Occasionally, such documents are added as an additional file on the distribution tape.)
- Technical descriptions of recent IBM programming announcements.
- Service information on selected IBM software products including early warning system (EWS) data and systems engineering communications (SECOM).
- Status information on selected program products, installed user programs and field developed programs. Included is information on availability, feature numbers, optional features and documentation order numbers.
- A selection of Program Temporary Fix (PTF) cover letters and Program Level Change (PLC) information that may be used in conjunction with the EWS file to locate appropriate fixes for identified problems.
- Brief descriptions of schedules for some of the education courses that IBM is conducting.
- An interactive HELP file designed to assist the user in making the most effective use of Information/System. A part of this file is a self-instruction tutorial for new users of the system.
- A keyword glossary giving alphabetical access to all keywords, whether abbreviated, hyphenated or misspelled by the author, which enhances the ability to find the required document.

The major products addressed by Information/VM-VSE include:

- Systems - S/370, 4300, 8100 Information System, industry and cross industry terminal systems, storage and printing units.
- Programming - Operating systems, compilers and assemblers, access methods, DB/DC products, emulators, job entry subsystems, utilities and interactive products.

The update of Information/VM-VSE is distributed by the standard IBM distribution centers. The distribution tapes are available in 9-track/1600 bpi and 9-track/6250 bpi. Utility programs in Information/System merge the updates into the existing data base.

During the installation process, users have the option to:

- Insert their own data into Information/VM-VSE.
- Select only those types of data from Information/VM-VSE that are likely to be relevant to their environment.

All the IBM-provided Information/VM-VSE material must be regarded as working documents intended to assist the professional data processing personnel. The information does not provide formal IBM recommendations or documentation. The information provided is intended for use by data processing personnel who are sufficiently familiar with the necessary background material to understand the topics discussed and to use the information within the proper context and with the proper safeguards.

The technical material included in Information/VM-VSE addresses a wide variety of IBM products that are commonly used in a VM/370 or VSE installation. Although the main objective of Information/VM-VSE is to assist the user with useful, timely and up-to-date information, there is no commitment to provide exhaustive or complete information on any product addressed.

The customer may make printed copies of limited portions of the Information/VM-VSE product for use within the customer's organization for purposes of maintenance and improvement of the customer's data processing installation.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Storage Estimates: Direct Access storage requirements for the data product varies with the amount of data selected by the user. Information/VM-VSE requires approximately 80 to 100 megabytes of direct access storage for an untailored data base.

RPQs ACCEPTED: No



PROGRAM PRODUCTS

**EXPANDABLE LEVEL INTERACTIVE APPLICATION SYSTEM/MULTIPLE VIRTUAL SYSTEM ELIAS/MVS (5668-923)**

**PURPOSE**

Expandable Level Interactive Application System/Multiple Virtual System is a productivity tool which assists programmers operating in the MVS environment in developing and maintaining batch and online applications written in COBOL and/or PL/I, supporting all ranges of application types, from the simplest to the most complex. It is a major functional and environmental extension of the productivity concepts proven by the Entry Level Interactive Application System-One (ELIAS-I) product family currently available in the VSE and SSX environments. In addition, ELIAS/MVS extends the potential for significant improvements in application programming productivity to programmers of all skill levels from DP novices to experienced professionals.

**SPECIAL SALES INFORMATION**

All established or new MVS installations having significant application backlog and significant application maintenance workload should benefit from the use of ELIAS/MVS. This product will prove very helpful in speeding up new application programming and application maintenance, especially in complex DB/DC applications and in large installations.

**HIGHLIGHTS**

- Single interface to application development and maintenance functions through use of ISPF dialog manager, and inline invocation of SDF Release 4.
- Interactive interface to macro parameter specification for CICS, DL/I, IMS/DB and VSAM.
- Supports all COBOL and PL/I non-floating-point functions.
- Productivity benefits for both experienced and entry-level programmers.
- Ease of use for entry-level users doing batch and DB/DC programming.
- 'Fast Path' for experienced programmers.
- Pre-coded program frameworks automatically filled in from data input procedures.
- Pre-coded, pre-tested sets of source code statements called 'bricks' to handle repetitive, commonly-used functions.
- System services to handle user-written bricks.
- Repository facilities to store, retrieve and reuse application elements.
- Application maintenance support through repository services.
- Export/Import capability of DBDs, PSBs and Data Structures, particularly intended to support Data Dictionary users.
- Import/Export of application elements between different ELIAS/MVS installations.
- Authorization mechanism to control access to dialogs.
- Three levels of default values.
- Online 'Help' and tutorials for ease-of-use and 'as-required' education.
- ELIAS/MVS will run under either TSO or VM/CMS (no-charge specify feature).
- Capability to specify code that the user may transport and adapt for compilation and execution in the VSE environment.
- Upward compatibility from ELIAS-I/VM.

**DESCRIPTION**

- ELIAS/MVS dialogs run under the control of the Interactive System Productivity Facility (ISPF, 5668-960), which provides a unique interface to most application development and maintenance functions, standardized panel layouts and, where appropriate, standardized Program Function key assignments. While ELIAS/MVS will support BMS macro definition, the use of SDF Release 4 is encouraged as a high-level, ease-of-use screen definition tool. ELIAS/MVS supports SDF/CICS OS/VS Release 4 (5740-XYF), and SDF/CICS CMS Release 1 (5664-178), providing services to handle map definitions generated by these products. SDF can be directly invoked by an ELIAS/MVS panel to which control will be automatically returned once the user has executed the desired SDF functions.
- ELIAS/MVS provides a user-friendly interface to specify CICS (both OS and VSE), IMS/DB, DL/I and VSAM parameters. Application execution, however, is dependent upon the availability of the corresponding products and features in the target (execution) system.

- This interface consists of a set of interactive dialogs which accept user specifications and automatically build the correct input for control blocks and program skeletons generation. These dialogs are sufficiently straightforward for the new user to understand, yet they provide the means for the advanced programmer to create more sophisticated function. This function can be used to build and maintain data communication, data base and VSAM file specifications.
  - ELIAS/MVS supports all functions provided by COBOL (5740-CB1) Release 2.3 and PL/I (5734-PL3) Release 4.0 (excluding floating-point functions).
  - ELIAS/MVS functions provide productivity benefits for the experienced programmer while retaining the ease-of-use characteristics necessary for entry-level customers. With this capability, ELIAS/MVS provides a single application development tool that spans the range of user skills and needs.
  - To accommodate the experienced programmer, fast-path dialogs are provided. A summary screen can be used to input data normally gathered through a series of prompting screens. The experienced programmer can go directly to this screen, bypassing the more detailed portions of any dialog.
  - As a result of definition dialogs, ELIAS/MVS generates pre-coded input/output sections and program frameworks, called 'skeletons'. The programmer has only to provide the logic that is unique to the application. These skeletons not only reduce the effort required to construct the program (and the attendant possibility for coding errors), but also standardize program layout. This can contribute to reduced programming and maintenance effort, and improve the self-documenting nature of COBOL and PL/I.
  - ELIAS/MVS provides a number of pre-tested sets of source code, called 'bricks'. These bricks provide the logic necessary to perform a range of commonly-used functions such as CICS services, error checking, error handling, and data base access that can be reused by all programmers. They can easily be inserted into the program through the use of a Program Function key or command. This capability not only saves the programmer time and effort, but also reduces the potential for error.
  - Through ELIAS/MVS facilities, users may add their own bricks to the library. These bricks will be supported by the same repository services available for the ELIAS/MVS-supplied bricks. The user-written bricks may be more application-oriented than the functional bricks supplied with ELIAS/MVS. The re-usability of these functional bricks can 'amplify' the work of skilled programming personnel by allowing easy inclusion of their code in programs written by less experienced people, reducing development and maintenance effort.
  - Repository facilities encourage the reuse of application items, thereby easing maintenance. As application items, such as DBDs, PSBs, Data Structures, VSAM file definitions, programs, user bricks, and screen maps are developed and tested, they may be entered into the ELIAS/MVS repository. These elements then become available to all designers and programmers for creating new applications and/or modifying old ones. Even in those cases where there is not a perfect fit, often only a small change will be needed to create a new element, saving much of the work.
- This easy way to integrate proven code while developing new applications and/or maintaining existing ones should significantly reduce the amount of testing and rework required.
- ELIAS/MVS also provides directory services. A programmer looking for an application element with specific characteristics will be able to search the repository using key-word queries. The relationship between elements can be determined through a where-used facility.
- This capability can be very useful for maintenance purposes. When a change is made to one element, all other affected elements can automatically be re-generated, including recompilation where required.
- ELIAS/MVS provides a dialog to support batch export of DBDs, PSBs, COBOL and PL/I data structures from ELIAS/MVS to the DB/DC Data Dictionary OS/VS Release 4 (5740-XXF). ELIAS/MVS also provides a function called ELIIMP which can read user pre-formatted data sets, containing existing DBDs, PSBs, and Data Structures created outside of ELIAS/MVS, into the repository. This facility is intended to assist migration of current application elements, including those previously input to the OS/VS DB/DC Data Dictionary, without the need to redefine them in the ELIAS/MVS application development environment.
  - Repository items can be exchanged between different ELIAS/MVS installations, to support migration and DDP installations.
  - ELIAS/MVS provides procedures for the system administrator to control the access of different user-IDs to specific projects and/or

## PROGRAM PRODUCTS

**ELIAS/MVS (cont'd)**

- dialogs. Each user-ID can be associated with multiple projects and may be authorized for different functions and dialogs for each project.
- ELIAS/MVS contains a recommended set of predefined system default values which can be easily modified by authorized users to personalize their application development environment. Default values can be established at three different levels: Project, user and system, with higher-level default values overriding lower-level values.
  - Help panels are provided which can be requested in any dialog. These panels address specific information the programmer may need to better understand both the function he/she is working with and the error messages displayed by the system. In addition, a set of tutorials is available that describes the overall operations of ELIAS/MVS. This can save time ordinarily required to look up information in a manual.
  - The user, via a no-charge specify feature, may order an ELIAS/MVS product to generate code either in the MVS/TSO or the VM/CMS environments. This code will be primarily intended to be compiled and executed in an MVS environment.
  - Although ELIAS/MVS generated code is primarily intended for compilation and execution in an MVS environment, users may also generate code to be compiled and executed in a VSE environment, provided that the specified code matches the requirements of the VSE compilation and execution target environments, and that the appropriate JCL is provided by the user. Installations having centralized application development and maintenance operations should find this facility helpful in supporting remote VSE systems.
  - ELIAS/MVS is upward compatible from ELIAS-1/VM (5748-XXXK); the VM option of ELIAS/MVS provides a conversion utility, ELICON, which allows the user to migrate IPF tables in the form of CMS files used by ELIAS-1/VM to the ISPF tables used by ELIAS/MVS.

**CUSTOMER RESPONSIBILITIES**

The system default values shipped with the product are derived from experience, and are intended to provide a powerful yet simple application development environment. It is the user's responsibility to verify whether the defaults provided will meet his/her particular needs, and to override or change these default values to obtain the best fit.

The user should ensure that the hardware configuration is sufficient to allow realization of the benefits of an online programming environment.

When generating source code for compilation and execution in a non-MVS environment (e.g., VSE, SSX), it is the user's responsibility to transport, adapt if necessary, include JCL, and submit the output of ELIAS/MVS to the target system. It is the user's responsibility to make sure that the target system has the software and hardware configuration necessary for compilation, link editing and correct execution.

The user is also responsible that all user-written bricks (code) will compile and execute correctly on the target system.

When importing pre-defined application elements such as DBDs, PSBs and Data Structures, the user is responsible to prepare and submit to ELIAS/MVS a sequential data set formatted as specified in the ELIAS/MVS documentation.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

ELIAS/MVS is designed to operate on the following IBM machines: All IBM S/370, 303X and 308X Processing Units and IBM 4300 Processors supporting the current version/release of ISPF (5668-960).

**SOFTWARE REQUIREMENTS**

ELIAS/MVS is designed to operate in an MVS environment with the MVS/Time Sharing Option (5752-VS2) Release 3.8 (or compatible successor) installed, and with SE2 or MVS/SP V1 or MVS/SP V2.

The VM option is designed to operate in a VM/SP environment supported by VM/SP CMS (5664-167) Release 2 (or compatible successor).

The product operates under control of the Interactive System Productivity Facility (ISPF, 5668-960), which provides a common dialog manager facility across systems.

**Note:** The Program Development Facility of ISPF (ISPF/PDF MVS, 5665-268) is not required to run ELIAS/MVS dialogs. However, it is required for MVS/TSO users, since the ISPF editor is part of ISPF/PDF MVS. Customers ordering the VM option of ELIAS/MVS may use, as an editor, the VM/CMS XEDIT or the Display Editing System (EDGAR) Release 1 (5796-PJP), or ISPF/PDF VM (5664-172).

**TARGET SYSTEM ENVIRONMENTS**

The set of macros and application programs generated by ELIAS/MVS may interface with the following programs:

- CICS/OS/VS Version 1 Release 6.0 (5740-XX1)

- IMS/VS DB Version 1 Release 2 (5740-XX2)
- OS/VS COBOL Compiler and Library Version 4 Release 2.3 (5740-CB1)
- PL/I Optimizing Compiler and Libraries Release 5.1 (5734-PL3), or its separate components
  - PL/I Optimizing Compiler (5734-PL/I)
  - PL/I Resident Library (5734-LM4)
  - PL/I Transient Library (5734-LM5)
- DMS/CICS/VS OS Releases 3.0 and 4.0 (5740-XC5)
- DB/DC Data Dictionary OS/VS Release 4 (5740-XXF)

Each product referenced above is required only if the corresponding facility is used by the application program.

ELIAS generated code does not require modification to any software component. It interfaces with the above products at the source level, and only through their standard interfaces as documented in their related publications.

**MIGRATION**

**Migration from ELIAS-I VSE and ELIAS SSX/VSE:** Since ELIAS-I VSE and ELIAS SSX/VSE tables are stored as members of an ICCF library, not available in the MVS environment, migration support will not be provided for these two products.

**Migration from ELIAS-1/VM:** Since ELIAS-1/VM tables are stored as CMS files, they can be migrated to the ELIAS/MVS repository using the conversion utility ELICON which is available in the ELIAS/MVS version running in the VM/CMS environment.

**SECURITY**

ELIAS/MVS runs under ISPF either in an MVS/TSO or a VM/SP environment, and is fully subject to the controls provided by these products according to the security options and procedures implemented in the installation. In addition, ELIAS/MVS provides a mechanism to control the usage of specific dialogs, both at the project and at the user level, allowing only selected users to execute sensitive ELIAS/MVS repository operations such as, for example, updating data base definitions. User management maintains full responsibility for selection, application, adequacy and implementation of security features, as well as for appropriate application controls.

**PERFORMANCE CONSIDERATIONS**

The response time for any ELIAS/MVS operation in a virtual storage environment depends upon the complexity of the function, the speed of the CPU and other devices, the programs running concurrently, system and application data set placement, paging characteristics and other factors. Among the specific factors influencing ELIAS/MVS performance, particular consideration should be given to the ISPF response time in the different supported environments, the size of the repository, and the number of accesses to the repository that can be expected in each particular installation.

The ELIAS/MVS repository is a significant breakthrough in IBM's efforts to improve the productivity of the application developer. The powerful facilities offered by the repository help the developer to avoid re-writing sections of programs which already exist and have been proven in operation, leaving him/her to give undivided attention to only those sections which are unique to the application under development. Of course, when these 'unique' sections are eventually stored in the ELIAS/MVS repository, they in turn become eligible for reusability in subsequent applications.

In preparing ELIAS/MVS for the marketplace, IBM has exercised the product in various machine configurations, with various numbers of concurrent users, and with various repository sizes. Our experience shows that it is beneficial from a performance point of view to limit the size of each repository to 2,000 items. Since ELIAS/MVS can operate with multiple repositories, different repositories can be established for each application team/project team etc. DP items can be exchanged between repositories as required, using the ELIAS/MVS Unload/Reload facility.

**DOCUMENTATION**

(available from Mechanicsburg)

*ELIAS/MVS: Licensed Program Specifications (GH19-6289) ...*  
*ELIAS/MVS: General Information Manual (GH19-6290) ...*  
*ELIAS/MVS: Reference Summary (SH19-6291) ...* *ELIAS/MVS:*  
*Application Design Guide (GH19-6292) ...* *ELIAS/MVS: Application*  
*Programmer's Guide, COBOL and PL/I (GH19-6293) ...* *Using*  
*ELIAS/MVS for the System Administrator (GH19-6294) ...* *Using*  
*ELIAS/MVS for the Application Programmer (SH19-6295) ...* *Using*  
*ELIAS/MVS for the Data Base Administrator (GH19-6296) .*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No

PROGRAM PRODUCTS

**DIRECT S.W.I.F.T. NETWORK LINK (DSNL)  
VERSION 1 RELEASE 1  
5668-926**

**PURPOSE**

Direct S.W.I.F.T. Network Link enables a member of S.W.I.F.T. (Society for Worldwide Interbank Financial Telecommunication s.c., Brussels, Belgium) to send messages via the S.W.I.F.T. network.

**HIGHLIGHTS**

Direct S.W.I.F.T. Network Link (DSNL) provides the connection to the S.W.I.F.T. network. It is a separately orderable program product that operates together with and under the control of Direct Multinetwork Link (DMNL). DSNL is based on the network interface function of DMNL. Direct S.W.I.F.T. Network Link allows a user to:

- Control the link to the S.W.I.F.T. network via operator commands.
- Send messages based on S.W.I.F.T. protocols.
- Process messages according to S.W.I.F.T. standards and formats.
- Recover S.W.I.F.T. messages.
- Authenticate and deauthenticate S.W.I.F.T. messages.
- Maintain the authenticator key file.
- Journal message traffic.

**DESCRIPTION**

Direct S.W.I.F.T. Network Link (DSNL) is the interface between the message processing facility Direct Multinetwork Link (DMNL) and the S.W.I.F.T. network. DSNL is a separate program product but operates concurrently with, and under the control of DMNL (see "Reference Information"). DSNL allows a bank that is a member or user of S.W.I.F.T. (Society for Worldwide Interbank Telecommunications s.c., Brussels, Belgium) to send messages via the S.W.I.F.T. network to other S.W.I.F.T. members or users. Direct S.W.I.F.T. Network Link provides the communication with the S.W.I.F.T. regional processor. After connection is established, Direct S.W.I.F.T. Network Link is treated by the S.W.I.F.T. regional processor as a computer-based terminal according to the S.W.I.F.T. definition.

As general application packages, DMNL/DSNL are integrable into a banking application environment. Together with other banking applications that can automatically be initiated by the user application interface facility, DMNL/DSNL allow a full computer-assisted processing of banking transactions.

Predefined panels for all S.W.I.F.T. message types, control blocks and other related items required to process S.W.I.F.T. messages are contained in the distributed material.

**Authentication:** Authentication of S.W.I.F.T. messages is done automatically using coded versions of the authenticator keys that have been agreed on between a sending and a receiving bank.

The code for the authenticator algorithm is a feature of the Direct S.W.I.F.T. Network Link. It will be distributed separately. This feature can only be delivered after the customer has signed as agreement with S.W.I.F.T.

**Reference Information:** DSNL operates under the control of Direct Multinetwork Link (DMNL). When ordering DSNL, the appropriate feature code must be selected according to the DMNL installation. The following program products are available:

- DSNL (5668-926)
- DMNL-CICS/DOS/VS (5662-269)
- DMNL-CICS/OS/VS (5668-965)
- DMNL-IMS/VS (5668-964)

**CUSTOMER RESPONSIBILITIES**

Users are responsible for the following installation prerequisites:

- The operating system must be generated as required for Direct S.W.I.F.T. Network Link and Direct Multinetwork Link.
- CICS/DOS/VS (without ELS option), CICS/OS/VS or IMS/VS must be installed.
- The prerequisite PRPQs for the control unit or the ICA must be installed.
- Data communication lines and modems must be installed to attach to the S.W.I.F.T. network.
- Direct S.W.I.F.T. Network Link and Direct Multinetwork Link must be installed.
- The S.W.I.F.T. Bank Connection Procedure must be performed.
- The dummy authenticator module (delivered with Direct S.W.I.F.T. Network Link) must be replaced by the separately-ordered authenticator module (DSNL feature).

**Restart/Recovery:** Restart/Recovery assistance is supplied for:

- S.W.I.F.T. line problems.

- Messages coming and going to S.W.I.F.T. by DMNL queue management; messages are also written to the journal.
- Failure of the IBM system covered by the recovery capabilities of CICS/DOS/VS, CICS/OS/VS, IMS/VS, DOS/VSE or OS/VS.

**SPECIFIED OPERATING ENVIRONMENT**

DSNL operates together with, and under the control of DMNL, which makes the installation of the appropriate version of DMNL prerequisite. DSNL requires specific hardware and software in addition to the hardware and software requirements noted for DMNL.

**HARDWARE REQUIREMENTS**

The size of the processor depends on the operating system (DOS/VSE with VSE/Advanced Functions, or OS/VS1 or MVS) and the data communication system (CICS/DOS/VS or CICS/OS/VS or IMS/VS) used to control the operation of DMNL/DSNL.

The direct connection between the computer system and the S.W.I.F.T. network requires one of the following network control facilities:

- IBM 3704, IBM 3705 in EP or PEP mode (exclusively with Scanner Type 2).
- An Integrated Communication Adapter (ICA) where possible
  - For IBM S/370 mdls 135-3 and 138, an ICA with RPQ XA7464.
  - For IBM 4321 J11 and IBM 4331 model group 11, a Communications Adapter with RPQ XD1603 and RPQ 7B0752.
  - For IBM 4331 model group 1 and 2, a Communications Adapter with RPQ XD1603.

The connection between the ICA or the control unit and the S.W.I.F.T. regional processor is a point-to-point BSC line, switched or non-switched, using nontransparent EBCDIC code.

**SOFTWARE REQUIREMENTS**

The programs that constitute the Direct S.W.I.F.T. Network Link program product are written in IBM S/370 Assembler language.

The relevant feature code must be selected when ordering the program product according to the particular DMNL (CICS/DOS/VS or CICS/OS/VS or IMS/VS environment, see "Reference Information").

If an IBM 3704 or 3705 is used to communicate with the S.W.I.F.T. network, the S.W.I.F.T. BSC Procedure (5799-AQT) must be installed.

For ACF/NCP/VS Release 2 or 3 (5735-XX1), SSP (5735-XX3) and SCP (5747-CH1, with EP feature #6004), the DSNL installation requires the compatibility for OS/VS or DOS/VSE EP Programs (5799-WRF).

DSNL uses the Basic Telecommunication Access Method (BTAM) for message traffic to and from the S.W.I.F.T. network. BTAM/ES (5746-RC5) Release 1.0 must be available for DOS/VSE. For OS/VS, BTAM is a component of the OS/VS System Control Program.

For additional requirements, refer to the appropriate version of the base product Direct Multinetwork Link.

**COMPATIBILITY and MIGRATION**

Direct S.W.I.F.T. Network Link, together with Direct Multinetwork Link provide all S.W.I.F.T.-specific services. The program products DMNL/DSNL Release 1.0 are internally restructured, functional extensions of the program product Direct S.W.I.F.T. Link (DSL). With respect to DSL Release 2.0, DMNL/DSNL Release 1.0 provides the following additional new functions:

- Direct S.W.I.F.T. Network Link
  - Support of all S.W.I.F.T. message types, including message category 7 (documentary credits).
  - Optional automatic retry of LOGIN processing.
- Direct Multinetwork Link (DMNL). (Refer to program numbers listed in "Reference Information".)

To ease migration, DMNL/DSNL Release 1.0 are designed to be functionally upward compatible with DSL. However, a customer migrating from DSL to DMNL/DSNL must follow the same installation procedure as a new customer.

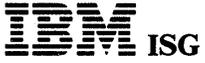
Message preparation and operational control of Direct S.W.I.F.T. Network Link requires the installation of Direct Multinetwork Link.

The generalization of the facility to define user-specific messages has implied modifications of the message format service, queue management and routing in DSL. User-written application programs that use these services may have to be rewritten.

**DOCUMENTATION**

(available from Mechanicsburg)

*DMNL/DSNL 1.0 General Information Manual (GH12-5142).*



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PP 5668-926.2  
Jul 83

PROGRAM PRODUCTS

**DSNL (cont'd)**

The following publications will be provided at availability of DMNL/DSNL 1.0:

*Licensed Program Specifications ... Program Reference Manual ... System and Application Programmer's Guide ... Operations Guide ... Messages and Codes ... Program Logic Manual ... Program Listing Microfiche.*

**RPOs ACCEPTED:** No

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**FILE TRANSFER PROGRAM  
VERSION 2 (FTP-V2)  
5668-932**

**PURPOSE**

The File Transfer Program Version 2, briefly referred to as File Transfer Program and abbreviated to FTP-V2 in this document, is a general-purpose utility program that provides remote file submission from any VSE- or SSX/VSE-based node to any other VSE- or SSX/VSE-based node by using SNA protocols. It offers transmission functions for VSAM and sequential disk or tape files.

**HIGHLIGHTS**

The File Transfer Program features the following highlights:

- Data Compression
- User control-statement interface independent of operating system
- Support of IBM standard-label and unlabeled tapes
- Support of VSAM files
- Checkpoint/restart and VTAM session recovery facilities
- Logging of file transmission activities
- Transmission invocation either at sending or at receiving location
- Trace facility
- Data Security

FTP-V2 is designed to support transfers of large, medium-sized, and small files. It is a ready-to-run program that does not require a generation step.

**DESCRIPTION**

The program product enables VSE-based installations to transfer data sets between nodes or within a node of a processor network. This function is known as the file-to-file function, which can be used for large, medium-sized and small files. The VSE operating system(s) can also run in a virtual machine provided by VM/370. FTP-V2 allows the user to transfer:

- Sequential data sets residing on tape or disk ( only in VSAM-managed space)
- VSAM Entry Sequenced Data Sets
- VSAM Key Sequenced Data Sets

FTP-V2 can transfer a data set to another data set within the same node or in another node. A data set that is to be transferred (called the 'from' data set) and the receiving data set (called the 'to' data set) must have one of the following record formats:

Fixed  
Fixed, blocked  
Variable  
Variable, blocked  
Undefined

The 'from' and 'to' data sets can have different file characteristics. For example, the 'from' data set might be a VSAM KSDS and the 'to' data set might be a tape file.

**CHECKPOINT/RESTART**

FTP's checkpoint/restart facility provides two essentially differing types of restart:

**Autonomous restart:** A restart that takes place during file transfer and does not require any user involvement.

**Deferred restart:** A restart performed by FTP-V2 on resubmission by the user of the job to invoke FTP-V2.

Autonomous restart is performed by FTP-V2 after a session is temporarily broken. The break in session can be caused by a temporary telecommunications line failure or certain types of error being detected by the system during file transmission.

Deferred restart is performed by FTP-V2 only when the job to invoke FTP-V2 is resubmitted by the user of the system after a session was permanently broken. The break in session can be caused by a telecommunications line problem, a system software error, a system hardware error, or a procedural error.

**MULTITHREAD OPERATION**

FTP-V2 is designed as a single-thread application program. This means that one copy of FTP-V2 establishes one session, with one other copy of FTP-V2 at any one time. However, FTP-V2 can be used to perform multithread operation by having two or more copies of FTP-V2 started at various locations in the network. This allows two or more locations to concurrently communicate with one location and, vice-versa, one location to concurrently communicate with two or more locations.

**CUSTOMER RESPONSIBILITIES**

It is the customer's responsibility:

- To install ACF/VTAM (with MSNF) or ACF/VTAME, respectively, and VSE/VSAM
- To define the VSAM cluster for the checkpoint/restart file of FTP-V2

- To define and catalog the VTAM definitions according to the FTP-V2 requirements

If the Prompter Facility is being used, the customer must also create and catalog a node-connection table and a job-information table according to the FTP-V2 requirements.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

FTP-V2 is designed to run on any IBM processor supported by VSE with VSE/Advanced Functions or SSX/VSE. It will use disk devices supported by VSAM and tape devices supported by the operating system-dependent data management (VSE -- LIOCS).

There are no specific requirements in addition to those for VSE/Advanced Functions or SSX/VSE. Users of an IBM S/370 should consider that FTP-V2 uses the conditional swapping feature.

**SOFTWARE REQUIREMENTS**

The programs that constitute the File Transfer Program are written in IBM Assembler language.

The programs are available for operation under the following operating and data communication systems:

For FTP-V2 VSE

Small System Executive/Virtual Storage Extended (SSX/VSE, 5666-265) Release 3 or subsequent releases.

IBM Disk Operating System/Virtual Storage Extended (5745-030) Release 3.0, together with VSE/Advanced Functions (5748-XE8) Release 3.0 or subsequent releases.

VSE/VSAM (5746-AM2) Release 2 or subsequent releases.

Advanced Communications Function for VTAM (ACF/VTAM) (5746-RC3) Release 3, including the Multisystem Networking Facility (MSNF), or subsequent releases, or

Advanced Communications Function for VTAM Entry (ACF/VTAME) (5746-RC7) Release 1 or subsequent releases, or

Advanced Communications Function for VTAM Version 2 (ACF/VTAM-V2) (5666-280) Release 1 or subsequent releases.

If the Prompter Facility is being used, FTP-V2 needs, in addition to the above products:

VSE/POWER Version 2 (5666-273)

VSE/Interactive Computing and Control Facility (ICCF) (5746-TS1)

**COMPATIBILITY and MIGRATION**

FTP-V2 can be used concurrently with the File Transfer Program Version 1 (5748-XE6) at the same node. Both versions may coexist. However, they cannot exchange data between each other. The following must be considered for users migrating from the previous FTP to FTP-V2:

FTP-V2 is designed as an SNA product that uses its own data transmission facility via VTAM API. Therefore, ACF/VTAM definitions are required.

Because of the checkpoint/restart and logging facilities of FTP-V2, a checkpoint/restart file has to be provided and must be defined via job control statements to FTP-V2 within the FTP-V2 job stream. The file organization for the checkpoint/restart file is VSAM KSDS.

SAM DASD files on VSE systems have to be managed by VSAM. This requires the VSAM Space Management feature for SAM Files (5746-AM2).

**DATA SECURITY**

FTP-Version 2 does not provide new or independent security functions. FTP has been designed to allow an installation's management and users effective use of the security features of VSAM, VTAM, and access control. FTP-V2 provisions for data protection include the use of the ACF/VTAM, or ACF/VTAME password protection options, and the access control function of VSE/Advanced Functions or the corresponding functions in SSX/VSE.

**DATA INTEGRITY**

FTP-V2 has many checks to ensure that the file transfer between nodes occurs as the user wishes. It is particularly important that the integrity of data is ensured; therefore, FTP-V2 terminates whenever there is an inconsistency that could indicate a possibility of a loss of data integrity. However, it is not possible to detect all potential situations that could result in lost data integrity. Therefore, it is important to plan all file transfers before they take place to ensure the proper level of data integrity.

**File Transfer Program V2 (cont'd)****PERFORMANCE**

The performance characteristics of FTP-V2 are dependent on two factors: The load on the processor caused by FTP-V2 and the efficiency with which data is sent to the network.

FTP-V2 is designed to use only pageable storage. The code is intended to be written to minimize the working storage set and the number of page references so that FTP will have minimum impact on the systems where it is running. The working set code is planned to be less than 10K of executable code excluding data management (for example, VSAM), I/O and work areas.

Where FTP must issue SEND, RECEIVE, GET, or PUT, it branches to code that is outside its direct control. The working set of this code is dependent on the access method and differs among VTAM, VSAM and SAM. Since the path length through the access methods is usually much longer than that through FTP, it is advisable to limit the number of calls to these routines and the path length through the routines by the following techniques:

- Using a large RU size (VTAM)
- Using a large block size (SAM)
- Using a large CI size (VSAM)

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual* (GH12-5141)

The following publications will be available at FTP-V2 availability:

*Licensed Program Specifications* (GH12-5261) ... *Program Reference and Operations Manual and Diagnosis Guide* (SH12-5349) ... *Diagnosis Reference* (SY12-5350).

Additionally, for the Prompting Facility:

*User's Guide* (SH12-5352) ... *Installation Guide* (SH12-5354).

**RPQs ACCEPTED: No**



## PROGRAM PRODUCTS

**4700 FINANCE COMMUNICATION SYSTEM  
APPLICATION MAP GENERATOR  
5668-934****PURPOSE**

The Application Map Generator for the 4700 Finance Communication System is a host-based online interactive programming tool for user presentation services development.

This licensed program is designed to execute on a S/370, 303X, 308X or 4300 with the Interactive Map Definition feature of the Graphical Data Display Manager. It will operate on SSX/VSE, DOS/VSE, OS/VS1, OS/VS2 (MVS), MVS/XA or VM/SP. Application Map Generator is used in application development environments to generate service-dependent control commands (maps) that are used with the Controller Resource Manager licensed program on the 4700 Finance Communication System, as part of Resource Manager.

**HIGHLIGHTS**

Application Map Generator utilizes a large-screen 1,920-character 3270 Keyboard/Display Terminal on a S/370, 303X, 308X, or 43XX Host Computer for the following:

- Creation of maps and operator guidance (panels) via an interactive map generation process
- Provides a map definition and flow concept that aids your programmer in structuring the normal, error, dynamic, and iterative flows of a transaction
- Supports field editing and data formatting
- Develops device format information (maps) that can be used with the Controller Resource Manager for the 4700 Finance Communication System
- Allows for device format independence in user application development
- Supports structures to describe a buffer of data using either 4700 COBOL or 4700 Assembler language
- Provides an online tutorial to assist the programmer in using RM4700AMG

This program development tool provides customer value by:

- Promoting early user involvement in application development
- Shortening the development cycle
- Increasing the productivity of programmers writing applications

**DESCRIPTION**

RM4700AMG allows definition of maps for the following media:

- Keyboard/Display
- PIN Keypad
- Magnetic Stripe
- Journal (continuous-forms) printer
- Cutform printer
- Passbook printer

RM4700AMG supports map definition of the following 4700 machines attached to the 4701 Controller, mdl 1 and 2:

- 4704 Display Workstation, mdl 1, 2, and 3 including MSR, MSR/E, and PIN Keypad
- 4710 Receipt/Validation Printer
- 4720 Printer, mdl 1 through 4
- 7463 Validation Printer mdl 3

RM4700AMG supports map definition of the following 3600 machines for attachment to the 4700:

- 3604 mdl 1 - 7 Keyboard/Displays including MSR, MSR/E, and PIN pad
- 3610 Document Printer
- 3611 Passbook Printer
- 3612 Passbook and Document Printer
- 3615 Administrative Terminal Printer
- 3616 Passbook/Journal Printer

RM4700AMG supports map definition of the following DCA machines for attachment to the 4700:

- 3178 mdl C1 and C2 Displays
- 3278 mdl 2 Display including MSR
- 3279 Color Display mdl S2A, 2A, S2B, 2B, and 2X including MSR (see Note 1)
- 3262 mdl 3 and 13 Line Printer
- 3287 mdl 1 and 2 Continuous Forms Printer
- 3210 mdl G01 and G02 (see Note 2)
- 7436 Printer (letter quality) (see Note 2)

Note 1: The Programmed Symbols (PS) feature is not supported.

Note 2: Supported in 3287-compatible mode only.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Application Map Generator is designed to operate on the following IBM machines: S/370, 303X, 308X, or 43XX Processor with sufficient main and external storage capacity, and peripheral devices capable of operating the software supported.

**SOFTWARE REQUIREMENTS**

This licensed program has as prerequisites the Graphical Data Display Manager with the Interactive Map Definition feature and the 4700 Finance Communication System Host Support licensed programs, program numbers 3748-XXH and 5668-989, respectively. It requires a current level of one of the following operating systems:

DOS/VSE with VSE/AF  
OS/VS1  
OS/VS2 (MVS)  
MVS/XA  
VM/SP

**DOCUMENTATION**

(available from Mechanicsburg)

*RM4700 General Information Manual (GC31-0508) ... RM4700 Licensed Program Specifications (GC31-1505) ... RM4700AMG User's Guide ... RM4700AMG User's Reference ... RM4700AMG Diagnosis Guide and Reference.*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where the installation of this program results in an exposure to the system integrity of MVS. Refer to the IBM Programming Announcement on MVS System Integrity dated April 21, 1980. This program is intended to run authorized.



PROGRAM PRODUCTS

**5668-935 - 4700 FINANCE COMMUNICATION SYSTEM  
CONTROLLER RESOURCE MANAGER**

**PURPOSE**

The Controller Resource Manager for the 4700 Finance Communication System, a comprehensive controller based facility, is provided to reduce the effort and expense required to design, develop and install advanced application functions. This program is part of the Resource Manager for the 4700 Finance Communication System support and is designed to be used in conjunction with the Application Map Generator for the 4700 Finance Communication System (5668-934) in application development environments.

**HIGHLIGHTS**

This product provides a basis for application development and implementation by providing a comprehensive set of tested common subroutines for device and communications logic handling, and functions commonly associated with system control. This set of routines is designed to do the following:

- Allows for insulation of application processing logic from terminal layout by the use of maps, hence, allowing application logic to be largely device-independent.
- Allows for the development of applications in COBOL to utilize skills already existent in the customer environment. 4700 Assembler language is also supported.
- Provides logical access for Systems Network Architecture (SNA) and Binary Synchronous Communications support.
- Provides logical access to direct access files.
- Provides file sharing among workstations.
- Provides single workstation access to multiple application programs.
- Allows end-user to access multiple application functions, including accessing non-Controller Resource Manager and host-based applications from a single keyboard/display via the Universal Workstation support.
- Manages queues for timers, messages and shared devices.
- Has pass-thru transaction processors to work directly with host 3270 applications.
- Provides debugging and tracing aids to interact with Communication Network Management facilities.
- Provides for the standardization of error handling, processing, and recording for improved reliability, serviceability, and availability.
- Provides user exit facilities.
- Provides checkpoint/recovery function.
- Reduces programming requirements for application maintenance.

**DESCRIPTION**

Controller Resource Manager for the 4700 Finance Communication System is a comprehensive set of software service routines, running in a 4700 Controller, which are designed to relieve users from providing and developing code which most 4700 applications would require. It will allow the user to make optimum use of available hardware resources, which in turn will make easier installation and maintenance activities.

These service routines are designed to take full advantage of the 4700 architecture. The standard 4700 COBOL CALL interface is used for these service routines. The routines that form the components of RM4700CTLR are:

- **Nucleus** - The nucleus calls the appropriate I/O processor which collects the transaction data and calls a user-provided application program. The user-provided application program is referred to as the transaction processor. It also provides Universal Workstation support.
- **Mapping services** - Mapping services uses RM4700AMG-produced maps for transaction flow control, including the handling of physical and logical error situations. It is designed to handle multiple steps of data collection, provides edits and transforms on data, and returns the results to the transaction processor.
- **Mapped I/O processors** - The mapped I/O processors provide the required interface between the physical device and mapping services.
- **Record I/O processors** - The record I/O processors provide a direct interface between the physical device and the user application for selected devices.
- **Communications support** - The communications service routines support Systems Network Architecture (SNA) Synchronous Data Link Communications (SDLC) and Binary Synchronous Communications (BSC) to a host processor. A 'datastream' interface is presented to the transaction processor. Session initiation and termination is handled and data flow protocols are enforced.

- **File processor** - The file processor service routine supports the temporary file and data sets accessed via the Extended Diskette/Disk Access Method (EDAM).

**Note:** The file processor will allow utilization of Keyed Access support which is being provided as part of the controller data support EDAM enhancements for the 4701 disk storage features. This support enables data access via either a Random Keyed Access Path or Keyed Sequential Access Path.

- **General service processors** - The general service processors provide functions that are used by both the transaction processors and the I/O processors. These functions include wait or post an event, request timer interruptions, enqueue/dequeue, and create message queues between stations.

Since RM4700CTLR executes as an application program, it is capable of co-residing with other financial applications, such as those required for the 3624, in the same 4700. The universal workstation support provides the capability for the user to access either existing programs or RM4700-based programs with only minimal modifications to existing applications. This is limited only by resource and/or performance considerations.

A datastream pass-thru transaction processor is provided to support SNA LU-2 communication protocol (SNA 3270) and LU-1 SCS formatted data streams to/from user host application programs. This support allows Finance Communication System Keyboard/Displays and selected Printers to interface with host applications which utilize those datastreams. The LU-1 SCS formatted datastreams (e.g., POWER/VS-RJE and JES2-RJE) must only contain the SCS control characters supported by the target printer; no translation on the datastream is performed by RM4700CTLR. Local print support is also provided to allow printing of a display image on a designated printer.

A set of problem determination aids and routines is provided to allow users and operators to interrogate the system in order to understand and resolve problems. This includes the ability by the network operator to invoke trace and other problem recovery procedures via Communications Network Management facilities. These functions can also be invoked locally at the controller. Using 4700 Host Support, both dump and trace data can be transmitted to the host and printed.

User exits are available at key processing points throughout RM4700CTLR to allow for special editing and other user processing.

RM4700CTLR supports the 4701 controller, mdls 1 and 2, including the following features and attached 4700 terminals:

- 1035 and 1045 Auxiliary Diskette Drives
- 4701 mdl 2 Disk Storage features
- 4704 Display Workstation, mdls 1, 2 and 3 including MSR, MSR/E, and PIN Keypad
- 4710 Receipt/Validation Printer
- 4720 Printer, mdls 1 through 4
- 4730 Personal Banking Machine
- 7463 mdl 3 Validation Printer

RM4700CTLR supports the following 3600 terminals for attachment to the 4701:

- 3604 mdls 1 - 7 Keyboard/Displays including MSR, MSR/E, and PIN pad
- 3610 Document Printer
- 3611 Passbook Printer
- 3612 Passbook and Document Printer
- 3615 Administrative Terminal Printer
- 3616 Passbook/Journal Printer

RM4700CTLR supports the following DCA-attached terminals to the 4701:

- 3178 mdls C1 and C2 Displays
- 3278 mdl 2 Display including MSR
- 3279 Color Display mdls S2A, 2A, S2B, 2B, and 2X including MSR (see Note 1)
- 3262 mdls 3 and 13 Line Printer
- 3287 mdls 1 and 2 Printer
- 5210 mdls G01 and G02 (see Note 2)
- 7436 Printer (letter quality) (see Note 2)

**Note 1:** The Programmed Symbols (PS) feature is not supported.

**Note 2:** Supported in 3287-compatible mode only.

The 4700 using RM4700CTLR can be attached to a S/370, 303X, 308X, or 43XX using IMS or CICS. In addition, the System/34, System/36, and 8100 Information System (DPPX) are supported for communication only. RM4700CTLR provides for secondary communications facilities supporting the following protocols:

- SNA/SDLC
  - LU 0 (FMP3/TSP3)
  - LU 0 (FMP4/TSP4)

## PROGRAM PRODUCTS

**4700 FCS Controller Resource Manager (cont'd)**

- LU 1
- LU 2
- FDX and HDX-FF
- BSC-3

Conversational communication is not supported for BSC-3.

**SPECIFIED OPERATING ENVIRONMENT**

IBM will ship to a host S/370, 303X, 308X, or 4300 computer location the licensed program materials for the customer to install. The customer will prepare, distribute, and install the licensed program materials on the designated controller(s) on which RM4700CTLR will execute.

This host computer location will be the designated Customer Service Location for Program Services which are provided by IBM for RM4700CTLR.

**HARDWARE REQUIREMENTS**

This licensed program will operate on an IBM 4701 mdl 1 Controller which has a minimum of 256K of memory and the latest applicable release of the 4700 Finance Communication System Controller data support. Consideration should be given to the amount of storage available for control program generation (CPGEN) data, user application program and data, and any optional controller support required.

**SOFTWARE REQUIREMENTS**

This licensed program has as a prerequisite the most current applicable release of the IBM 4700 Finance Communication System Host Support (5668-989), for installation, distribution, and maintenance of RM4700CTLR to the designated controller(s). The user needs a current release level of one of the following operating systems:

- DOS/VSE with VSE/AF
- OS/VS1

**COEXISTENCE**

RM4700CTLR may coreside on 4700 Controllers with other applications, including those migrating from 3600.

The Universal Workstation support enables existing and new applications to share devices and workstations. It allows non-Controller Resource Manager-based applications to provide the same user interface for application selection. It must be ensured that non-Controller Resources Manager applications observe the conditions specified for use of this feature.

**DOCUMENTATION**  
(available from Mechanicsburg)

*RM4700 General Information Manual (GC31-0508) ... RM4700 Licensed Program Specifications (GC31-1506) ... RM4700CTLR COBOL Programming Reference and Assembler Language Programmer's Reference ... RM4700CTLR Programmer's Guide ... RM4700CTLR Diagnosis Guide and Reference ... RM4700CTLR Problem Determination Guide.*

PROGRAM PRODUCTS

**IMS APPLICATION DEVELOPMENT FACILITY II  
5668-937**

**PURPOSE**

The IBM IMS Application Development Facility II (IMSADF II) is an application generator product which aids the development, maintenance and modification of applications for IMS/VS data base and data communication systems. It operates with IMS/VS to reduce the time and effort required for development and maintenance of data base and data communication applications. It provides increased capabilities in the areas of data independence, access control, data integrity, and routing messages between application systems.

Application Development Facility II is an upward compatible enhancement of the IMS Application Development Facility IUP (5796-PHX). It includes all of the IUP Release 1.3 function plus new functional and performance enhancements.

**DESCRIPTION**

**IMSADF II OVERVIEW:** The IMS Application Development Facility II is designed to allow quick and efficient application development for IMS/VS. The facility provides generalized functions (common modules) which relieve the need for a programmer to code, in a procedural language (Assembler, COBOL and PL/I), many of the most frequently developed and used modules. The common modules provide functions which execute DL/I calls, format and de-format 3270 screens, edit input data, validate segments, perform application logic, verify user authority, and route messages between applications and system users. Conversational, non-conversational, batch message processing, and batch drivers are furnished which provide the logic necessary to connect the generalized functional modules into executable IMS applications. The programmer specifies the required application function by defining parameters, called rules, which are stored in tables within the facility. During execution, the application drivers and common modules reference these tables to perform the application to meet the end-user's requirements.

Applications are implemented by coding and generating the static rule descriptions of the data bases, and the transaction rule(s). Optionally, display screens may be defined or a default display screen may be used. Screen field edits, data base segment validation, and processing logic definitions (audit rules) may be added to the transaction specifications to perform user edit functions and user processing functions. If a transaction requires additional processing logic, then a special processing routine, or audit exit routines coded in COBOL, PL/I or Assembler can be added.

IMSADF II also provides: (1) A message handling application to send and receive messages among user groups and individual users, and (2) a text processing application for simple text processing.

The enhancements contained in this release of the program product are described below and are followed by an outline of the four IMSADF IUP releases.

**HIGHLIGHTS**

- Program Product.
- Field Engineering Service.
- Data Dictionary Extension.
- IMS/VS 1.2 Data Sharing Support.
- Fast Path Data Base Access Support.
- New Auditor Functions.
- Extended Color Support.
- Screen Handler Improvements.
- PF Key Support.
- Rules Generator Enhancements.
- Batch Driver Enhancements.
- Performance Enhancements.
- Additional Exits.
- Serviceability Facility.
- Text Utility Processing Enhancements.
- Rules Documentation Improvements.

**PROGRAM PRODUCT:** IMSADF II code and documentation have been upgraded to program product standards. The product will follow the SMP process for installation and service. Service will be provided by Field Engineering.

**DATA DICTIONARY EXTENSION:** The Data Dictionary extension provides support for the IMSADF master rules concept (common rules which are used by multiple user transactions). The extension provides: (1) A Data Dictionary IMSADF extensibility data model which connects to Data Dictionary standard categories to represent IMSADF rules definitions, and (2) an IMSADF II Data Dictionary output processor to create rules generator source from the dictionary data definitions.

**DATA BASE SUPPORT**

**IMS/VS 1.2 DATA SHARING SUPPORT:** This IMSADF II segment handler enhancement supports the use of IMS/VS V1 Release 2 data sharing.

**FAST PATH DATA BASE ACCESS SUPPORT:** This modification allows IMSADF standard and special processing applications (IMS/VS mixed mode) to access IMS/VS fast path data bases (MSDBs and DEBbs) and use standard ADF facilities for retrieving, updating, inserting and deleting fast path data base segments.

**NEW AUDITOR FUNCTIONS:** The auditor facility enhancements provide:

- Support for twin segment processing.
- Support for IMS/VS Multiple System Coupling by allowing the auditor to directly route secondary transactions to another IMS/VS system.
- Capability to terminate secondary key selection.
- Capability to specify the encode/decode table key dynamically at execution time.
- Immediate secondary transaction generation.
- Ability to switch from static to dynamic rule if audit rule is not found in the static load module.
- Capability to control audits by IMSADF System ID.
- Greater flexibility for key audit naming conventions.
- Dynamic PCB# alteration.
- Ability to map DL/I status code into an audit error message.
- Ability for auditor to trigger multiple error and/or warning messages per audit.

**SCREEN HANDLING:** IMSADF II screen handling enhancements include the following:

- Full color and extended highlighting support for the 3279 terminal; the color characteristics and highlighting may be specified through the rules generator and modified dynamically through the auditor or special processing routines.
- An option to return directly to the signon screen in a single step.
- An option to control display of the transaction and key field on segment display screen.
- Support for four standard data formats:
  - MM/DD/YY - Former US standard with (/) separator.
  - YY-MM-DD - New standard with (-) separator.
  - YY MM DD - New standard with (blank) separator.
  - DD.MM.YY - Former European standard with (.) separator.

**PF KEY SUPPORT:** Provides support for using PF keys with conversational and non-conversational standard and special processing transactions.

**RULES GENERATOR ENHANCEMENT:** The rules generator enhancements provide support for new and modified ADF function, including the generation of MFS source for secondary transactions and output messages to screens and printers.

**BATCH DRIVER ENHANCEMENTS:** These enhancements allow the batch driver:

- As a BMP, to provide secondary transaction generation capability by giving the batch driver the ability to access the IMS/VS message queue for output, including the ability to send output to MFS-supported screens and printers.
- When used in DL/I batch, the same function causes output to be written to an OS/VS sequential data set providing a means to create output listings using audit rules.
- To coordinate special processing routine checkpoints on restart.

**PERFORMANCE ENHANCEMENTS:** Improvements to the architecture and performance characteristics of IMSADF II include:

- Utilizing a directory to reduce paging and speed up audit static rule searching.
- Reducing PL/I environment initializations on audit calls to PL/I audit user exits.
- Minimizing repetitive BLDLs for commonly used composite load modules.
- Providing the ability for multiple special processing routines to operate under the same IMS/VS transaction, thereby reducing program-to-program message switching.
- Providing an optional data mapper segment call when all fields of a DL/I segment are requested for a data area.

## IMS Application Development Facility II (cont'd)

- Reducing number of Set Program Interrupt Exit (SPIE) calls to a minimum.

**ADDITIONAL EXITS:** The segment handler has been modified to provide a user exit before and after each segment handler DL/I call to allow for specialized user-developed processing, such as audit trails.

**SERVICEABILITY FACILITY:** The serviceability facility provides a diagnostic trace capability which will show the IMSADF II modular flow and details of the interfaces between modules.

**TEXT UTILITY TRANSACTION ENHANCEMENTS:** The text screen processor has been enhanced to support up to a 43-line screen. The utility will be able to handle up to 34 user segments per screen as compared to the current 15, and will allow a key of up to 20 bytes as compared to the current 8-byte key.

**RULES DOCUMENTOR IMPROVEMENTS:** The Rules Documentation facility has been improved to provide:

- IMSADF SYSID sensitivity consistent with other IMSADF II components.
- A report on a single input transaction rule similar to the SR02 report for all input transaction rules.
- A composite load module report.

### IUP RELEASE HISTORY

There have been four releases of IMSADF as an IUP with extended support. The contents of each release is outlined below to provide a history of product enhancements.

**VERSION 1 RELEASE 0:** Announced January 28, 1977.

This release used as a base a program developed at an internal IBM location, the Manufacturing Floor Control System. The base product was modified to remove language dependencies, and user documentation was provided. A rules generator facility for creating the specifications of IMSADF conversational applications was provided.

**VERSION 1 RELEASE 1:** Announced November 9, 1977.

Enhancements were made in the following functional areas:

1. Rule Generator
  - Batch and non-conversational processing rules produced by the Rule Generator.
2. Data Base Processing Restrictions Eased
  - Segment length increased.
  - Concatenated key length increased.
  - Key length for each segment increased.
  - Number of PCBs accessed by Transaction Drivers increased.
  - GET NEXT processing changed to allow the display of multiple occurrences of the target segment.
  - Access to the root and its dependent segments allowed through both secondary key selection and usage of partial keys.
3. Screen Handling
  - Display screen formats specified by screen image format statements.
  - Option to control displayed system information.
4. Performance
  - Substantially reduced the number of DL/I calls required in several processing areas.

**VERSION 1 RELEASE 2:** Announced December 13, 1978.

Enhancements were made in the following functional areas:

1. Rule Generator
  - Common batch screen design facility.
2. DL/I Data Base Support
  - Access data base segments with non-disposable keys.
3. Transaction Processing
  - Data base compare prior to update with conversational processing.
  - SPA extension and flexibility.
  - Multiple path and data base access with standard processing.
4. Auditing
  - Expanded auditor operation descriptors.
  - Encode/decode function.

5. Screen Handling
  - Segment display ease-of-use.
  - Combine Standard and Special Processing menus.
6. Special Processing
  - Expanded DL/I call function.
  - Perform data base updates as directed by special processing routine.
  - PL/I interface for Audit user exit.
7. Performance Module Architecture
  - One copy of common modules.
8. Message Handling
  - Leading zero editing for message generation.

**VERSION 1 RELEASE 3:** Announced October 17, 1980.

Enhancements were made in the following functional areas:

1. Rule Generator
  - Screen support [3277, 3278 (mdls 2, 3, 4, 5), 3279 (base colors only)].
  - Performance enhancement - Bypass Assembler to generate rules.
  - Basic FIELD form for input of FIELD definitions and options.
  - SEGMENT statement override capability.
2. Transaction Processing
  - Increase number of user data bases from 15 to 120 per PSB.
3. Auditing
  - High-level Language - Batch compiler generates Batch Driver input.
  - New Audit phase - Key audits prior to DL/I calls.
  - Two levels of messages - Warning and error.
  - New audit operations
    - Related-to-related field moves, compares.
    - Immediate DL/I calls.
    - 20 other new operations for general use.
4. Screen Handling
  - Screen-to-screen dialog controlled through the auditor.
  - Full use of dynamic attributes for fields.
5. Performance Module Architecture
  - Install options - Test or production, work data base parameters, device type for prebuilt screens.
6. Utilities
  - Rule Reporter
7. Signon and Menu Processing
  - Merge Text Utility Menu with Transaction Selection Menu.
8. Batch
  - Error transaction data set.
9. Message Handling
  - Additional substitution functions into messages.
  - Externalize all execution time messages.

### CUSTOMER RESPONSIBILITIES

The installation of IMSADF II requires a properly configured IMS/VS system with appropriate terminals and other devices, as required for IMS/VS and the desired operating system.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The machine configuration required for IBM IMS Application Development Facility II (5668-937) is determined by the requirements of the host operating system and the IMS/VS subsystem, and the objectives of the installation.

The minimum system requirements for which IBM IMS Application Development Facility has been designed to operate are:

- An IBM S/370 capable of supporting OS/VS1 or OS/VS2 and IMS/VS.
- An IBM nine-track tape drive for purposes of installing distributed

**IMS Application Development Facility II (cont'd)**

material.

**TERMINALS:** IMSADF II has been designed to support the IBM 3270 Information Display System family of display terminals. Terminals must be at least 24 lines by 80 columns in size, and be supported by the IMS/VS DC system and the IMS/VS MFS facility.

IMSADF II in an IMS/VS DB/DC host processing environment supports the IBM 3275, 3277, 3278 and 3279 (with an appropriate control unit).

**SOFTWARE REQUIREMENTS**

IBM IMSADF II has been designed to operate with current releases of OS/VS1 and OS/VS2 MVS, and requires one of the following release levels of the IMS/VS program product: IMS/VS Version 1 Release 1.6, Release 2 and subsequent releases, unless otherwise specified (either IMS/VS DB or IMS/VS DB/DC).

For IMS/VS operating system requirements, see "Software Requirements" in the IMS/VS pages.

OS/VS DB/DC Data Dictionary Release 4.0 (5740-XXF) is required to utilize the IMSADF II Data Dictionary Extension enhancement.

**STORAGE REQUIREMENTS:** The minimum virtual storage requirements to operate satisfactorily are:

- Adequate storage for IMS/VS DB/DC with at least 300K for conversational or non-conversational message regions or 512K for a batch message region.
- Requires an OS/VS batch region size of approximately 768K (varies with the number of control statements submitted) for the rules generator.

**INSTALLATION:** The System Modification Program (SMP) Release 4 for OS/VS2 MVS or OS/VS1 is required for installation.

**COMPATIBILITY**

IMSADF II includes all existing functions of IMSADF IUP (5796-PHX) Release 1.3.

**MIGRATION**

For IMSADF Release 1.3 IUP users - Regeneration of static rules or conversion of dynamic rules data bases *will not* be required.

**IMS APPLICATION DEVELOPMENT FACILITY IUP:** IMS Application Development Facility IUP (5796-PHX) Release 1.3 will be withdrawn from marketing at availability of IMSADF II, and service will be discontinued 12 months after IMSADF II availability.

**DATA SECURITY, AUDITABILITY and CONTROL**

IMSADF II runs as an application program under IMS/VS with OS/VS1 or OS/VS2 MVS and is subject to the controls that they provide. IMSADF II provides end-user signon validation and authorization functions to control end-user access to data bases. User profiles restrict data base access by segment type, processing option, and mode of access (retrieve, delete, etc.). A user exit before and after each segment handler DL/I call is provided for user-written audit trails, access controls or other specialized processing. User management is responsible for the selection, application, adequacy and implementation of these features, and for appropriate application controls.

**PERFORMANCE**

The combination of the functional and performance enhancements is expected to be equivalent to or better than IMSADF II Release 1.3 IUP depending on individual installation characteristics.

**DOCUMENTATION**

(available from Mechanicsburg)

**Available now:** *IMS Application Development Facility II General Information* (GH20-5597)

**Available at product availability:** *Licensed Program Specifications ... Diagnosis Guide and Reference ... Installation Guide ... User Reference ... Application Development Reference ... Rules Documentation User's Guide ... Data Dictionary Extension User's Guide.*

**MVS INTEGRITY**

IBM will accept APARs where installation of IMSADF II introduces an exposure to the system integrity of OS/VS2 (MVS). This program is intended to run unauthorized.

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**GRAPHICS PROGRAM GENERATOR  
VERSION 1  
5668-941**

**PURPOSE**

The Graphics Program Generator program is a set of programs designed to create, maintain and display information about facilities, their locations and relationships to one another. The Graphics Program Generator supports an interactive dialog on a graphics workstation. In this dialog, pictures of the facilities are displayed. The operator selects actions to be performed, and indicates the facility or location involved by pointing to the displayed picture. The Graphics Program Generator program is a significant enhancement of the Interactive Geo-Facilities Graphic Support Programming RPQ P09016 (5799-AYB). It contains all of the capabilities of the PRPQ as well as many totally new functions, performance improvements, and productivity options.

**SPECIAL SALES INFORMATION**

The Graphics Program Generator is a part of a family of IBM products intended to broaden and strengthen the marketability of a wide variety of geo-processing applications in several industries. Designed for use with the Geo-Facilities Data Base Support Programming RPQ P09030 (5799-BEB), it is a key systems component of the Distribution Facilities Information Systems (DFIS) architecture.

The DFIS architecture provides the basis for supporting geo-processing applications within the railroad, energy utility and communications industries, facilities or space management in addition to state and local governments.

**DESCRIPTION**

This product provides all the functions of the Interactive Geo-Facilities Graphic Support PRPQ which includes the following:

- **Workstation Control** - A comprehensive set of functions providing user controls for registering paper documents on a tablet; windowing and zooming picture data within the display; selecting picture scales and points of interest; and controlling cursor operations. (See "Specified Operating Environment" below for a description of a workstation.)
- **Graphic Data Entry and Editing** - A powerful set of interactive functions for constructing and modifying two-dimensional pictures in a workspace. Included are user-specified procedures for dynamically adding, deleting, and moving facilities in picture displays; constructing arcs, parallel or perpendicular lines; attaching, connecting, and offsetting lines; various forms of graphic annotation, etc.
- **Attribute Data Entry and Modification** - A set of programs support user data entry directly from menu keys and the keyboard into facilities data fields. Included are various formatting and data conversion options for internal storage of user data.
- **Symbol Generation** - Symbol Generation is the generation of symbols and characters from a user-specified symbol table. An installation has significant flexibility in the interactive design of its symbol character set. Symbol definitions also make it possible to easily support the generation of symbols of various sizes and orientations desired in the display.
- **Graphic Workspace Data Transformation to and from Interface Format** - Functions to manage picture data, and to maintain complex relationships between picture data and application data. Since data may be created outside of the Graphics Program Generator system, a device and system-independent Interface Format (SH20-5622) provides a common method for interfacing. The Graphics Program Generator will transform data from the Interface Format into the internal workspace structure, and from workspace structure into Interface Format.
- **Flexible Menu Layout and Function Definition** - Menu layouts are designed by the user. Each menu area may consist of one or more keys and subkeys. Each key corresponds to one menu function. Each subkey defines a set of data to be passed to the function. A single menu pointing may invoke one or more functions with different data input. Functions invoked via the menu may include both preprogrammed library functions and user application programs.

This product also includes the following functional additions and enhancements:

- **Performance Improvements** - A number of internal modifications have been made to improve picture generation and correlation. In addition, documentation is provided to enable the user to improve performance.
- **Menu Enhancements** - More flexibility is offered in creating graphics on the menu. References to entity variables and system variables can be used in menu definitions. Menu subroutines are provided to simplify menu preparation and reduce preparation time. Menus can now be used on the graphics screen as well as a digitizing tablet.

- **Program Variables** - Any entity ID or field may be used in menu subkeys, pointing rules, or picture definitions. In addition, they are more easily addressed by user exit routines. A number of predefined system entities are provided which contain a major portion of the internal variables. These are now available for use in definitions instead of constants without writing any user exit routines.
- **Pointing Rules** - A substantial amount of function allowing for interaction in the rule has been added to include execution of menu functions, expansion of checks and selection criteria, and the ability to perform computations. In addition, a number of graphic functions are provided to assist in user guidance to make the system easier to use.
- **Checkpoint/Restart** - A menu function to cause the saving of the current status and data is provided. Cold/warm/resume commands are provided to allow different stages of restart from the previously checkpointed condition.
- **Graphic Functions** - An expansion of geometric entities such as polygons, parabolas, ellipses and new geometric construction techniques are included. In addition, graphic copying, line paralleling, centerline expansion, mirroring, shading and a very comprehensive line definition facility are included.
- **Cadastral Data Entry** - Polygon functions provide support for parcel boundary descriptions. In addition, a metes and bounds process is provided to enter cadastral data descriptions (from surveyor notes) in order to describe the location of points and store the source information.
- **Report Generator** - Reports may be produced either ad hoc or on a standard basis. Output may be to the display screen or the printer. The data selection, sorting sequences and formats define the report results. Reports are based on the workspace attribute records.
- **Multiple Fonts** can be specified - A conversion program to convert the U.S. government's HERSHEY fonts is provided. Font spacing, slant, and aspect ratio are specifiable.
- **Frames, Insets and Registration** - Each workspace produced by Graphics Program Generator may contain a frame describing border conditions, as well as many insets which are expansions or contractions of some portion of the workspace. A document produced from a workspace can be registered automatically including the frame, as well as inset information. Insets can have different scales in the X and Y dimensions. A document can be registered using more than 2 points resulting in a polynomial transformation from tablet pointing to data base coordinates. Multiple menu and map documents may be registered simultaneously.
- **Map Projections** - Data can be displayed using the U.S. State Plane projections or different scales in both X and Y coordinates. User-supplied projection algorithms may be used.
- **Warping Functions** - Three explicit warping algorithms are provided: Linear similarity, linear affine and projective transformations.

**CUSTOMER RESPONSIBILITIES**

To use the Graphics Program Generator, the customer is required to:

- Define symbols beyond those provided, where needed ... Develop appropriate facility definitions and menu layouts ... Develop pointing rules and picture definitions.

Customers may install Geo-Facility Data Base Support (5799-BEB) to provide a companion data base function. Graphics Program Generator contains substantial amount of function that can be used to communicate data base information to Geo-Facility Data Base Support.

Customers installing this product to interface to application systems (other than Geo-Facility Data Base Support) will be required to program the interface modules. These could include data base detail layout, creation and maintenance module, facility retrieval module, transform modules (to/from the interface format) and special conversion programs.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

To operate Graphics Program Generator, each workstation must include:

1. A three-megabyte virtual machine or three megabytes of virtual storage for each workstation on an IBM 43XX or 30XX Processor.
2. Direct access storage of approximately 400K bytes for each saved workspace, and approximately 15 megabytes for saved entity pools, saved menu pools, source code and object modules.
3. IBM 3277 Display Station mdl 2 with 3277 Graphics Attachment RPQ (7H0284) with a storage tube display and optional digitizing

**Graphics Program Generator (cont'd)**

tablet connected. A plotter may also be attached. The tablet and plotter are connected via RS-232-C ports.

The workstation supported by Graphics Program Generator is the IBM 3277 Display Station mdl 2 with Graphics Attachment RPQ (7H0284) using a vendor-supplied storage tube, optional digitizing tablet and optional plotter. Device support will be provided for one variety of storage tube, digitizing tablet and plotter. The user may choose other storage tubes, digitizing tablets, or plotters, but may have to make minor modifications to the device support. Refer to *IBM 3277 Display Station Model 2 with Graphics Attachment RPQ (7H0284): Custom Feature Description (GA33-3039)*. The plotter supported is the IBM Instruments XY/750 Digital Plotter.

**SOFTWARE REQUIREMENTS**

Graphics Program Generator is designed to run under MVS/TSO or under VM/CMS.

**Requirements for both CMS and TSO**

1. IBM 3277 Graphics Attachment Support Programming RPQ P09013 (5799-AXX).
2. VS FORTRAN Release 2 Library (5748-LM3) is required. When the FORTRAN library is installed, the number of unit tables must be set to 99 (UNTABLE=99) to allow definition of files 1 through 99. The FORTRAN extended error handling should also be included using the parameter OPTERR=INCLUDE in the FORTLIB macro.
3. The VS FORTRAN Release 2 Compiler and Library (5748-FO3) are required if any of the FORTRAN programs are to be modified, or if user functions are to be written. See notes above about installing the library.
4. The OS/VS Assembler XF (SCP) or H (5734-AS1) is required if Assembler language programs are to be modified.

**Requirements for CMS only**

1. VM/SP Release 1 (5664-167) and subsequent releases. VM/High Performance Option (5664-173) is required for hardware environments that require this extension to VM/SP.

**Requirements for TSO only**

1. MVS/SP-JES2 (5740-XY5), MVS/SP-JES3 (5740-XYN), MVS/SP-JES2 Version 2 (5740-XC6), and MVS/SP-JES3 Version 2 (5665-291) and subsequent releases.
2. If the TCAM MCP buffer size is specified at less than 2,200 bytes, the variables MAXTULEN in the Graphics Attachment PRPQ TCAM Terminal I/O Handler module (GAATRMTS) must be modified to accommodate the lower buffer size and recompiled.
3. The TSO option installed must include the Basic Partitioned Access Method (BPAM) and either the Telecommunications Access Method (TCAM) or Virtual Telecommunications Access Method (VTAM).

**COMPATIBILITY**

Existing Interactive Geo-Facilities Graphic Support PRPQ source files (DEFN, MENU, SYMBOL) and workspaces are upward compatible. Documentation on source changes and possible conflicts with new function are provided.

**CONVERSION**

Existing Interactive Geo-Facilities Graphic Support PRPQ source files (DEFN, MENU, SYMBOL) must be recompiled with the Graphics Program Generator program product source compilers. Existing workspaces must be converted by a utility provided with the program product.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (GH20-5355) ... Program Reference Manual (SH20-5621) ... Interface Format Definition Manual (SH20-5622) ... Terminal Operator's Guide (SH20-5623) ... Programmer's Guide (SH20-5624) ... Logic Manual (LY20-2591).*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs where the installation of this program introduces an exposure to the system integrity of MVS. Refer to Programming Announcement dated October 21, 1981. This program is intended to run unauthorized.

RPQs ACCEPTED: No

**CROSS SYSTEM PRODUCT/APPLICATION  
DEVELOPMENT (AD) for CICS/VS, SSX/VSE, MVS/TSO  
and VM/SP CMS (5668-944)**

**CROSS SYSTEM PRODUCT/APPLICATION  
EXECUTION (AE) for CICS/VS, SSX/VSE, MVS/TSO  
and VM/SP CMS (5668-945)**

**PURPOSE**

Cross System Product/Application Development provides an interactive interface for defining, testing and generating application programs for execution on a CICS/VS, SSX/VSE, MVS/TSO, VM/SP CMS or DPPX/SP environment. Cross System Product/Application Development includes the facilities for developing, testing and generating applications. Cross System Product/Application Execution provides for production execution of Cross System Product/AD applications.

**SPECIAL SALES INFORMATION**

Cross System Product/Application Development and Cross System Product/Application Execution for CICS/VS, SSX/VSE, MVS/TSO and VM/SP CMS are members of the Cross System Product set of programs which also contains DMS/DPPX, DMS/DPCX, and Cross System Product/AD and Cross System Product/AE for DPPX/SP. Each of these programs shares a common, proven architecture and all are highly compatible in their implementation. The Cross System Product set provides the IBM customer with a highly productive capability for producing applications which, with little or no change, may be used in the SSX/VSE, CICS/DOS/VS, CICS/OS/VS, MVS/TSO, VM/SP CMS and DPPX/SP environments. Applications developed in the DMS/DPPX or DMS/DPCX environments may be moved to the Cross System Product/AD environment, regenerated and executed in the Cross System Product/AE environment, subject to published restrictions.

Cross System Product/AD provides a powerful tool for the customer who is planning distributed applications for the 4300 and/or the 8100 Information System. Cross System Product/AD can also be used by customers who have not previously used an application generator and are not developing or planning applications that make use of DL/I.

Execution in the TSO and VM/SP CMS environments is provided primarily to facilitate application development and test. It is expected that most applications will be generated for the CICS/VS environment or for DPPX/SP.6

Cross System Product/Query is a companion product to Cross System Product/AD in the DOS/VSE and SSX/VSE environments. It reduces the skill requirement for one-time query and report generation, and significantly expands the report writing capabilities of Cross System Product/AD. Cross System Product/Query is a complementary query product to Query Management Facility/VSE (QMF/VSE) and extends the customer audience for the Cross System Product set into the business professional community.

The DMS/CICS/VS application generator product continues to be recommended for the larger system customer and for the customer who plans to develop applications based on DL/I. DMS/CICS/VS, however, is not compatible with the members of the Cross System Product set.

**HIGHLIGHTS**

- Interactive definition, test and execution of application programs.
- Trace/debug facility at development time.
- Direct execution of generated applications.
- Call and transfer linkage to other applications.
- Access to user-defined VSAM files.
- Portability of application definitions (within published restrictions) across the supported environments of the Cross System Product set.

**DESCRIPTION**

**Data Definition** - Allows the definition of data structures and the characteristics associated with that data. Single elements of data are defined as data items. Each data item name is unique within a library called the Member Specification Library (MSL). Data items are components of a record, table, map or working storage. After a data item has been defined once, it may be used in other records, tables, maps or working storage by entering the data item name. The associated characteristics of the data item, collected from the MSL, need not be reentered.

**Map Definition** - Allows the definition of a map for a terminal display or printer. Each map is given a unique name within a map-group (a group of maps for use in an application) and device. The variable fields defined on a map are named and characteristics are defined for each. Characteristics may be collected from data definitions on the MSL if an already-defined data item name is used.

**Application Definition** - Provides for the definition of an application as a group of related processes. Processing statements can be used to

define arithmetic operations, movement of data, use of tables, access to map fields and record data items, and logical testing and branching.

**Application Test** - Allows the user to verify the syntax and logic design of any Cross System Product/AD-defined application, as well as to view the logical sequence of map displays as the user will see them in the production environment.

**List Processor** - Provides the capability to list all members of an MSL, or select subsets to be listed, and then invoke other Cross System Product/AD functions against them. These functions are: Copy, rename, delete, print, change, where used, edit, view, export. Most utilities and editors can be invoked directly from the list processor.

**Tutorial** - Can be used to learn about Cross System Product/AD by reading it as a manual or by direct selection of certain sections. It can be accessed at any point in Cross System Product/AD by pressing the HELP program function key.

**Utilities**

- **EXPORT** - Allows an MSL member to be moved out of an MSL.
- **IMPORT** - Allows a previously-exported member to be moved into an MSL.
- **Member Maintenance** - Allows members in an MSL to be copied, deleted, renamed, or printed.
- **File Maintenance** - Allows the user to view or change data that is stored in a file that has been previously created and defined. If the change option is selected, the user may display, replace, delete, add or copy records to the file.

**Application Generation:** This process translates the defined application into a set of tables which may be executed using Cross System Product/AE. Cross System Product/AE is required for Cross System Product/AD and must be installed first. These tables are placed in an application library called the Application Load File (ALF). Once there, the application can be executed without reference to this MSL. At generation time, the user may select one or all of the environments for execution (including the DPPX/SP environment).

**Application Execution:** Once an application has been generated, it may be executed under the control of Cross System Product/AE. Cross System Product/AE retrieves the application definition from the Application Load File, initializes it to the run-time environment, and manages the execution of the application.

Execution in the TSO and VM/CMS environments is provided primarily to facilitate development and test. While a user might choose to execute an occasional application under TSO or VM/CMS, it is expected that most applications will be generated for the CICS/VS environment or for DPPX/SP.

**CUSTOMER RESPONSIBILITIES**

**INSTALLATION:** The installation procedure consists of loading programs and data files from the distribution tape to disk. Cross System Product/AD and Cross System Product/AE are distributed in object module form and program assembly is not required. Cross System Product/AE is required for Cross System Product/AD and should be installed first.

**CICS/DOS/VS:** The distribution tape includes installation jobs and procedures which may be tailored by the user to a particular system. Maintain System History Program (MSHP) is supported for system and change management.

**SSX/VSE:** Installation is prompter-supported under SSX/VSE. This means that the installation is assisted by IBM-supplied prompting programs. These prompters reduce the system knowledge and user intervention required and shorten the install time. Maintain System History Program (MSHP) is supported for system and change management.

**CICS/OS/VS and MVS/TSO:** The distribution tape includes installation jobs and procedures which may be tailored by the user to a particular system. The installation procedure supports the use of the System Modification Program (SMP) Release 4 and SMP/E.

**VM/SP CMS:** Installation requires program and data files, and sample EXECs to be copied from the distribution tape to the CMS mini-disk. VSE/VSAM is required and EXECs are provide to define the VSAM space required. The procedures and EXECs may be tailored by the user to the particular system.

**Cross System Product/AD & AE for CICS/VS, SSX/VSE, MVS/TSO and VM/SP CMS (cont'd)**

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Cross System Product/AD and Cross System Product/AE are designed to operate on any IBM S/370, 4300 or 3000-series Processor with a minimum of one megabyte of real storage.

The following equipment is also required:

- Depending upon the operating system used, any direct access storage device supported by the Virtual Storage Access Method (VSAM) and the operating system.
- Any magnetic tape drive supported by the operating system (required for installation only).
- A minimum of one IBM 3270 1,920-character Display Station or other compatible device with 12 program function keys.

**SOFTWARE REQUIREMENTS**

Both Cross System Product/AD and Cross System Product/AE must be installed for application development and test. Cross System Product/AE may be used separately when only application execution is planned.

Cross System Product/AD and Cross System Product/AE require one of the following operating environments

**CICS/DOS/VS:** Operating system facilities are:

- VSE/SP 1.1 (either Production or Generation) or VSE SIPO/E 1.3.1 or later or DOS/VSE SCP with VSE/Advanced Functions Release 2 or later with a current release of:
- CICS/DOS/VS 1.5 or later.
- Virtual Storage Access Method (VSAM) Release 2 or later with backup/restore and space management for SAM.
- ACF/VTAM Version 1 or 2 or ACF/VTAME or BTAM-ES.

Cross System Product/AD and AE are documented supported products in VSE SIPO/E 1.4.

**SSX/VSE:**

- SSX/VSE Release 1.2 or later.

**CICS/OS/VS:** Operating system facilities required are:

- MVS/SP 1.3 or MVS/SP 2 or OS/VS2 (MVS) Release 3.8 or later or OS/VS1 Release 7.
- VSAM.
- A teleprocessing access method:
  - ACF/VTAM
  - ACF/TCAM Version 2 Release 3 or later
  - BTAM
- CICS/OS/VS Release 1.5 or later.

Cross System Product/AD and AE when executing in the MVS/XA environment execute in 24-bit mode below 16 megabytes.

**MVS/TSO:** Operating system facilities required are:

- MVS/SP 1.3 or MVS/SP 2 with TSO/E or OS/VS2 (MVS) Release 3.8 or later.
- VSAM.
- A teleprocessing access method:
  - ACF/VTAM or
  - ACF/TCAM Version 2 Release 4 or later.

Cross System Product/AD and AE when executing in the MVS environment operate in 24-bit mode below 16 megabytes.

**VM/SP CMS:** VM/SP is required for definition and execution under CMS. VSAM is required for system files (ALFs, MSLs, etc.).

**Storage Requirements:** Cross System Product/AD requires 280K of virtual storage shared by all definition users; of this, 136K is shared with Cross System Product/AE. Each concurrently used definition terminal requires an additional 50K to 150K of virtual storage, most of which will be shared by multiple users of a particular Cross System Product/AD facility.

Cross System Product/AE requires 210K of virtual storage which is shared by all executing applications. Additional storage requirements vary by application.

Product modules are reentrant and may be placed in a discontinuous shared segment area of VM/CMS or in an MVS link pack area.

**COMPATIBILITY and PORTABILITY**

**COMPATIBILITY Among Cross System Product/AD Environments:** Cross System Product/AD application definitions are compatible across CICS/VS, SSX/VSE, MVS/TSO and VM/SP CMS. In addition, applications generated for CICS/VS or for SSX/VSE are compatible in Application Load File (ALF) form.

**COMPATIBILITY With Cross System Product/AD for DPPX/SP:** Cross System Product/AD provides a means for defining applications which, with little or no change, can be migrated between S/370, 3000-series, 4300 and 8100 systems. This is achieved as follows:

The definition facilities, by which a user describes his application and data, are identical in Cross System Product/AD for CICS/VS, SSX/VSE, MVS/TSO and VM/SP CMS (5668-944) and Cross System Product/AD for DPPX/SP (5660-284). These definitions are stored in a Member Specification Library which can be moved from one system to another. Each product includes utilities to assist in moving definitions between them.

Cross System Product/AD and Cross System Product/AE recognize differences between environments and allow use of certain facilities unique to the environment. While use of these facilities does not preclude portability, the user should be cautious in taking advantage of them during definition as they may introduce some extra effort into migrating between supported environments.

Additional information on application portability is included in the *Operation-Development Manual*.

**COMPATIBILITY with DMS/DPPX and DMS/DPCX:** DMS/DPPX, DMS/DPCX and Cross System Product/AD are conceptually the same in the definition phase, however, Cross System Product/AD offers functions that are not available with DMS/DPPX or DMS/DPCX. Applications developed on Cross System Product/AD execute only on Cross System Product/AE.

Applications defined using DMS/DPPX or DMS/DPCX are portable to Cross System Product/AD within published restrictions. For more information about portability, see the *Operation-Development Manual*.

**COMPATIBILITY with DMS/CICS/VS:** There is no compatibility or portability between Cross System Product/AD and DMS/CICS/VS.

**CONVERSION (Not applicable)**

**PERFORMANCE GUIDELINES**

Cross System Product/AD will support a limited number of concurrent users in application definition and/or execution within a 4321 or 4331 with one megabyte of main storage. Customers who plan to use Cross System Product/AD for application development and concurrent application execution will normally require two megabytes of storage. Applications designed for volume workloads will likely require two megabytes of more of storage.

**DOCUMENTATION**

(available from Mechanicsburg)

All of the publications, binders and binder inserts may be obtained by ordering *Cross System Product/AD* (SBOF-1023) and *Cross System Product/AE* (SBOF-1024).

Individual form numbers for publications are: *General Information* (GH20-0940) ... *Application Development Guide* (SH20-0942) ... *How-to-Use Cross System Product/Application Development* (SH20-0941) ... *Operation - Development* (SH20-0943) ... *Operation - System Considerations* (SH20-0944) ... *Operation - Execution* (SH20-0945) ... *Problem Determination Guide* (SH20-0947) ... *Messages and Codes* (SH20-0946) ... *Program Specifications - Development* (GH20-0951) ... *Program Specifications - Execution* (GH20-0952) ... *Reference Summary* (GX20-0950).

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No

**5668-947 - NCCF V2 for ACF/VTAM, ACF/TCAM  
NETWORK COMMUNICATIONS CONTROL FACILITY  
VERSION 2 for ACF/VTAM and ACF/TCAM  
MVS/370 and MVS/XA (Compatibility Mode)**

**PURPOSE**

The Network Communications Control Facility (NCCF) Version 2 is a program product that operates with ACF/VTAM and ACF/TCAM as an application program under the control of MVS/370 or MVS/XA (Compatibility Mode). NCCF establishes a program base for communications network management (CNM). It provides facilities to support users in operating and managing their ACF/VTAM and ACF/TCAM data communication networks which include single-domain, multi-domain, and multi-network environments. NCCF provides enhanced ACF/VTAM and ACF/TCAM operator facilities. It provides telecommunications access method services, operating system services, and problem determination data services for the support of CNM applications that are either IBM-supplied or user-written. Examples of IBM-provided CNM applications include Network Problem Determination Application which provides problem management support and Operator Communications Control Facility which supports remote processor operations. Through these applications, network management capabilities beyond those directly available in NCCF can be obtained. Additionally, NCCF provides services which can be used to develop support for automating various elements of the network management task.

**HIGHLIGHTS**

NCCF provides:

- Enhanced ACF/VTAM and ACF/TCAM operator facilities
- Network management automation and application service support
  - Command Lists
  - Command Processors
  - User exits
  - Telecommunication and operating system services
- Support for IBM-supplied network management applications
- Terminal Access Facility support

In addition to the functions provided by NCCF Release 2, NCCF Version 2 provides:

- SNA Network Interconnection Support (requires ACF/VTAM Version 2 Release 2 and ACF/NCP Version 3)
- Support for NLDM Release 2 including session connectivity test
- Integration of the Terminal Access Facility (a feature of NCCF R2)
- CLIST and network operator automation enhancements
  - Command entry in CLIST Pause state
  - Enhanced network automation through CLIST WAIT function
  - CLIST statement continuation
- Usability improvements to unsolicited message handling
- Dynamic Program Function Key support
- Operator usability improvements
  - Timed autowrap
  - Non-deletable messages
  - Enhanced command input line handling
  - Enhanced cross-domain logon procedure and password protection
- Class of service support and logmode usability improvement
- New customization functions for command processors
- ASCII 8-bit support
- Katakana character set support
- Storage utilization improvements

**DESCRIPTION**

**Enhanced ACF/VTAM and ACF/TCAM operator facilities:** The following capabilities provide increased flexibility in distributing, implementing, and coordinating operator control throughout a network or multi-networks.

- NCCF operators can enter access method commands and receive access method messages.
- Screen management functions for operator stations provide line-by-line and full-screen message formatting support.
- NCCF operator stations can be located anywhere in a physical network as supported by the access method.
- Multiple NCCF operators can share control of a network.
- Operator-to-operator communications is supported.
- Commands and messages can be routed in a cross-domain environment.

- Authorization facilities are provided in the area of designated terminal usage, operator logon security, restricting operator control of network resources (ACF/VTAM systems only) and network management commands.
- Logging support is provided for CNM operator activity and NCCF operator messages. A hard copy log is supported for real time use and a disk log can be produced for later offline printing.

**Network management automation and service support:** NCCF provides facilities that enable users to automate various operator functions and to supplement the basic network management functions supplied by NCCF. This can aid the operator in managing the network, enhance the accuracy of network control, permit operator control at program execution speeds, and improve productivity. Functions provided in this area include:

- Command list (CLIST) support to allow the user: To write sequences of network management commands, to dynamically construct and modify commands, and to control the sequence of execution.
- The ability to invoke CLISTs by name, timer events, and messages.
- Support of user-written command processors to enable users to define their own commands for network operation. These commands can be invoked by timer events and messages.
- User exit points which can be exploited by user-written routines to perform such operations as screening and editing operator messages.
- Services to enable users to develop their own applications which can supplement NCCF's. Examples are: Data management, screen management, and isolation from telecommunication access method and operating system differences.

**Support for IBM-supplied network management applications:** NCCF provides the base support for the following IBM-developed network management applications:

- Network Problem Determination Application (NPDA) which provides hardware problem management facilities.
- Network Logical Data Manager (NLDM) which supports network software problem determination.
- Operator Communications Control Facility (OCCF) which supports remote processor operations.

The following are NCCF Version 2 enhancements:

**SNA Network Interconnection Support**

Together with ACF/VTAM V2R2, ACF/NCP V3, and NLDM R2, NCCF Version 2 provides facilities for supporting the interconnection of multiple, independent networks. NCCF supports an alias name translation function which allows interconnected networks to maintain their current network names. The alias name translation function permits the same names to coexist among the interconnected networks by translating the real resource name as defined in the owning network to an alias name for use in another network. Alias support also allows the mapping of class of service and logmode names for sessions between two networks.

NCCF supports, with NLDM R2, a connectivity test for active SNA sessions. This capability allows NLDM to obtain and display configuration and connectivity information about sessions in single-domain, multiple-domain, and interconnected SNA networks.

For a SNA network interconnection environment, IBM recommends that NLDM Release 2 and NCCF Version 2 be present at every ACF/VTAM host that serves as a gateway node to support the problem determination effort for cross-network sessions. With these products installed, the network operator will have access to data used for network problem determination and problem source identification. See the NLDM Release 2 announcement for further information.

**Integration of the Terminal Access Facility**

The NCCF terminal access facility enhances network management operations by enabling an operator at a single NCCF terminal to access subsystems without requiring intervening LOGON and LOGOFF procedures. Using single-line entry mode the NCCF terminal access facility operator can control CICS/VS, IMS/VS, DSX Version 2, and through HCF Version 2, the 8100 DPPX system. In full-screen mode, the NCCF terminal access facility operator has access to applications that execute on CICS/VS, IMS/VS, DSX Version 2, TSO, remote NCCF systems, and through HCF Version 2, the 8100 DPPX and DPCX systems. With the Multisystem Networking Feature of ACF/VTAM or ACF/TCAM, the terminal access facility can be used to link cross-domain and cross-network to CICS/VS, IMS/VS, TSO, HCF Version 2, DSX Version 2 with NCCF being required only in the first domain, and to remote NCCF systems.

## NCCF V2 for ACF/VTAM, ACF/TCAM (cont'd)

The terminal access facility support to allow an NCCF operator in one domain to access a remote NCCF system in full-screen mode is now provided for both ACF/VTAM and ACF/TCAM systems. This was previously provided by NCCF Release 2 for ACF/VTAM systems only. Support for an NCCF operator to access local and remote TSO systems or another local NCCF is only provided for ACF/VTAM systems.

### CLIST and Network Operator Automation Enhancements

- **Command entry in CLIST Pause state**  
 Commands and CLISTs may be entered when CLIST execution has been suspended and the CLIST is in a Pause state. This function can be used to allow operator intervention for conditions not handled by the CLIST.
- **Enhanced network automation through CLIST WAIT function**  
 Command lists can suspend their activity and WAIT for the reception of a predefined message or group of messages before causing CLIST execution to resume. Users can employ this function to further automate operations by eliminating the need for operator intervention to handle messages during CLIST execution. It enables users to synchronize the execution of their CLISTs with events that are identified by messages.
- **CLIST statement continuation**  
 Continuation of CLIST statements beyond 80 characters is supported. This extends the number of operands specifiable on a single statement.
- **Usability enhancements to unsolicited message handling**  
 The routing algorithm has been improved to enable unsolicited and authorized messages to be routed by assignment to a designated set of operators. Additional copies of messages can be routed to multiple operators for informational purposes. An ASSIGN command is provided for defining dynamic message routing based on message ID.
- **Dynamic setting of Program Function Keys**  
 The NCCF SET command allows individual operators to define dynamically the commands to be executed using the Program Function Keys. The operator can also dynamically append information, such as parameters, to the command invoked by the Program Function Key before the command is executed. The SET command can be used in CLISTs to assign Program Function Keys. One useful application of this capability is to define a standard set of Program Function Key values which would be established for each operator at LOGON. Operators can use the LIST command to display the Program Function Key settings.

### Operator Usability Improvements

- **Timed Autowrap**  
 NCCF operators can set the amount of time NCCF will delay after a screen is filled with messages before writing over the messages with new ones. NCCF also provides a new HOLD command which allows the operator to freeze the screen display until it is manually unlocked.
- **Non-deletable messages**  
 Users can define 'non-deletable' messages that will not be automatically rolled off the terminal screen or overlaid. Thus messages requiring operator attention will not be lost.
- **Enhanced command input handling**  
 NCCF will erase the command input area immediately after the operator enters a command. This permits the operator to enter new commands as soon as the keyboard unlocks and to scroll the screen without the need to first erase the command input area. In the case that NCCF recognizes a command error, the command will be displayed to allow operator correction.  
 NCCF handling of the immediate message area has also been changed to help eliminate a potential source for operator confusion when entering a series of commands. Previously, the immediate message area could contain a message that was continuously displayed during a sequence of commands inputs. Thus the operator might have difficulty associating the message with the actual command that caused it. In NCCF Version 2, the immediate message area is erased after each entry.
- **Enhanced cross-domain logon procedure and password protection**  
 The cross-domain and cross-network logon procedure employs a screen format similar to the same domain logon. The full screen logon prompt will display the name of the other domain that was started. The password area will not be displayed on the screen and will also be suppressed if written to the hard copy device or disk log.
- **Class of Service support and logmode usability enhancement**

ACF/VTAM COS facilities can be independently applied to the different NCCF sessions that are established. In addition, NCCF will now accept any logmode entry name. This allows logmode tables to be consolidated and permits the use of ACF/VTAM default logmode tables.

- **Compound Command Processors**  
 Command processor support has been extended by the addition of three new customization macros that provide for the implementation of commands which:
  - Communicate with other NCCF tasks including cross-domain and cross-network
  - Invoke CLISTs or other commands
  - Require ABEND or LOGOFF notification
  - Require access to storage by name rather than by address
- **ASCII-8 support**  
 The ASCII 8-bit character code set, as defined in ANSI X3.41-1974, is supported for those devices listed in the Communication Devices section.
- **Katakana character set support**  
 An option is provided at NCCF initialization that permits the user to specify NCCF support for the Katakana character set. This allows Katakana characters to be entered and displayed on an NCCF operator terminal, to be printed by the NCCF hard copy facility, and to be written to the disk log. A mix of Katakana and non-Katakana devices is not supported.
- **Improved storage utilization**  
 Virtual storage utilization can be improved through the following NCCF Version 2 support. Savings will vary depending upon the environment.
  - NCCF initialization code will be loaded and deleted as required. This releases storage used during initialization for other use.
  - A user can identify specific Command processors to be loaded when called and deleted after execution is completed.
  - Only critical or frequently used messages will be resident. All other messages will reside on disk.

### CUSTOMER RESPONSIBILITIES

To use NCCF, the customer must:

- Define the NCCF, ACF/VTAM or ACF/TCAM network environment.
- Determine the NCCF operator stations to be supported.
- Order and install any additional required communications equipment, e.g., 3270 terminals.
- Have the prerequisite ACF/VTAM or ACF/TCAM installed.
- Define all desired NCCF program definition parameters.
- Install NCCF.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

NCCF Version 2 is designed to run in a virtual storage environment in any IBM system configuration that supports MVS as specified in the "Software Requirements" section.

**Communication Devices:** NCCF Version 2 supports the following terminals as operator stations:

#### Controllers:

- IBM 3271 mdl 2 (BSC)
- IBM 3271 mdl 12 (SNA/SDLC remote)
- IBM 3272 mdl 2 (local)
- IBM 3274 mdls 1A, 21A, 31A, and 41A (local SNA)
- IBM 3274 mdls 1B, 1D, 21B, 21D, and 31D (local non-SNA)
- IBM 3274 mdls 1C, 21C, 31C, 41C, 51C, and 61C (SNA/SDLC, BSC) [ Note 1 ]
- IBM 3791, configuration support #9169 [ Note 2 ]
- IBM 8100 (with DPPX, DPCX) [ Note 2 ]
- IBM 5551 (with 3270 Emulation Program) [ Note 11 ]

#### Controllers/Display Units [ Note 6, 7 ]

- IBM 3275 mdl 2 (BSC)
- IBM 3275 mdl 12 (SNA/SDLC)
- IBM 3276 mdls 2, 3, and 4 (SNA/SDLC, BSC) [ Note 10 ]
- IBM 3276 mdls 12, 13, and 14 (SNA/SDLC)

#### Display Units [ Note 6, 7 ]

- IBM 3277 mdl 2
- IBM 3278 mdls 2, 3, 4, and 5 (mdl 5 supported as mdl 2) [ Note 8 ]
- IBM 3279 mdls 2A, 2B, 2C, 3A, 3B, and 3C [ Note 8, 9 ]
- IBM 3290 (supported as 3278 mdl 2)
- IBM 3178 (supported as 3278 mdl 2)

**NCCF V2 for ACF/VTAM, ACF/TCAM (cont'd)**

- IBM 8775 mdls 1, 2, 11, and 12 (supported as 3278 mdls 2, 3, and 4) [ Note 2 ]
- IBM 5555 (attached to 5551) [ Note 11 ]

NCCF Version 2 supports the following printers for hard copy output:

Printers [ Note 3, 6, 7 ]

- IBM 3284 mdls 1 and 2 [ Note 4 ]
- IBM 3286 mdls 1 and 2 [ Note 4 ]
- IBM 3287 mdls 1, 1C, 2, 2C, 11, and 12 [ Note 5 ]
- IBM 3288 mdls 1, 2, and 4
- IBM 3289 mdls 1, 2, and 4
- IBM 3262 mdls 1, 3, 11, and 13
- IBM 3230 mdl 2
- IBM 3268 mdl 2
- IBM 5553 (attached to 5551) [ Note 11 ]

**Notes:**

1. ASCII-8 is supported on 3274 controller level only for SDLC/SNA.
2. 3270 data stream compatibility required.
3. NCCF supports printers attached to SNA controllers as LU type 1 logical units. All other printers are supported as LU type 0 logical units.
4. When attached to an IBM 3274 mdl 1C or 51C Controller, this printer is supported in BSC mode only.
5. Requires SCS feature #9660 when operating with controllers in SNA mode. The 3287 mdl 1C is supported as a mdl 1; the mdl 2C is supported as a mdl 2. Only one color (monochrome) is supported.
6. Katakana character set is supported as an NCCF option.
7. NCCF uses LU2 and LU1 protocols to communicate with SNA operator stations and printers, respectively. NCCF support of devices that utilize those protocols is limited to those that are listed above or their equivalent. Refer to the *NCCF Installation and Resource Definition* (SC27-0660) publication for additional information on device support.
8. The terminal access facility will log on to the application as a 3278 mdl 2. Thus a 3278 mdl 3 or 4 and a 3279 mdl 3A or 3B will only format the mdl 2 screen size when a full-screen session is being presented.
9. Mdls 2A, 2B, and 2C are supported as 3278 mdl 2. Mdls 3A, 3B, and 3C are supported as 3278 mdl 3. One color (monochrome) or base color mode is supported. Using full-screen presentation services, your own command processors can support extended color and programmable symbol sets.
10. For use with SNA/SDLC, the SDLC/BSC switch feature is required.
11. Kanji is not supported.

**SOFTWARE REQUIREMENTS**

NCCF Version 2 is designed to run with the the following operating system releases:

- OS/VS2 (MVS) Release 3.8, optionally with:
  - MVS/SP Version 1 for S/370
  - MVS/SP Version 2 for Extended Architecture (XA) processors. NCCF with MVS/XA operates in 24-bit mode.

NCCF Version 2 runs as an application program on the following access method levels and subsequent releases unless otherwise specified:

- ACF/VTAM V1R3, V2R1, and V2R2
- ACF/TCAM V2R4

The NCCF Version 2 alias name translation function and the enhanced connectivity test support for NLDM R2 require ACF/VTAM V2R2.

If NCCF data services or the NCCF disk log is used, the release of VSAM which is supported on the above operating systems is required.

**Additional Considerations:** NCCF Version 2 operates in a VM/370 environment using MVS and the above access method support in a guest virtual machine.

**NCCF terminal access facility requirements**

- In an environment that contains multiple TSO systems and uses the terminal access facility to access a TSO system in another domain, the requirement for NCCF and the terminal access facility to be present in that cross-domain host is eliminated as defined below.

Product	PTF No.	Put Tape
ACF/VTAM V1R3	UJ58908	8301 (superseded by 8304)
	UZ60689	8304
ACF/VTAM V2R1	UJ58907	8301
ACF/VTAM V2R2	(function integrated)	

- Terminal access facility support to allow an operator to use facilities of local and remote TSO systems or another local NCCF is only provided for ACF/VTAM systems.
- Multiple access methods: For a single host with multiple telecommunication access methods, a copy of NCCF is required for each access method supported.

**Installation:** The System Modification Program (SMP) Release 4 or a later level is required.

**COMPATIBILITY**

**NCCF Release 2:** NCCF Version 2 will operate with NCCF Release 2 definition statements providing equivalent function. NCCF Release 2 CLISTs will run on NCCF Version 2. Existing user code written in accordance with *NCCF Installation* (SC27-0430) and *NCCF Customization* (SC27-0433) publications will be source compatible; however a reassembly using NCCF Version 2 macro libraries is required. User-developed XITCI and XITCO exit routines may require modification if the new NLDM connectivity test is utilized. This test sends over the CNM interface new RUs that may affect user routines. User exit routines may also be affected by the change made to message DSI809A in the implementation of the enhanced cross-domain logon procedure.

**IBM Products:** NCCF Version 2 will support the following levels and subsequent levels of IBM products without a recompile unless otherwise specified:

- NPDA Versions 2 and 3.
- NLDM Releases 1 and 2. The NCCF Release 2 SPE supporting NLDM Release 1 has been integrated into NCCF Version 2.
- MVS/OCCF.
- Information/Systems Version 1 Release 2.

**Terminal Access Facility:** The NCCF Version 2 terminal access facility will support the following levels and subsequent releases of IBM products unless otherwise specified:

- CICS/VS Release 1.5.
- IMS/VS Version 1 Releases 1.6 and 2.
- Host Command Facility Version 2 supporting the 8100 DPPX and DPCX systems.
- TSO.
- DSX Version 2.
- NCCF Release 2 cross-domain sessions.

**Cross-domain sessions:** NCCF Version 2 cross-domain communications with NCCF Version 2 and NCCF Release 2 are supported.

**MIGRATION**

To facilitate migration from an installed level of NCCF, the user can run both the old and new levels of NCCF in the same host with the same telecommunications access method. Reference the *NCCF Installation and Resource Definition* publication (SC27-0660) for a description of the procedures and considerations.

To assist migration from NCCF Release 2 to NCCF Version 2, NCCF Release 2 is supported on ACF/VTAM Version 2 Release 2.

**SECURITY/INTEGRITY**

NCCF provides the following facilities to help prevent unauthorized access to information:

- Operator station security: If desired, NCCF access can be restricted to operator stations that have been defined by the user during program installation.
- Operator logon security: NCCF facilities check an operator's authorization prior to allowing the operator to use NCCF. Additionally, on OS/VS2 (MVS) and MVS/XA systems, NCCF provides an interface to the Resource Access Control Facility (RACF) to provide logon authorization checking.
- Resource control authorization: On ACF/VTAM systems, an individual operator can be restricted to a subset of network resources.
- Command authorization: An individual operator can be restricted to a subset of the commands available through NCCF.
- Auditability is enhanced through provisions for logging operator messages which can provide a hard copy audit trail of network operation activities.

These facilities provide security only in the context of NCCF. The RACF program product can be used to provide an integral foundation for security in MVS, complementing NCCF facilities by controlling access to system resources.

IBM will accept APARs where the installation of NCCF introduces an exposure to MVS system integrity.

**NCCF V2 for ACF/VTAM, ACF/TCAM (cont'd)****PERFORMANCE CONSIDERATIONS**

NCCF storage is virtual and is in the private area of its address space. The minimum estimated virtual storage required for NCCF Version 2 in a single-domain VTAM environment, with one global control operator, one disk log task, and excluding the terminal access facility, alias support, and NLDM cross-domain support is 552,960 bytes. The use of the terminal access facility in an environment supporting one subsystem such as TSO with full-screen sessions requires an additional 106,496 bytes of storage.

Actual user storage requirements may vary widely depending upon the device configuration chosen by the user and the size of the network being controlled. Also NCCF Version 2 provides a facility to help reduce storage requirements through a user option for defining unique command processors to be loaded when called and deleted after execution. Virtual storage required for a particular user configuration can be estimated using tables contained in the *Network Program Products Planning (SC27-0658)* publication.

In environments that contain NCCF-supported applications such as NPDA and NLDM, which run in the same address space as NCCF, the user must include those applications when calculating the total virtual storage requirement.

NCCF is not expected to have any significant impact on the overall performance of the system. NCCF operator response time will depend on the complexity of the functions being executed and the system load.

**DOCUMENTATION**

(available from Mechanicsburg)

*Network Program Products Planning (GC27-0658) ... NCCF Installation and Resource Definition (SC27-0660) ... NCCF Messages and Codes (SC27-0663) ... NCCF Diagnosis (SC27-0665) ... NCCF Licensed Program Specifications (GC30-9567) ... Network Program Products General Information (GC27-0657) ... Network Program Products Bibliography and Master Index (GX27-0216) ... NCCF Reference Summary (SX27-0039) ... NCCF Customization: Command Lists (SC27-0661) ... NCCF Customization: Command Processors, Exit Routines and Subtasks (SC27-0662) ... NCCF Operation (SC27-0664).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** Yes

**RESTRICTED MATERIALS:** Yes

This licensed program will be available with source licensed program for some modules designated as "RESTRICTED MATERIALS OF IBM". These modules will be those formerly available in NCCF Release 2 and are being provided to aid in migration.

In addition, some modules will be available without source licensed program materials. These modules will be available in object code.

PROGRAM PRODUCTS

**BATCH TERMINAL SIMULATOR  
5668-948**

**PURPOSE**

The Batch Terminal Simulator is a productivity aid that allows the execution of IMS/VS applications in a batch or TSO environment. This facilitates the testing and debugging of IMS/VS application programs.

**HIGHLIGHTS**

- A means of accessing DL/I data bases from a TSO terminal.
- Increased application programmer productivity through comprehensive interaction with an application during testing, producing information that is not available from an online execution.
- Flexible application test periods making them easier to schedule and execute.
- A regression test tool for testing modifications to applications as well as modifications to the system, including new releases.
- A more stable online system in both test and production environments. After applications have been shown to execute properly with the Batch Terminal Simulator, they are much less likely to cause serious problems to the system when they are put online.
- A natural addition to a program's documentation because it traces all IMS/VS application interaction and prints 3270 input and output formats.
- A tool for training personnel in the internal and external operation of an application.

**DESCRIPTION**

The Batch Terminal Simulator is a productivity aid that allows the execution of IMS/VS applications in a batch or TSO environment. This facilitates the testing and debugging of IMS/VS application programs.

The Batch Terminal Simulator provides a comprehensive means of checking the following:

- Application program logic
- IMS/VS interfaces
  - Teleprocessing activity
  - 3270 format control blocks
  - Data base activity

The Batch Terminal Simulator supports testing of application programs written in:

- COBOL
- Assembler
- PL/I

The Batch Terminal Simulator operations are completely transparent to the application. No changes have to be made to:

- IMS/VS code
- IMS/VS control blocks
- IMS/VS libraries
- Application load modules

The Batch Terminal Simulator can be used to execute the following IMS/VS applications:

- Fast path
- BMP
- MSG
- Batch
- Conversational teleprocessing

The Batch Terminal Simulator intercepts each IMS/VS call made by an application program and reports details related to the call. The information may include:

- Segment Search Argument
- Scratch Pad Area
- Key Feedback Area
- I/O Area

The Batch Terminal Simulator can supply statistics that are useful in uncovering system resource contention problems and in evaluating the impact of new applications on an IMS/VS system. These statistics show the number of each type of function call made against each program communication block (PCB).

The Batch Terminal Simulator simplifies the comprehensive testing and debugging of program logic by:

- Supporting IMS/VS user-written transaction code (input) editing.

- Providing for dynamic modification of main storage contents.
- Accepting SNAP and ABEND requests.

The Batch Terminal Simulator allows the formatting of 3270 input and output during simulation. This provides a means for testing the IMS/VS Message Format Services (MFS) Utility generated control blocks. By either implicitly or explicitly specifying the position on the display screen, field-oriented input can be passed to the application program via MFS. Screen images of the application program's terminal input and output are printed. This includes field attribute characters, if desired.

When 3270 formatting is specified, the following application input and output is represented in the Batch Terminal Simulator output listing.

- Contents of the 3270 screen on receipt of a /FORMAT command.
- Terminal operator's input specifications simulating:
  - Keyboard entries
  - Function keys
  - Selector pen
  - Operator Identification Card Reader
- Message segments passed to the application program to service GU and GN calls and those transferred to IMS/VS with ISRT and PURG calls.
- First page of each output message and additional pages if requested.

With the Batch Terminal Simulator Full Screen Support (FSS), the user can take advantage of TSO in testing applications programs. The Batch Terminal Simulator uses the TSO terminal as an IMS/VS screen for formatted output from the application program. It also allows the user to enter new data through the IMS/VS formatted screen, and on request, writes a trace of application program calls to the TSO terminal. During this trace, the user can stop execution of the application program and enter the TSO Test Monitor to inspect the program, make temporary modifications to it, and resume execution. Also supported are the PL/I Checkout Compiler and COBOL Interactive Debug.

Finally, the Batch Terminal Simulator can produce a sequential data set which contains all data input to the Batch Terminal Simulator during the TSO session. This data set allows the user to create a regression test file for a subsequent test run.

**CUSTOMER RESPONSIBILITIES**

The Batch Terminal Simulator is distributed in SMP4 format and should be installed using SMP.

Execution requires the definition of at least one parameter card. If the application program is being tested in a batch environment, a Batch Terminal Simulator input data stream containing the transactions will be entered interactively through a TSO terminal.

**SPECIFIED OPERATING ENVIRONMENT**

All statements in the Specified Operating Environment section also apply to subsequent releases and modification levels of this licensed program unless otherwise specifically indicated in future updates to these pages.

**HARDWARE REQUIREMENTS**

At a minimum, the Batch Terminal Simulator requires an IMS/VS batch system machine configuration.

The Batch Terminal Simulator and application program load modules must reside on direct access storage.

When 3270 formatting is used, tape or direct access storage is required at execution time for work data sets.

The Batch Terminal Simulator program modules execute in 128K of virtual storage. This virtual storage is in addition to that required by:

- IMS/VS.
- The amount of virtual storage the Batch Terminal Simulator has to acquire dynamically by issuing GETMAINS.
- The amount of virtual storage required by the user's application program.

**SOFTWARE REQUIREMENTS**

The Batch Terminal Simulator programs are written in Assembler language.

The Batch Terminal Simulator is designed to work with IMS/VS Version 1 Release 1.6 (5740-XX2) and subsequent releases and modification levels and the Operating System environments within which that Version and Release of IMS/VS will operate, unless otherwise stated.

The Batch Terminal Simulator has the following software requirements:

## PROGRAM PRODUCTS

**Batch Terminal Simulator (cont'd)**

- A current version of IMS/VS DB system.
- The IMS/VS DC feature is a prerequisite for the use of the 3270 formatting function.
- An IMS/VS DB/DC system is required to execute the Batch Terminal Simulator in an online IMS/VS environment.
- Operating System requirements are the same as those required by the corresponding IMS/VS release.
- The Time Sharing Option (TSO) of OS/VS2 is required to use the Batch Terminal Simulator Full Screen Support (FSS) which provides the 3270 Display Station simulation.
- SMP4 is required to install the Batch Terminal Simulator program product. No IBM Utilities or Service Aids are required during the execution of the Batch Terminal Simulator.

**COMPATIBILITY**

This program is a functional replacement of the BTS II IUP, 5796-PGT.

**CONVERSION**

No Batch Terminal Simulator parameters need to be changed when converting from Version 1 Modification Level 6 of BTS II IUP (5796-PGT), to the Batch Terminal Simulator program product.

**DATA SECURITY**

The Batch Terminal Simulator has no logging or security features within its own design philosophy. If a log tape is provided for the Batch Terminal Simulator run, normal data base logging can be accomplished as usual by IMS/VS. Multiple transaction logging will result in only the last transaction appearing on the log tape, when the Batch Terminal Simulator is executed in a batch IMS/VS-type region. No log records associated with teleprocessing activity are created by the Batch Terminal Simulator. The log tape so produced is not suitable for backout operations, so only test data bases should be used in the Batch Terminal Simulator run.

**PERFORMANCE CONSIDERATIONS**

The Batch Terminal Simulator does not simulate the execution times that could be experienced in an IMS/VS production environment. Application program execution times under the Batch Terminal Simulator can be affected by several factors:

- Machine speed.
- Nature of the processing of the IMS/VS application being simulated.
- Job environment within the machine at the time of simulation.
- Number of IMS/VS applications being simulated within the given Batch Terminal Simulator execution.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (GH20-5343) ... General Information Manual (GH20-5522) ... Program Reference and Operations Manual (SH20-5523) ... Program Logic Manual (LY20-2569) ... Program Listings Microfiche (LYB0-2570).*

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**SYSTEM MODIFICATION PROGRAM EXTENDED  
(SMP/E) for OS/VS2 MVS and OS/VS1  
5668-949**

**PURPOSE**

System Modification Program Extended (SMP/E), an IBM licensed program, provides enhanced system enabling and change management capability, improved product usability, and improved product RAS. SMP/E is designed to operate with MVS/370, MVS/XA, and VS1 system environments. Some SMP/E usability enhancements are not available to the VS1 user.

**HIGHLIGHTS**

The major enhancements of System Modification Program Extended include:

- Improved product usability
  - SMP interactive capability via dialogs which operate with the Interactive System Productivity Facility (ISPF) and the Interactive System Productivity Facility/Program Development Facility (ISPF/PDF). The dialogs provide:
    - Assistance in the construction of SMP jobs for installing software function and service.
    - A query capability against SMP data sets, to aid in researching system status.
    - Assistance in establishing and administering the SMP data sets.

The dialogs are available only to MVS/370 and MVS/XA users.

- Dynamic allocation support for key SMP data sets, and for target, distribution library, and temporary data sets. Dynamic allocation is available only to MVS/370 and MVS/XA users.
  - Automatic management of inputs having exceptional conditions, such as PTFs in error (PEs), or PTFs or functions requiring actions outside normal SMP processing.
  - List and report enhancements.
  - Restructure and consolidation of SMP data sets using VSAM.
  - Extended product capability:
    - Additional SMP processing selection options, such as:
      - The ability to direct SMP processing to modifications pertaining to only a single function (FMID) or to a user-defined set of functions.
      - The ability to direct SMP processing to a single modification type (FUNCTION, APAR, PTF, USERMOD).
      - The ability to direct SMP processing to modifications from a defined source, such as a product tape ID, a cumulative service tape ID, or a PUT tape number.
- Use of these selection options, singly or in combination facilitates the subsetting of SMP processing, without the necessity of generating lengthy and unique EXCLUDE and SELECT lists. The new selection options consolidate within SMP, and provide enhancements to, programming functions currently provided on PUT tapes.
- The capability of restructuring load modules (i.e., delete CSECTs) during SMP APPLY processing.
  - Product RAS Enhancements

**DESCRIPTION**

**IMPROVED PRODUCT USABILITY**

**Dialogs (MVS only)**

The full range of SMP function, as in SMP Release 4, can be executed as batch jobs by VS1, MVS/370, and MVS/XA users. Additionally, for MVS/370 and MVS/XA users, SMP/E can run as an application under ISPF/PDF. The menu of primary SMP/E dialog options includes:

**1. Option 1 - ADMINISTRATION**

Functions which assist in establishing and structuring the SMP data sets.

**2. Option 2 - SYSMOD MANAGEMENT**

Dialogs which provide a step-by-step path through the Processes of installing software changes (function and service) which are identified to SMP as system modification (SYSMOD) packages. These dialogs generate and submit appropriate SMP jobs for background execution.

**3. Option 3 - QUERY**

Functions to display information from the SMP/E data sets, such as:

- Status, contents, and attributes of a SYSMOD.

- Function and service level of a module or macro.
- SYSMODS installed in a system or subsystem.
- Values established for use by dynamic allocation.

**4. Option T - TUTORIAL**

Information on SMP/E dialog processes.

The SMP/E dialogs have the following usability attributes:

- The panels present a consistent format to the user.
- They are designed to be easily understood by the occasional or less experienced SMP user. Many panels display what options, selections, or responses can be made by the user. These are backed by tutorial panels to provide additional assistance.
- SMP/E dialogs reduce the amount of data required to be entered by the user to perform a task because:
  - When appropriate, user input for one execution is saved and used during the next execution.
  - Information saved in SPF tables or SMP/E data sets eliminates much user data entry.
  - In many dialogs, defaults or installation-defined values are assigned, so that the user need only enter the data if the default is not wanted.
- The dialogs simplify the performance of certain tasks by handling SMP syntax and technical detail for the user. The dialogs alert the user when any overt action (such as the submission of a background job) is to take place, and the user has the option of editing the jobstream, submitting the job, or deferring or canceling the job.
- A dialog session can be suspended and resumed across logons. The user has the option of resuming the dialog at the point it was suspended, or beginning a new dialog invocation.

**DYNAMIC DATA SET ALLOCATION (MVS only):** The MVS user can have SMP/E dynamically allocate each data set required for an SMP execution, using information previously stored in an SMP data set. SMP dynamic data set allocation can be overridden by supplying DD statements when SMP is invoked.

**EXCEPTION SYSMOD CONTROL:** SMP/E allows the user to better manage system modifications (SYSMODS) which require special processing. SMP/E supports an additional input file during RECEIVE processing. This file contains control statements which identify exception SYSMODS. A 'HOLD' control statement indicates to SMP that a SYSMOD is to be put back into 'exception' status; a 'RELEASE' control statement specifies that a SYSMOD is to be removed from 'exception' status. Three categories of exception status are supported:

- ERROR, indicating that the SYSMOD has had an APAR reported against it, and that the SYSMOD should not be processed until the APAR is resolved. This category is commonly referred to as PTF-in-error, or PE PTF. SMP/E will automatically release the held error SYSMOD when a SYSMOD which supersedes the APAR is processed. The PUT tape will have a file containing error HOD control statements for SMP processing.
- SYSTEM, indicating that special action outside SMP processing is required for the SYSMOD. Examples are: SYSMODs requiring UCLIN to be run prior to installation; SYSMODs requiring a SYSGEN after installation; SYSMODs requiring installation of an associated EC level. System HOLD control statements can appear in the SYSMOD itself, as well as in a separate HOLD input file.
- USER, indicating that the SYSMOD requires special processing because of a decision made by the user.

**ENHANCED APAR REGRESSION:** During the installation of a function SYSMOD, SMP/E provides a warning message if the function can potentially overlay (regress) an APAR which had been previously installed on a prior release of the function.

**SMP DATA SET STRUCTURE:** SMP/E control information is maintained in VSAM data sets, in contrast to the partitioned data sets used by SMP Release 4. The VSAM data sets are known as the Consolidated Software Inventory (CSI). These inventory data sets contain information on system structure, system function and service levels, and other control information required for SMP processing. Within any one VSAM data set, multiple products, subsystems, and systems may be represented as separate 'zones'. The 'zones' are analogous to the SMP Release 4 CDS and ACDS data sets. Both system target library and distribution library information can be maintained within one inventory data set as separate 'zones'.

The SMP Release 4 data sets which must be converted to the VSAM CSI structure are:

**PROGRAM PRODUCTS**
**SMP/E (cont'd)**

- Control information from the PTF Temporary Store (PTS) data set. The actual text of system modifications (SYSMODs) will continue to be maintained in a PTS partitioned data set in SMP/E.
- The control data set (CDS).
- The alternate control data set (ACDS).
- The conditional requisite queue (CRQ).
- The alternate conditional requisite queue (ACRQ).

The other SMP data sets require no conversion. SMP/E includes data set conversion and data set administration facilities.

The VSAM CSI implementation provides: An architectural base for new SMP function; increased data set management capability; simplification and consolidation of SMP data; inquiry capability against the SMP data set.

**EXTENDED PRODUCT CAPABILITY**

**Processing Selection Option:** SMP/E provides greater flexibility in specifying the SYSMODs to be processed, leading to processing efficiencies and reduced research.

The user may specify a function (FMID) or a set of related functions as a means of grouping modifications for SMP APPLY, ACCEPT, LIST and UNLOAD processing. Only those modifications applicable to the specified function(s) are eligible for processing.

SMP processing may also be qualified so that for an SMP APPLY, ACCEPT, LIST or REJECT operation, only a single modification type (FUNCTION, PTF, APAR, USERMOD), or combination of types will be eligible for processing.

During SMP RECEIVE processing, a user-defined source identifier (such as a PUT tape number) may be specified; the identifier will be associated with each SYSMOD processed during that RECEIVE operation. Subsequently, this source identifier can be specified for APPLY, ACCEPT, REJECT and LIST operations, restricting processing only to those SYSMODs associated with that identifier.

Use of these processing selection options (singly or in combination), along with the exception SYSMOD control capability, improves the RECEIVE process by removing the necessity of performing extensive SYSMOD research prior to executing RECEIVE. SMP/E allows SYSMODs to be 'warehoused' in the PTS, and selectively processed during subsequent APPLY and ACCEPT operations. This provides a convenient way of subsetting SMP processing without the labor-intensive research and job stream tailoring required with SMP Release 4 to generate and maintain extensive EXCLUDE and SELECT lists. This capability allows mass-mode SMP operations to be conveniently reduced to more manageable units.

RECEIVE processing in SMP/E is also changed so that, unless specifically requested by the user, the modification control statements (MCS) which constitute the SYSMODs are not listed as part of the RECEIVE operation. For each SYSMOD that SMP/E successfully RECEIVES, one message will be printed indicating successful RECEIVE. No messages will be produced for SYSMODs not applicable to the user's system. This eliminates the excessive amount of output produced by SMP Release 4, which included partial listings of SYSMODS not applicable to the user's system.

For SYSMODs found with syntax errors, SMP/E prints an error message, and the SYSMOD is not RECEIVED.

At the completion of RECEIVE processing, SMP/E produces a RECEIVE summary report containing information for each SYSMOD in the input file.

Since RECEIVE processing no longer prints MCS statements, a facility is provided to list them from the SMPPTS. An example of the use of this facility is to list the 'Cover Letter' of a PTF.

**CSECT Delete Support:** SMP/E provides the capability to restructure load modules (delete CSECTs) during SMP APPLY processing. This facilitates the installation of products which may have a requirement to delete CSECTs from load modules made up of modules from multiple products. Such products can be installed via SMP/E APPLY processing, eliminating the requirement for a system generation.

**SMP/E RAS IMPROVEMENTS**

**VSAM Implementation:** The SMP CSI data sets take advantage of RAS characteristics inherent to VSAM, such as the VERIFY function of data set integrity, and the VSAM statistical displays for data set management. With VSAM, updates to the CSI are written as they occur, so that the SMP/E CSI reflects current status more accurately than SMP Release 4, which batches many updates prior to writing them to the CDS.

**Exception Processing:** SMP/E exception SYSMOD processing enhances the reliability of the service process by preventing the inadvertent application of error PTFs. Exception processing also improves serviceability through the automatic recognition of other exception conditions, such as UCLIN, EC, or SYSGEN requirements associated with application of a PTF.

**Processing Selection Options:** The ability to subset SMP/E processing (to an FMIDset, to a source id, and to a modification type) provides for greater flexibility, shorter job steps, and shorter recovery runs in the event of error.

**Dialogs:** For the MVS user, the SYSMOD management dialogs reduce the potential for error in constructing SMP jobs. The dialogs also save information from one invocation to the next, resulting in less data entry and less potential for error.

**Dynamic Allocation:** For the MVS user, dynamic allocation also enhances SMP RAS by creating a report which lists all DD statements and data set names used during an SMP command execution. Dynamic allocation also writes data set usage records to the SMP LOG.

**System Errors:** When a system error is encountered, SMP/E attempts to take a SNAP dump to record status prior to potentially modifying storage with cleanup operations.

**I/O Errors:** To aid in diagnosing I/O errors, SMP/E functions requiring I/O operations to the SMP data sets record information about the function being attempted, the SMP module involved, and the cause of an I/O error.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

SMP/E runs on the IBM hardware supported by:

- MVS/370 - Release 3.8 and subsequent offerings
- MVS/XA
- VS1 - Release 7.0 and subsequent offerings

**SOFTWARE REQUIREMENTS**

SMP/E operates in the following IBM system environments:

- MVS/370 - Release 3.8 and subsequent offerings
- MVS/XA
- VS1 - Release 7.0 and subsequent offerings

SMP/E dialogs and dynamic allocation support are not available to VS1 users. Utilization of the dialog capability by MVS users is optional. If the dialogs are to be used, the following programs are required:

- Interactive System Productivity Facility (ISPF), Program Number 5668-960.
- Interactive System Productivity Facility/Program Development Facility (ISPF/PDF), Program Number 5665-288.

**COMPATIBILITY**

SMP/E and SMP Release 4 can co-exist in a system; this permits subsystems to be selectively migrated to SMP/E, with SMP Release 4 continuing to support those subsystems not yet migrated. When all subsystems have been migrated to SMP/E (i.e., all SMP Release 4 data sets have been converted), SMP Release 4 can be deleted from the system.

For compatibility, all currently available system modification (SYSMOD) input acceptable to SMP Release 4 will be acceptable to SMP/E. A PTF will be provided for SMP Release 4 to syntactically support new SMP/E SYSMOD statements or keywords. The PTF will not add any new function to SMP Release 4, but will prevent syntax errors during SYSMOD processing; i.e., the new SYSMOD statements or keywords will be ignored. The PTF will cause no significant changes to SMP Release 4 externals.

**CONVERSION**

After SMP/E is installed, the data conversion and data set administration facilities of SMP/E are used to convert SMP Release 4 data sets (CDS, ACDs CRQ, ACRQ and PTS) to the VSAM CSI format. If multiple groups of SMP Release 4 data sets exist in a system (e.g., one for MVS, one for each subsystem), not all groups need be converted at the same time.

**SMP DATA SECURITY**

The SMP CSI data set is defined with VSAM SHAREOPTION(2). This allows multiple users to share a CSI data set for READ operations, while WRITE operations to a CSI are serialized on the data set. This prevents the concurrent update of a CSI by more than one user. A CSI being updated by one user is still available for READ access by other users.

All SMP background jobs are assumed to include WRITE operations, and are serialized on the CSI data set.

**MVS SECURITY**

SMP/E runs as an authorized program under MVS. Use of this program can be controlled by RACF (5740-XXH) or password protection of the SMP data sets (e.g., SMPCSI). Customers are responsible for the selection, adequacy, and implementation of these controls for the protection of their data.

**PERFORMANCE CONSIDERATIONS**



PROGRAM PRODUCTS

**SMP/E (cont'd)**

The batch processing characteristics of SMP/E can be tuned via VSAM allocation parameters and VSAM index and data buffer specifications. For equivalent operations, SMP/E provides performance characteristics equivalent or better than SMP Release 4, with virtual storage requirements less than or equal to those of SMP Release 4. Direct access (DASD) requirements for SMP/E are less than or equal to those of SMP Release 4.

For the MVS user, the performance of SMP/E dialogs will be similar to that of other applications running under ISPF.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual (GC28-1106) ... User's Guide ... Reference ... Terminal User's Guide ... Messages and Codes ... Program Logic Manual.*

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**NON-SNA INTERCONNECTION PROGRAM  
for the 3705 and 3725  
MVS/XA, MVS/370, OS/VS1 and VSE/AF  
5668-951****PURPOSE**

For those facilities that are controlled by the Non-SNA Interconnection program, the BSC data and control characters are enveloped in an SNA/SDLC format and transported through the network in the same fashion as is SNA data. When the data exits the program and is sent to the terminal (via a BSC RJE line) or to the subsystem (via a 3705-II, 3705-80 or 3725 emulation subchannel), the SNA/SDLC envelope is removed and the original BSC data stream is presented to the receiving facility.

**SPECIAL SALES INFORMATION**

Non-SNA Interconnection has applicability in the following user environments:

- SNA customers with multiple host locations that use BSC RJE terminals and have a need to connect these RJE terminals to any subsystem (e.g., JES2) in network through the shared SDLC network links.
- SNA customers with multiple host locations that use BSC lines to transport the data between two subsystems (e.g., JES3 to JES3) and want to eliminate the need to store-and-forward the data in intermediate host facilities, and have the added advantage of being able to share SDLC network links for the SNA and BSC data.
- SNA customers, regardless of the number of host locations, who have a need to concentrate data from BSC RJE terminals and SNA devices over a shared SDLC line from a remote 3705-II, 3705-80 or 3725 Communication Controller in order to reduce communication line costs.

**HIGHLIGHTS**

The program supports the following BSC terminals/subsystems for point-to-point leased line operation using EBCDIC or ASCII code, dependent on subsystem support:

- BSC RJE Terminals:
  - 3780 Communications Terminal
  - 3776 mdl 1 Communication Terminal
  - 3776 mdl 2 Communication Terminal
  - 3777 mdl 1 Communication Terminal
  - IBM BSC Terminals supporting the IBM BSC Multi-Leaving protocols.
- Subsystems:
  - MVS/SP-JES 2 Version 1 Release 3
  - MVS/SP-JES 2 Version 2
  - MVS/SP-JES3 Version 1 Release 3
  - MVS/SP-JES3 Version 2
  - VM/RSCS Networking Releases 2 and 3
  - VSE/POWER Version 2 Networking Support

The Non-SNA Interconnection Program also permits the subsystems listed above, if currently communications-compatible, to communicate with one another on a host-to-host basis, using BSC line control, through the SNA network.

The Non-SNA Interconnection Program extends some of the enhanced networking functions and problem determination facilities offered in ACF/NCP Version 2 to the non-SNA facilities as follows:

- Improved network connectivity for BSC RJE terminals.
- Improved network connectivity for BSC host-to-host subsystem communications.
- Attachment of BSC RJE terminals to remote 3705-II, 3705-80 or 3725 Communication Controllers (remote concentration).
- Sharing of the SDLC network links between 3705-II, 3705-80 or 3725 Communication Controllers for SNA and SNA-enveloped BSC data.
- Improved network management for BSC RJE terminals and subsystems.
- Line cost reductions due to BSC/SNA network link sharing.
- Load sharing and backup for BSC RJE terminals and subsystems.
- Session initiation by either the Network Operator or the BSC RJE Terminal Operator (system generation option - Workstation-Initiated Subsystem Selection).

**CUSTOMER RESPONSIBILITIES**

To install and use the Non-SNA Interconnection Program, the customer must:

- Design the network:
  - Install the required communications equipment.

- Install corequisite programs:
  - SSP for ACF/NCP Version 2.
  - ACF/VTAM Version 2 (in at least one host).
- Generate ACF/NCP Version 2 and Non-SNA Interconnection using the ACF/System Support Program (ACF/SSP) Version 2.
- Load the 3705-II, 3705-80 or 3725 with the generated ACF/NCP and Non-SNA Interconnection load module.
- Possibly update the subsystem configuration for any new routes or emulation subchannels.
- Update the terminal operator's job execution instructions in order to take advantage of the program's networking capability.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Non-SNA Interconnection Program is designed to operate in the IBM 3705-II, 3705-80 and 3725 Communication Controllers. At least one locally-attached IBM 3705-II, 3705-80 or 3725 Communication Controller meeting the storage requirements of both ACF/NCP Version 2 and the Non-SNA Interconnection Program is required. The program will support up to two Channel Adapters Type 4 on the 3705-II and 3705-80 and up to six 3725 Channel Adapters. The Channel Adapters used must provide emulation subchannels for Non-SNA Interconnection to interface to the host subsystem. The Non-SNA Interconnection Program also supports either the Communications Scanner Type 2 or Type 3 on the 3705-II and 3705-80 and the 3725 Communications Scanner. The Non-SNA Interconnection Program will also operate in a 3705-II, 3705-80 or 3725 that is remotely connected to the host by an SDLC line through a channel-attached communications controller.

**SOFTWARE REQUIREMENTS**

Non-SNA Interconnection Program requires that:

- ACF/VTAM Version 2 be installed in at least one host of the customer's network. This ACF/VTAM (or these ACF/VTAMs) will control the Non-SNA Interconnection Program resources (lines, Physical Units, Logical Units). The other resources in the network may be controlled by different ACF/VTAM versions or ACF/TCAM.
- ACF/NCP Version 2 be installed concurrently with the Non-SNA Interconnection Program in the IBM 3705-II, 3705-80 or 3725 Communication Controllers that directly attach either the Non-SNA Interconnection-controlled BSC RJE terminals or the Non-SNA Interconnection-controlled emulation subchannels - any current version of ACF/NCP can be installed in all other IBM 3705-II, 3705-80 or 3725 Communication Controllers in the network.
- ACF/System Support Program (ACF/SSP) Version 2 be used to generate the required ACF/NCP and Non-SNA Interconnection.
- ACF/SSP Version 2 and ACF/VTAM Version 2 will run under the following host operating systems:
  - MVS/370 Version 1 Release 3
  - MVS/XA Version 2
  - OS/VS1 Release 7
  - DOS/VSE and VSE/AF Release 3
- ACF/VTAM Version 2 may run in a VM/370 Virtual Machine under MVS/XA, MVS/370, OS/VS1 or VSE/AF operating system.
- The Non-SNA Interconnection Program must be ordered to run with the same host operating system as ACF/SSP Version 2 and ACF/VTAM Version 2, as well as the appropriate ACF/NCP Communication Controller.
- ACF/SSP Version 2 may run in a VM/370 Virtual Machine under MVS/XA, MVS/370, OS/VS1 or VSE/AF operating systems.

**Limitations:**

- Non-SNA Interconnection Program can coexist with PEP with the restriction that Non-SNA Interconnection-controlled BSC lines can not be alternated between Non-SNA Interconnection and emulation modes.
- Non-SNA Interconnection supports BSC nonswitched line, point-to-point operation only.
- Non-SNA Interconnection can not be used in conjunction with a 3705 Channel Adapter Type 1 or a Communication Scanner Type 1.
- Non-SNA Interconnection does not support the IBM 3705 mdl 1.
- Non-SNA Interconnection does not support Panel Line Test for the 3725 and 3705.
- Non-SNA Interconnection does not support Wrap Test for the 3725.

## PROGRAM PRODUCTS

**Non-SNA Interconnection Program (cont'd)****COMPATIBILITY**

Non-SNA Interconnection is a new program which can be used in lieu of Partitioned Emulation Program (PEP) or Emulation Program (EP) for BSC RJE terminals or for BSC Host-to-Host facilities. The data stream, as seen by the subsystem or the RJE terminal, is an unmodified BSC data stream. Therefore, no changes to the RJE subsystem are required other than possibly changing the job routing information and any associated tables.

**COEXISTENCE**

The Non-SNA Interconnection Program can coexist with any licensed program which uses the NCP customization facility [e.g., Network Terminal Option (NTO), Network Routing Facility (NRF)], and can coexist with PEP with the restriction that the Non-SNA Interconnection-controlled BSC lines can not be alternated between Non-SNA Interconnection and emulation modes or NTO BSC operation.

**PERFORMANCE and STORAGE CONSIDERATIONS**

**Performance:** The path lengths in each communication controller, for SNA attached devices or facilities (subarea to subarea), will not increase when the program is installed in each communication controller.

The path lengths in each communication controller, for BSC devices or facilities attached via Non-SNA Interconnection, will be longer than they were for those same devices or facilities that were previously attached using Emulation Program. This increase in path length is expected to have a small impact on throughput for those facilities not using the networking or BSC remote concentration capability of the Non-SNA Intercommunication Program.

The BSC data transported through the SNA network via the non-SNA Interconnection Program will have SNA headers appended to the BSC data for routing and control. The addition of these headers (29 bytes) can cause variations in expected terminal throughput. These potential variations are dependent upon the NCP buffer size; as the buffer size increases, the impact on throughput of the SNA headers decreases. The BSC data acknowledgements (ACK, NAK, ...) are end-to-end (terminal to subsystem) not terminal or subsystem to the local communications controller.

- For those facilities using the networking capability of Non-SNA Interconnection (BSC RJE terminal or subsystem communicating with a subsystem via one or more intermediate hosts in an EP environment), the throughput will be equal to or better than the throughput (input/output start to input/output complete) in the EP environment. Total throughput will be dependent upon system and network variables such as line speeds and the amount of other traffic on the shared SDLC network links.
- Due to the store-and-forward operation introduced when a remote communication controller is used to attach devices for remote concentration, consideration should be given to increasing the communication line speeds between the BSC RJE terminal and the remote communication controller, and between the remote and local communication controllers. This consideration is necessary if existing terminal throughput requirements are to be maintained.

**Storage:** In addition to the storage required for ACF/NCP Version 2 (including the BSC-Start/Stop Processor), Non-SNA Interconnection will require the following:

- For interfacing to the emulation subchannels, minimum 31.5K bytes.
- For interfacing to the BSC RJE terminals, minimum 18.5K bytes
- For interfacing to both, minimum 50K bytes.

More specific information regarding Communication Controller estimated storage requirements for the Non-SNA Interconnection Program will be provided in the *Non-SNA Interconnection Installation and Operations Manual* (SC33-2024), and in CF3205 and CF3725.

**DOCUMENTATION**  
(available from Mechanicsburg)

At announcement: *Non-SNA Interconnection Licensed Program General Information* (GC33-2023, GC30-9554).

At availability of the program for the 3705: *Non-SNA Interconnection Licensed Program, Installation and Operation Manual* (SC33-2024) ... *Non-SNA Interconnection Licensed Program Specifications* (GC30-9554).

At availability of the program for the 3725: *Non-SNA Interconnection Licensed Program, Installation and Operation Manual* (SC33-2024 Revision).

RPQs ACCEPTED: No

**PROGRAM PRODUCTS**
**DISTRIBUTED OFFICE SUPPORT SYSTEM/370  
 VERSION 2 RELEASE 1 Modification Level 0**
**5668-982**
**DISTRIBUTED OFFICE SUPPORT SYSTEM/8100/DOSF  
 RELEASE 1 Modification Level 0**
**5668-955**
**PURPOSE**

The Distributed Office Support System (abbreviated to DISOSS in this document) provides document-handling functions by means of licensed programs executing in a host/distributed subsystem environment. The Distributed Office Support S/370, Version 2, Release 1.0 operates on a host computer, such as the S/370, the 3031 or the 4331 or larger Processors, under the control of OS/VS1 or OS/VS2 (MVS) and under either the Customer Information Control System/Virtual Storage (CICS/VS) or the Information Management System/Virtual Storage (IMS/VS). It offers both interactive and deferred communication with the Distributed Office Support System/8100/DOSF Release 1.0 that operates on host-attached 8100 subsystems under the control of the Distributed Processing Control Executive (DPCX) and Distributed Office Support Facility (DOSF).

**DESCRIPTION**

Significant capabilities of the Distributed Office Support System include:

- Document and message distribution to users on the same or on different 8100/DPCX/DOSF systems. Optionally, confirmation of receipt can be requested.
- Automatic logging of received documents and messages per recipient.
- Display, printing and redistribution of received documents.
- Host document filing with indexing.
- Filed-document search and retrieval.
- Direct document viewing of a filed-document without copying the entire document into the 8100 system.
- Filed and distributed document access protection.
- Filed-document printing on host-attached printers.
- Filed-document formatting for input to a STAIRS data base.
- Submission of batch jobs to the host system.

These functions are achieved by means of programs in the host and in each attached subsystem.

The users of the Distributed Office Support System can be secretaries, typists, office clerks, editorial assistants, managers, or professionals. They use the system by means of 8100-attached 3732 Text Display Stations or 327X or 8775 Data Display Stations.

The Distributed Office Support System/370 Version 2, Program Number 5668-982, Release 1.0, and the Distributed Office Support System/8100/DOSF, Program Number 5668-955, Release 1.0, are designed to offer a replacement for, and an extension of, the Distributed Office Support System/370 Version 1, Program Number 5740-XY9, and the Distributed Office Support System/3730 Version 1, Program Number 5740-XYK, respectively.

Customers can easily migrate from DISOSS/370 Version 1 to DISOSS/370 Version 2 by using a migration utility that converts the host text library from the Version 1 to the Version 2 format.

On the subsystem, DISOSS does not maintain any data of a permanent nature; therefore, no migration is required. Documents that are stored in the permanent storage of a 3730 can be transferred to the 8100 by means of diskettes, using the archive function of the 3730 and the 8100/DOSF service for restore.

**Distribution and Mail Processing:** The user can distribute documents or messages to other DISOSS users on the same or on different 8100/DPCX/DOSF subsystems attached to the same DISOSS host system. Optionally, confirmation of receipt can be requested.

DISOSS collects and retains distribution information in the recipient's mail log. This distribution information essentially consists of the received date, the sender and either the subject of the received document or, in case of a received message, the message itself. The user can view his mail log in total, or he can view it selectively by specifying selection criteria such as a date or a date span.

Once a particular mail-log entry has been selected, the user can display, print, or redistribute the received document, send a response message to the sender, suspend the mail-log entry through the assignment of an action date, delete the entry, or insert a personal note.

**Filing and Retrieving:** The user can file documents created at, and stored in, the subsystem in a document library maintained by the host system. While filing a document, the user can specify filing information that indexes the document and can be used for later retrieval of the document. This filing information consists of search arguments, such as the document name, the author, recipients, and keywords describing

the contents of the document. In addition, access codes can be added to help control the document-access authorization.

To retrieve a filed-document, users first search for it using some of the search arguments specified when the document was filed. In such a search request, search arguments can be truncated, and one or more alternative search arguments can also be specified. Once a document has been identified, it can be restored in the subsystem, displayed at the subsystem, printed on the host or the subsystem, transferred to recipients on the same or on different subsystems, or deleted.

Filing and retrieval of documents can be performed interactively or in deferred mode. Deferred processing is particularly applicable for large documents because the operation is executed in parallel to other tasks performed at the terminal.

**Host Printing:** This facility allows the user to print documents that are filed in the host library on a host-attached printer upon request from his IBM-attached terminal. The IBM 6670 is supported as a host line printer.

**STAIRS Input Formatting:** Using this function, documents created at the 8100/DOSF system can be prepared for batch input to a STAIRS data base.

**Job Submission:** The job submission capability allows the user to send predefined jobs to the host system for batch execution.

This capability can also be used to submit a document from the subsystem to the host along with the job. A user-written program can place this document into a data set for subsequent host-application processing.

**Installation:** The Distributed Office Support System provides convenient techniques to ease the installation of the system and the maintenance of its data sets.

Significant installation support capabilities provided with DISOSS include:

- Customization of the system environment, which is supported by DISOSS facilities that generate system control information based on generation options selected by the user.
- Default values for installation parameters. These default values allow the user to reduce the time and effort required for the installation whenever the offered values are acceptable.
- A utility that supports the creation and maintenance of individual DISOSS user profile information, such as the user's name, location, password, and access codes.
- Facilities that support the translation of messages, prompting texts, and HELP texts into national languages.
- Utilities that support the migration of DISOSS/370 Version 1 host text libraries and user profiles to the DISOSS/370 Version 2 environment.

**Document Security:** In a multiple-user document processing system, data security is of great interest to its users. The Distributed Office Support System is designed to provide data security based on the interaction of the following:

- Access codes
- Document ownership
- Level of document privacy

Access codes are assigned to users centrally at the host and to documents during filing. A user who needs to gain access to a filed document must be assigned one access code that matches one access code of the document to be retrieved. The host user profiles can only be changed under central control.

Document ownership is another means to provide document-access authorization. DISOSS distinguishes between two types of document ownership.

Primary document ownership is assigned to the filing or original distribution requestor. Only primary owners of a document are authorized to assign access codes to the document or to delete existing access codes.

Secondary document ownership is assigned to the recipients of distributed or redistributed documents. They are not authorized to assign or change access codes.

Document deletion requests can only be issued by document owners; they cause deletion of the related ownership. Deletion by all owners causes the document to become inaccessible.

## PROGRAM PRODUCTS

**DISOSS/370 V2 & DISOSS/8100/DOSF (cont'd)**

With respect to privacy, DISOSS distinguishes between two types of documents: Private documents and public documents. Private documents are accessible to their owners alone and are, therefore, not assigned any access codes. Public documents, which are recognized by the presence of access codes, can be retrieved by all authorized users.

In the Distributed Office Support System, passwords can be assigned to users to control access to the central file from any 8100/DOSF Display Station on the same network.

These facilities for controlling access to protected resources are effective only within the context of the Distributed Office Support System itself.

Access control within OS/VS1 outside the scope of the Distributed Office Support System is not provided.

The Resource Access Control Facility (RACF) program product, Program Number 5740-XXH, can be used to provide an integral foundation for security in IMS/VS under MVS, complementing the Distributed Office Support System's facilities by controlling access to system resources.

For applications in which sensitive data is sent over external communication facilities, user management may wish to augment these facilities with the application of cryptography. User management is responsible for the selection, implementation, and adequacy of these security features for the company's environment.

**HIGHLIGHTS**

- Document and message distribution to users on the same or different 8100/DPCX/DOSF systems that are attached to the same host system. Optionally, confirmation of receipt can be requested.
- Redistribution of received documents with the option to attach a message (buck slip).
- Facility to create and reuse general purpose request forms such as distribution lists or "canned messages".
- Automatic logging of received documents and messages per recipient.
- Display, printing and redistribution of received documents.
- Filing of 8100/DPCX/DOSF documents in the host document library.
- Searching for documents in the host document library by specification of search arguments, such as document name or search terms, authors, recipients.
- Indexing of external (hard-copy) documents.
- Retrieval of filed-documents from the host document library.
- Direct document viewing of a filed-document without copying the entire document into the 8100 system.
- Submission of batch jobs to the host system from an 8100/DPCX/DOSF display station.
- Document access protection.
- Host support for the archive, retrieve from archive and delete from archive commands from 3730 and 8100/DPCX/DOSF.
- Printing of documents on a host-attached printer.
- Formatting of documents for batch input to a STAIRS data base.

**CUSTOMER RESPONSIBILITIES**

Customers generate the Distributed Office Support System by means of a set of specification statements. These statements provide options that can be selected to tailor the system to each company's individual needs.

**SPECIFIED OPERATING ENVIRONMENT****DISTRIBUTED OFFICE SUPPORT SYSTEM/370 (5668-982)****HARDWARE REQUIREMENTS**

The IBM Distributed Office Support System/370 Version 2 is designed to operate on the following IBM machines:

One IBM S/370 Model 138 or larger, or one IBM 3031, or one IBM 3081, or one IBM 4331 or larger with main and external storage capacity and peripheral equipment as required for, and supported by, IMS/VS or CICS/VS.

**SOFTWARE REQUIREMENTS**

The Distributed Office Support System/370 is written in an IBM proprietary language and shipped as IBM S/370 Assembler language. It is designed to operate in the following environment:

**Host System:** OS/VS1 Release 7.0 or OS/VS2 Release 3.8 or subsequent releases unless otherwise specified, together with one of the following licensed programs:

- The then most current release of the IBM S/370 Information Management System/Virtual Storage (IMS/VS) Version 1, Program Number 5740-XX2, including the Data Communication (DC) feature, together with its required associated programs, or a subsequent release unless otherwise specified. In IMS/VS, data management is performed by Data Language/I (DL/I) and the Virtual Storage Access Method (VSAM). Communication with the IBM 8100 is via the SLU type P protocol.

- The then most current release of the IBM S/370 Customer Information Control System/Virtual Storage (CICS/VS) Version 1, Program Number 5740-XX1, together with its required associated programs, or a subsequent release unless otherwise specified. In CICS/VS, data management is performed by the Virtual Storage Access Method (VSAM). Communication with the IBM 8100 uses the Full Function Logical Unit (SNA LUO protocol). However, communication with the Document Transmission Function of the distributed subsystem is via the CICS/VS Data Interchange Program (DIP) and uses the Batch Data Interchange Logical Unit (SNA LU1 protocol).

In addition, the following programming support must be available:

- For IMS/VS, one of the following:
  - Advanced Communications Function for VTAM (ACF/VTAM), Program Number 5735-RC2, Release 2.0.
  - Advanced Communications Function for TCAM (ACF/TCAM), Program Number 5735-RC3.
- For CICS/VS, one of the following:
  - Advanced Communications Function for VTAM (ACF/VTAM), Program Number 5735-RC2, Release 2.0.
  - Advanced Communications Function for TCAM (ACF/TCAM), Program Number 5735-RC3.
  - An IBM OS/VS Sort/Merge program product.

**IBM 3704 or 3705:** One of the following is required for attachment of subsystems:

- 3704/3705 Network Control Program/Virtual Storage (NCP/VS), Program Number 5744-BA1, Release 5.
- Advanced Communications Function for NCP/VS (ACF/NCP/VS), Program Number 5735-XX1, Release 1.0.

**DISTRIBUTED OFFICE SUPPORT SYSTEM/8100/DOSF (5668-955)****HARDWARE REQUIREMENTS**

The IBM Distributed Office Support System/8100/DOSF is designed to operate on IBM 8100/DPCX/DOSF systems with remote attachment to a host system. The minimum storage capacity is that required for DPCX Release 2.0 and DOSF Release 2.0 with Feature #6001 and host connection.

**SOFTWARE REQUIREMENTS**

DISOSS/8100/DOSF is written in DPPX/DOSF programming statements.

IBM Host Prep Release 4 (OS/VS), Program Number 5744-XR3, must be available. This consists of:

- Program Validation Services (PVS).
- Subsystem Support Services (SSS).
- DPCX/DOSF programming statement library.
- Subsystem Information Retrieval Facility (SYSINFOREF).

In the IBM 8100, the IBM Distributed Processing Control Executive (DPCX), Program Number 5761-DS1, Release 2.0 (or a subsequent release unless otherwise specified) with Feature #6001 is required, together with the IBM Distributed Office Support Facility (DOSF), Program Number 5761-XR1, Release 2.0 (or a subsequent release unless otherwise specified) and its associated programs.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Design Objectives (GH12-5059) ... General Information Manual (GH12-5139).*

RPQs ACCEPTED: No.

MVS SYSTEM INTEGRITY APPLIES: Yes

PROGRAM PRODUCTS

**INTERACTIVE DISPLAY TEXT FACILITY  
IDTF (5668-956)**

**PURPOSE**

Interactive Display Text Facility (IDTF) program provides text entry and edit functions for an 8775 Display Terminal attached to an 8100 Information System. IDTF is licensed to an 8100 processor and is downstream-loaded into any appropriately configured 8775 attached to that processor for execution.

IDTF provides users with text functions similar to those provided by the 3732 Text Display Station, while giving users access to the existing data functions of the 8775. Thus an 8775 with IDTF downstream-loaded provides a single workstation that meets the requirements of users who need a terminal for text entry as well as an 8775 terminal for data applications. IDTF extends the use of the Distributed Office System into applications where only a single terminal can be justified, and provides text processing facilities for users accustomed to 8775 characteristics.

**SPECIAL SALES INFORMATION**

IDTF is designed to be used with other components of the Distributed Office System: Distributed Office Support Facility (DOSF), Distributed Processing Control Executive (DPCX), and Distributed Office Support System (DISOSS). With this support, an operator has access to the text functions of DOSF, and the host-oriented storage, retrieval, and distribution facilities of DISOSS.

The facilities of DPPX or DPPX/SP Data Stream Compatibility provide access only to DOSF from an 8775 attached to an 8100 Distributed Processing Programming Executive (DPPX) System or an 8100 Distributed Processing Programming Executive/System Product (DPPX/SP).

**HIGHLIGHTS**

IDTF supports the 8775 mdls 1, 2, 11 and 12 with the 87-Key EBCDIC Typewriter/Text Entry and Edit Keyboard Feature (see Product Announcement letter). This keyboard provides the characters and functions of the 87-Key EBCDIC Typewriter Keyboard available on the 8775, with additions for the IDTF text entry and edit characters and functions.

In addition to giving users access to the data functions provided by the 8775 Display Terminal, IDTF provides text entry and edit functions including:

- A single scale line with numerals for narrow and wide text.
- Tabulation and column tabulation.
- Normal, decimal, and centering tab stops.
- Automatic newline with forward and backward wordpill.
- Required characters.
- Definition and cancellation of temporary left margin.
- Adjust and no-adjust mode selection.
- Superscript and subscript control.
- Display/non-display and edit of text control symbols.
- Character delete, backspace character delete, work delete, and line delete.
- Word and character underscore and de-underscore.
- Horizontal displacement of wide text (screen left and right).
- Definition and cancellation of text reference segment.
- Ability to type more than one screen of typical memo-width text without using the Enter key.
- Character highlighting (underscore, blinking, reverse video) under program control.

Support is also provided for invoking DOSF text entry and edit functions programmed in an 8100 (for example screen and page advance and return, top and end, immediate command), together with DOSF advanced functions such as Spelling Verification, Automated Text, and Records Processing.

Support is provided for display and entry of characters from any one character set used by an 8775 Text Display Station. All the characters used by the 3732 can be displayed and entered, together with the special control symbols required for text. Additionally, any character in the DOSF graphics character set can be displayed.

IDTF, downstream-loaded from DPPX or DPPX/SP, offers the DPPX or DPPX/SP user access to the full functional capabilities of DOSF when operating with DPPX Data Stream Compatibility (DSC). The 8100 DPPX or DPPX/SP system attaches directly, or through a nonswitched line, to a communication port on the 8100 DPCX system. Up to five such attachments can be made to DPCX, with up to eight 8775s active per attachment. Text printing is provided only on the 8100 DPCX system. When not operating with DPPX DSC to DOSF, the 8775 retains its full capability to access DPPX or DPPX/SP applications.

**OPERATION**

IDTF is downstream loaded into an 8775 in a similar manner to the 8775 features Enhanced Function, Enhanced Function with Magnetics, and Multiple Partitions and Scrolling. Downstream loading is initiated via the 8775 terminal setup procedure.

Only one downstream load can reside in an 8775 at any one time.

When IDTF is downstream-loaded, the availability of text or data functions to an operator is controlled by the application to which the terminal is connected. In the data state the 8775 is unchanged, and remains compatible with the 3278 Display Terminal.

To switch an 8775 from IDTF to Enhanced Function or Multiple Partitions and Scrolling, the operator enters the terminal set up procedure and requests the required downstream load. On returning from the terminal set up procedure, the desired feature is loaded. A similar procedure is used to reload IDTF.

**PROGRAMMING SUPPORT**

IDTF is designed to be used with Release 2.1 of the Distributed Office Support Facility (DOSF) and Release 2.2 of the Distributed Processing Control Executive (DPCX).

Support for IDTF, downstream-loaded from DPPX or DPPX/SP with access to DOSF, is provided by DPPX FEP 6 or DPPX/SP, Release 3 of DPCX, and the latest version of DOSF at the time of DPCX Release 3 availability.

Facilities for host-oriented viewing of documents via the 8775 when in data state, and for storage, retrieval and distribution of documents using IDTF and DOSF are provided by:

- The current release of Distributed Office Support S/370 (DISOSS/370)
- The current release of Distributed Office Support S/370/VSE (DISOSS/VSE)
- The current release of the Distributed Office Support S/8100/DOSF (DISOSS/8100/DOSF)

**USER SET**

An 8775/IDTF/DOSF configuration is primarily intended for personnel whose normal tasks involve data applications and who have an occasional need for text functions, for example clerical personnel. Differences between the 8775 and 3732 keyboards, the performance differences described above, and the volume of text entry and edit work to be processed, should be taken into consideration when evaluating the suitability of an 8775 with the IDTF licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

An IBM 8775 with IDTF downstream-loaded requires as a minimum:

- One IBM 8100 Information System, configured to support DOSF Release 2.1 and DPCX Release 2.2.
- 8775 specify code #9600 and its prerequisite features #3623, #3905, #4670, #5781, #3624, #3626, and #5110.

**SOFTWARE REQUIREMENTS**

IDTF is designed to be used with:

- DOSF Release 2.1 (5761-XR1).
- DPCX Release 2.2 (5761-DS1).

IDTF, when attached to DPPX or DPPX/SP with access to DPCX/DOSF, can be used with:

- DOSF latest release at DPCX Release 3 (5761-XR1) availability time.
- DPCX Release 3 (5761-DS1).
- DPPX FEP 6 (5760-010).
- DPPX/SP (5660-281).

**DISTRIBUTION AND INSTALLATION**

IDTF will be distributed on diskette as a licensed program from the IBM program libraries. All shipments will consist of the same code: IDTF is not language-dependent.

Installation of the IDTF diskette is the responsibility of the customer. IBM will provide information describing how customers should install the diskette.

Note: Source code listings will not be provided for IDTF.

**COMPATIBILITY**

- When IDTF is downstream-loaded, the 8775 screen size is limited to 1920 characters for both text and data applications.
- The DOSF sentence delete function is not supported by IDTF.

**Interactive Display Text Facility (cont'd)**

- Certain other DOSF functions will be used by IDTF in a slightly different way compared with their use on a 3732. For more information refer to the *IDTF General Information Manual* (GA33-3115).

**DATA SECURITY**

The security facilities of DPCX and DOSF are available to users of an 8775 with IDTF downstream-loaded. For applications in which sensitive data is sent over external communication facilities, user management may wish to augment these facilities with the application of cryptography. User management is responsible for the selection, implementation, and adequacy of security features.

**PERFORMANCE**

Of the attachment modes available to the 8775 with IDTF, for performance reasons it is recommended that the 38.4K bps loop be chosen. It is also recommended that the 8100 system have one megabyte of processor storage. For an 8775 on DPPX or DPPX/SP accessing DOSF on DPCX, it is recommended that the highest speed point-to-point communication attachment appropriate for the system environment be used.

Response times for operations that require interaction between the terminal and an 8100/DPCX/DOSF system will be longer than with a directly-attached 3732 for equivalent systems and loads. When operating with DPPX or DPPX/SP DSC, response times that require interaction between the 8775 and DOSF will be lengthened. Certain operations, such as Screen Left, Screen Right and Line Delete, are performed within the terminal. For these operations, the response times will be shorter than with the 3732.

When an 8775 with the IDTF licensed program is operating in data state, response times will be similar to the standard 8775 response times.

An 8775 with the IDTF licensed program may also be attached to an 8100 via a communication port. In this case response times will be longer than with a 38.4K bps loop attachment and will vary considerably, depending on line speed and whether the teleprocessing connection is point-to-point or multidrop. Careful analysis and planning is required when considering a communication port attachment.

The time taken to load the IDTF licensed program into an 8775 will be similar to the time taken to load the Enhanced Function, Enhanced Function with Magnetics, or Multiple Partitions and Scrolling features.

**DOCUMENTATION:**  
(available from Mechanicsburg)

*IDTF General Information Manual* (GA33-3115) ... *IDTF Licensed Program Summary* (GC33-0137).

**RPOs ACCEPTED: No**

PROGRAM PRODUCTS

**5668-960 - ISPF (MVS/TSO, VM/CMS)  
INTERACTIVE SYSTEM PRODUCTIVITY FACILITY**

**PURPOSE**

The Interactive System Productivity Facility (ISPF) is a dialog manager for interactive applications. It provides control and services to support processing of interactive applications (dialogs) in different host environments. ISPF and the applicable ISPF/Program Development Facility (5665-268 for MVS and 5664-172 for VM) are related IBM program products. Together, they are designed to increase productivity in the development of applications by taking advantage of the features of display terminals. They contain special functions for the development and use of interactive applications (dialogs).

The dialog management functions of ISPF and the program development functions of the ISPF/Programming Development Facility (ISPF/PDF) products were previously combined in the predecessor program product, the Systems Productivity Facility (5668-009) for MVS/TSO and VM/CMS. Significant function and usability enhancements have been included in the dialog management facilities of ISPF. With this announcement of ISPF for TSO and CMS, IBM's direction is to extend this common dialog manager capability to the VSE/ICCF environment. Further information on the VSE/ICCF version of this product will be available later.

**HIGHLIGHTS**

- ISPF consists of a comprehensive set of dialog management services:
  - Display predefined screen images.
  - Build and maintain permanent tables for user information.
  - Generate output files for jobs submitted or other processing.
  - Define and control symbolic variables.
  - Interface to Edit/Browse.
- The ISPF dialog manager provides control facilities to:
  - Traverse a hierarchy of selection menus and invoke the appropriate dialog function.
  - Manage the physical display image in single screen or split screen mode.
  - Interpret program function (PF) key usage.
  - Transfer in and out of tutorials.
- A common dialog manager capability is provided across two major operating system environments.
- It is IBM's direction to extend the ISPF product to the VSE/ICCF environment at a future date.
- ISPF is the base dialog manager for the Program Development Facility products.
- ISPF includes significant function and usability enhancements over the previous System Productivity Facility (SPF) in the following areas:
  - Display Services:
    - Light-pen support - 'ATTENTION' mode.
    - Multiple line selection or modification.
    - Extended verification function.
    - Alternate locations for command and message fields.
  - Program Function (PF) key support including optional usage.
  - Variable Services:
    - Profile variables inclusion in standard variable search.
    - Profile variables stored by application and user.
    - User exits.
    - Variable names longer than screen fields.
  - Entry of APL and TEXT character data.
- ISPF contains a new facility, command tables, to intercept entered commands and take appropriate action.

**DESCRIPTION**

ISPF allows for a wide variety of dialog organizations so that the end user, at a display terminal, can approach an application in a natural, comfortable way.

A dialog managed by ISPF consists primarily of the following items:

- Selection panels (menus), from which the user selects a particular processing option.
- Functions (command procedures or programs), that perform the requested processing.

- Data entry panels, on which the user supplies additional information needed for the application.

Functions may take the form of an MVS/TSO CLIST, a VM/SP CMS EXEC or be written in a language such as assembler or one of the following:

- PL/I
- COBOL
- FORTRAN IV

One way to create and test these functions is through the related ISPF/PDF program product. This product provides a model facility that simplifies the generation of many of the dialog elements for various languages and a test facility that helps the developer find problems in user developed dialog applications.

When a dialog is invoked, ISPF facilities:

- Display a hierarchy of menus based on user selection.
- Invoke functions from menus. These functions may be command procedures (CLISTs or EXECs) or programs.
- Communicate with the user via data entry displays and messages.
- Provide online help and tutorial information.
- Generate sequential output to be passed as input to another function, or dialog (for example, JCL to be submitted as a batch job, or SCRIPT/VIS text to be formatted for printing).
- Maintain user-entered or program-generated data during this session or from one session to another. For example:
  - Define and control user variables.
  - Build and maintain permanent tables of user information.
- Provide split-screen displays where the user may partition the display screen into two "logical" areas.

Significant differences between the previous product and ISPF include:

- Table display services enhancements:
  - Multiple line selection or modification.
  - New JMODEL header statement keywords.
  - Variable names on model lines.
  - Multiple model lines.
  - Explicit cursor placement within scrollable data.
- Panel display services enhancements:
  - Extended verification functions.
  - "Z" variables as field name placeholders.
  - Truncation remainder function.
  - Alternate locations for command and message fields.
  - Profile variable support.
  - New attribute keywords: SKIP and ATTN.
  - Katakana and Canadian-French keyboard support.
- New profile variable support and the following enhancements to variable services:
  - Profile variables are included in standard search sequence.
  - Profile variables are now stored by application and user instead of just by user.
  - A name-list interface is provided for the VCOPY and VREPLACE services.
  - User exits are provided for variable access and conversion.
- A new facility allows the dialog manager to intercept user-entered commands and take appropriate action.
- Program function keys are no longer required. All functions for which PF keys were required in the previous product may now be entered in the command field of any display.
- ISPF detects fields on a panel via a light pen or via the cursor select key.
- The SELECT service and the ISPF command now allow specification of an optional application ID on the NEWAPPL keyword.
- A NOCHECK keyword may be specified with either the CMD or PGM keyword. With this keyword, the dialog function (command or program) is invoked even if the user specifies a chain of options.
- A parameter in a CALL ISPLINK no longer has to be enclosed in parentheses when there is only one variable in the list.

PROGRAM PRODUCTS

Interactive System Productivity Facility (cont'd)

- A new system variable, ZPARENT, allows the developer to indicate the next panel to be displayed when the user enters the END command or when a function completes operation. This alters the reverse-order sequence established during the original selection sequence.
- A new "set next message" function provides the ability to specify a message to be displayed with the next panel that is written by ISPF to the terminal.
- Help panels may now contain variables so that dialog information (including information entered by the user) may be displayed on the help panel.
- New selections may be added to existing menus.
- An application may direct table output to a table output library other than the library specified on the table output ISPTABL DD or FILEDEF statement.
- An application may direct file tailoring output to an output library other than the library specified on the file tailoring output ISPFIL DD of FILEDEF statement.
- Dialog control services enhancements:
  - An option has been added to allow display output without unlocking the keyboard.
  - Split-screen mode may be enabled or disabled by a function.
  - The display environment may be saved and restored.
- Non-interactive applications may be executed in the background.
- A utility is provided to assist with the conversion of Interactive Productivity Facility (IPF) tables in VM/CMS.
- Variable names may now be assigned that are longer than the screen field in a panel definition.

CUSTOMER RESPONSIBILITIES

The installation of ISPF requires a properly configured system, with appropriate terminals and other devices, as required for the desired operating system. Also, appropriate processing programs (and TSO prompters for MVS) must be installed to use the ISPF foreground and batch options. Support for printed output from the SCRIPT/VS utility is provided by the Document Composition Facility.

On an MVS system, if ISPF is to be used with TSO/TCAM, the standard TSO/TCAM message handler must be reassembled to incorporate minor modifications. These modifications are designed to eliminate interference between the full-screen I/O operations used by ISPF and the line-oriented I/O operations used by TSO. No other changes are required for TSO or TCAM.

A dialog developer must be familiar with the base operating system and appropriate programming languages, and should review *ISPF Dialog Management Services*. A user of the ISPF/Program Development Facility must be familiar with the base operating system and should review *ISPF/PDF Reference*.

INSTALLATION

In an MVS environment the installation of ISPF via SMP deletes the previous SPF product. You may want to take the necessary steps to have both products available during a transition stage.

This can be accomplished by maintaining the previous SPF product on a completely separate set of backup packs or in a set of libraries that do not interfere with the execution of ISPF. The previous SPF product can be used to assist in converting user parameter information into the new ISPF format of user profile data. See "SPF Parameters (User Profile Data) Convert Utility" for more information.

Installation procedures are available in *ISPF Installation and Customization*.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The Interactive System Productivity Facility is designed to operate on any IBM processors that meet the minimum requirements for the desired operating system. These include the IBM S/370, 43XX and 30XX processors.

**MVS:**  
The machine requirements are the same as those for MVS with the Time Sharing Option (TSO).

Up to 325K bytes of pageable link pack area (PLPA) may be used for ISPF program residency. Use of PLPA is recommended for performance reasons but not required. Most of the performance benefits may be achieved by using 280K bytes of PLPA. The minimum region size required for ISPF is 512K bytes. The recommended size is 2M bytes.

Approximately 8 cylinders of 3330 equivalent direct access storage are required for the program, panel, message, table and skeleton libraries distributed with ISPF.

**VM:**  
The machine requirements are the same as those for VM/System Product (VM/SP) Release 1 with the Conversational Monitor System (CMS).

Approximately 384K bytes of a discontinuous shared segment (DCSS) area are required for ISPF program residency. The virtual storage requirements for each user's virtual machine will vary depending upon the application being executed, the size of tables and files, and the use of "split screen". The minimum virtual machine size is 512K bytes. The recommended size is 2M bytes.

If ISPF is run on an IBM model 4331 with 1M bytes of real storage, VM/SP must be generated with the "small CP" option.

**Note:** ISPF performance on a processor with 1M bytes or less of real storage should be carefully evaluated.

Approximately 10 cylinders of 3330 equivalent direct access storage are required for the program, panel, message, table and skeleton libraries and EXECs distributed with ISPF.

**TERMINALS:** ISPF requires an IBM 3270 display terminal with at least 24 lines. 3270 models that may be used are:

For MVS/TSO Systems:

- 3275 Mdl 2 and 12
- 3276 Mdl 2, 3, 4, 12, 13 and 14
- 3277 Mdl 2 (local and remote attachment)
- 3278 Mdl 2, 3, 4 and 5 (local or remote attachment)\*
- 3279 All models (local or remote attachment) when operated in 4-color compatibility mode.

For VM/SP Systems:

- 3275 Mdl 2
- 3275 Mdl 12 (via NM/VCNA)
- 3276 Mdl 2, 3 and 4
- 3276 Mdl 12, 13 and 14 (via VM/VCNA)
- 3277 Mdl 2 (local or remote attachment)
- 3278 Mdl 2, 3, 4 and 5 (local and remote attachment)\*
- 3279 All models (local or remote attachment) when operated in 4-color compatibility mode.

\* The 3278 mdl 5 operates on 80 characters per line except when used with the ISPF/PDF Edit and Browse facilities which can use up to 132 characters per line.

SOFTWARE REQUIREMENTS

The Interactive System Productivity Facility is designed for use on the OS/VS2 (MVS) and MVS/System Product (MVS/SP) operating systems with TSO and on the VM/System Product (VM/SP) operating system with CMS.

MVS

ISPF operates as a TSO command processor under the Time Sharing Option of VS2 Release 3.8 (MVS), MVS/SP Version 1 Release 1.1, or MVS/SP Version 2 Release 1 (when available). The BPAM and BSAM access methods are required by ISPF for reading and writing data sets, and TSO/TCAM or TSO/VTAM is required for terminal communication.

The telecommunications access methods supported are:

- TCAM 10 (available with MVS)
- ACF/TCAM Version 2, Release 2 or later (5735-RC3)
- VTAM 2 (available with MVS)
- ACF/VTAM Version 1, Release 2 or later (5735-RC2)
- ACF/VTAM Version 2 (5665-280)

Internal interfaces to the following IBM programs are provided. These programs are not required to operate ISPF. However, if an IBM 3284, 3286, 3287, 3288 or 3289 printer is used for ISPF output, the appropriate DSPRINT command processor must be installed on the system.

OS/VS2 MVS 3270 Extended Display Support Session Manager Release 2	5740-XE2
TSO/TCAM Command Processor "DSPRINT"	5798-AYF
TSO/VTAM Data Set Print (DSPRINT)	5798-CPF
TSO/VS2 Programming Control Facility (PCF)	5798-BBJ
TSO Programming Control Facility - II (PCF2)	5798-CLW

VM

ISPF operates as a CMS command under the VM/System Product (VM/SP). The operation of ISPF also requires a disconnected virtual machine (ISPVM) that communicates with each user's machine via the VM Communication Facility (VMCF).



PROGRAM PRODUCTS

**Interactive System Productivity Facility (cont'd)**

If ISPF is to be used with SNA 3270 displays, the following IBM program product must be installed:

Virtual Machine/VTAM Communications, Network Application (VM/VCNA), 5735-RC5.

**COMPATIBILITY**

All existing functions in the System Productivity Facility are available either in ISPF or ISPF/PDF.

**MIGRATION**

Migration considerations from SPF, the predecessor program product, to ISPF are documented in the migration section of the *General Information Manual*.

**SYSTEM PRODUCTIVITY FACILITY:** The System Productivity Facility (5668-009) will be withdrawn from marketing 6 months after the availability of the respective ISPF, ISPF/PDF program products.

**DEPENDENCIES:** ISPF is dependent upon the System Modification Program (SMP) for installation on OS/VS2 (MVS) and MVS/SP. ISPF under MVS and MVS/SP operates with TSO. ISPF under VM/SP operates with CMS.

**DATA SECURITY**

ISPF provides no security or data integrity functions beyond those provided by the environments in which it operates. It is the responsibility of customer management to use any existing programs to provide this support.

**DOCUMENTATION**

(available from Mechanicsburg)

Available now: *ISPF General Information* (GC34-2078) ... *ISPF Program Summary* (GC34-2077).

Available at FCS: *ISPF Licensed Program Specifications* (GC34-2081) ... *ISPF Dialog Management Services* (SC34-2088) ... *ISPF Dialog Management Services Examples* (SC34-2085) ... *ISPF For MVS Installation and Customization* (SC34-2084) ... *ISPF For VM Installation and Customization* (SC34-2083).

**MVS INTEGRITY**

IBM will accept APARs where installation of ISPF introduces an exposure to the system integrity of OS/VS2 (MVS).

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**5668-960 - VSE/ISPF**  
**VSE/INTERACTIVE SYSTEM PRODUCTIVITY FACILITY**

**PURPOSE**

The Interactive System Productivity Facility (ISPF) dialog manager for interactive applications is now available for Virtual System Extensions/Interactive Communications Control Facility (VSE/ICCF). This greatly enhances the capabilities of DOS/VSE, and provides complete 'cross-system' capability for the dialog manager function of ISPF. It provides control and services to support processing of interactive applications (dialogs) in different host environments. ISPF and the applicable ISPF/Program Development Facility are related IBM program products. Together, they are designed to increase productivity in the development of applications by taking advantage of the features of display terminals. They contain special functions for the development and use of interactive applications (dialogs). With this support of ISPF for VSE, IBM has extended this common dialog manager to the ICCF environment.

**HIGHLIGHTS**

The ISPF program product is the base dialog manager for the MVS and VM system IPOs. It is IBM's direction to extend the dialog manager to the future VSE system IPO.

ISPF is a dialog manager for interactive applications. It provides control and services to support processing of the dialogs in the different host environments.

A dialog managed by ISPF consists primarily of the following items:

- Selection panels (menus) from which the user selects a particular processing option.
- Functions that perform the requested processing.
- Data entry panels on which the user supplies additional information needed for the application.

Functions may be written in a language such as Assembler, or one of the following compilers:

Compiler	VSE/AF
PL/I Optimizer	5736-PL1
COBOL	5746-CB1
VS FORTRAN Rel.2	5748-FO3

One way to create and test the dialog is through the related PDF program product. This product provides a model facility that simplifies the generation of many of the dialog elements for several languages, and a test facility that helps a user test ISPF applications.

When a dialog is invoked, ISPF facilities:

- Display a hierarchy of menus based on user selection.
- Invoke program functions from the menus.
- Communicate with the user through data entry displays and messages.
- Provide online help and tutorial information.
- Generate sequential output to be passed as input to another process; for example, JCL to be submitted as a batch job.
- Maintain user-entered or program-generated data from one session to another. For example, ISPF facilities:
  - Define and control user variables.
  - Build and maintain permanent tables of user information.
- Provide split-screen displays through which the user may partition the display screen into two 'logical' areas.
- Intercept user-entered commands and take appropriate action based on information contained in command tables.

**CUSTOMER RESPONSIBILITIES**

The installation of ISPF requires a properly configured system, with appropriate terminals and other devices, as required for the desired operating system. Also, appropriate processing programs must be installed to use the ISPF batch option.

A dialog developer must be familiar with the base operating system and appropriate programming languages, and should review *ISPF Dialog Management Services*. A user of the ISPF/Program Development Facility must be familiar with the base operating system and should review *ISPF/PDF Reference*.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Interactive System Productivity Facility is designed to operate on any IBM processor that meets the minimum requirements for the desired operating system; this includes the IBM S/370, 43XX and 30XX Processors.

The machine requirements are the same as those for VSE with the Interactive Communication Control Facility (ICCF).

Up to 388K bytes of shared virtual area (SVA) may be used for ISPF program residency. Use of SVA is recommended for performance reasons, but not required. Most of the performance benefits may be achieved by using 364K bytes of SVA. The minimum ICCF interactive partition size required for ISPF is 128K bytes. The recommended size is 256K bytes.

Approximately 10 cylinders of 3330-equivalent direct access storage are required for the program, panel, message, table and skeleton libraries distributed with ISPF.

**Terminals:** ISPF requires an IBM 3270 display terminal with at least 24 lines. 3270 models that may be used are:

**For VSE/ICCF Systems:**

3178

• 3275 mdl 2 or 12

3276 mdl 2, 3, 4, 12, 13 or 14

3277 mdl 2 (local or remote attachment)

3278 mdl 2, 3, 4 or 5 (local or remote attachment)\*

3279 mdl 2A, 3A, 2B or 3B (local or remote attachment) (2B and 3B only when operated in 4-color compatibility mode)

\* The 3278 mdl 5 operates on 80 characters-per-line except when used with the ISPF/PDF Edit and Browse facilities which can use up to 132 characters-per-line.

**SOFTWARE REQUIREMENTS**

The Interactive System Productivity Facility is designed for use on the VSE operating system with ICCF.

ISPF may be invoked in a VSE batch partition or through an ICCF procedure as an application program in an ICCF interactive partition. It may not be invoked as a command.

The following VSE support programs are required:

- Advanced Functions Release 3.5 (5746-XX8)\*
- VSE/POWER Version 2 Release 1 (5746-XE3)
- VSE/ICCF Release 3.5 in either of the following telecommunication environments:
  - ICCF/TTF (received with ICCF)
  - CICS/VS Version 1 Release 3.5 or later (5746-XX3)

\* This release is contained within VSE/SIPO 1.4.0 which is available as an Early Support Program (ESP).

**Installation:** Installation procedures are described in the *ISPF Installation and Customization* manual (SC34-2080).

**Dependencies:** ISPF is dependent upon the Maintain System History Program (MSHP) for installation on VSE. ISPF under VSE operates with ICCF.

**DATA SECURITY**

ISPF provides no security or data integrity functions beyond those provided by the environments in which it operates. It is the responsibility of customer management to use any existing programs to provide this support.

**DOCUMENTATION**

(available from Mechanicsburg)

*ISPF General Information* (GC34-2078) ... *ISPF Program Summary* (GC34-2077) ... *ISPF Licensed Program Specifications* (GC34-2081) ... *ISPF Dialog Management Services* (SC34-2088) ... *ISPF Dialog Management Services Examples* (SC34-2085) ... *ISPF for VSE Installation and Customization* (SC34-2080) ... *ISPF Diagnosis* (SC34-2132).

**RPOs ACCEPTED:** No

PROGRAM PRODUCTS

**5668-963 - NRF for 3705/3725 R1, R1.5  
NETWORK ROUTING FACILITY RELEASE 1, 1.5  
for the 3705 and 3725 COMMUNICATION CONTROLLERS**

**PURPOSE**

The Network Routing Facility Release 1 is designed to provide users of Advanced Communication Function/Network Control Program (ACF/NCP/VS) with a 3705-based message routing facility. The Network Routing Facility Release 1 resides in a 3705 Communication Controller with ACF/NCP/VS or ACF/NCP/VS Version 2 (3705) and routes messages between assorted devices without the use of host processor resources. The Network Routing Facility Release 1.5 resides in either a 3705 or 3725 Communication Controller with ACF/NCP Version 3, and routes messages between assorted devices without the use of host processor features.

**HIGHLIGHTS**

Network Routing Facility provides the following features:

- Message routing between supported terminals without the use of a host processor.
- Support for 3650 Programmable Store System, Series/1 and 3780 Data Communications Terminal.
- Multiple message routing options are selectable by the user.
- User exits allow customized routing, editing and error processing.
- Session continuation in the event of a host failure.
- Detection of abnormal conditions with reporting to the host ACF/VTAM.
- Provides the ability to route to or from a CICS/VS host application using the CICS/VS support for the 3650 Pipeline Logical Unit (NRF Release 1.5 only). Such a CICS/VS host application may be substituted for a terminal in the description of NRF Release 1.5 routing functions.

**DESCRIPTION**

**Message Routing Functions:** The Network Routing Facility communicates with terminals which are logically owned by ACF/VTAM Version 2. ACF/VTAM establishes sessions between the Network Routing Facility and the devices. Once sessions have been established the Network Routing Facility performs terminal to terminal routing without the use of host resources.

The Network Routing Facility routes incoming messages to the appropriate destination based on user specified options. Reply messages from the destination terminal can be automatically routed by the Network Routing Facility back to the originating terminal or can be forwarded to any other Network Routing Facility terminal specified by the user.

The Network Routing Facility permits the user to select from among the following routing options for each logical unit (LU) which it controls. These selections are made during the Network Routing Facility system generation.

- Fixed Table Routing - each message received from the LU is routed to a single specified destination.
- Argument Table Routing - A field in the incoming message is compared with entries in a routing table to determine the destination terminal.
- Correlation Routing - Reply messages are routed back to the originating terminal.
- User Routing - A user exit is invoked to determine the destination.

Capabilities are also provided to balance message traffic over several communications lines to improve performance.

**User Exits:** The Network Routing Facility provides the capability for user exit routines to be invoked at various stages in the routing process. These routines can be used with any of the routing techniques, and can perform functions such as message editing, customized routing and error handling. User exit routines are coded using 3705 Assembler language and included during the Network Routing Facility system generation process.

**Error Conditions:** The Network Routing Facility will maintain its terminal sessions and continue routing functions in the event of a failure of the owning ACF/VTAM system. The Network Terminal Option (NTO) has been enhanced to provide for session continuation.

The Network Routing Facility generates error messages in the event of routing errors. Conditions such as inactive or invalid destinations, correlation timeouts and unrecognizable messages generate ALERTs which are sent to ACF/VTAM in the controlling host. ALERTs can be formatted and displayed to the network operator by the Network Problem Determination Application (NPDA) Version 2. NPDA will provide a probable cause indication for each type of Network Routing Facility error ALERT.

**CUSTOMER RESPONSIBILITIES**

The customer must perform the following tasks in order to utilize the Network Routing Facility:

- Install the following products:
  - ACF/VTAM Version 2
  - ACF/NCP/VS Release 3, ACF/NCP Version 2 (3705) or ACF/NCP Version 3
  - Network Routing Facility
  - NTO Release 2 or 2.1 (if required)
  - NCCF (if required)
  - NPDA Version 2 (if required)
  - NLDM (if required)
- Choose an appropriate routing technique and create the related routing tables.
- Define the devices to ACF/NCP and the Network Routing Facility system generation.
- Code any desired user exit routines.

*Network Routing Facility Planning (SC27-0598)* should be reviewed for a more detailed explanation of these tasks.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Network Routing Facility is designed to operate on the IBM 3705-II, 3705-80, and 3725 Communication Controllers.

Message routing functions are provided for the following systems:

- IBM Series/1
- IBM 3650 Programmable Store System: Host Positive Authorization Logical Unit and User Programs Logical Unit
- IBM 3780 Data Communications Terminal (in transparent mode only)
- IBM CICS/VS Version 1 Release 6 host application using the CICS/VS support for the IBM 3650 Pipeline Logical Unit (NRF Release 1.5 only)

The Network Routing Facility supports a full duplex LU Type 0 SNA protocol. For detailed information regarding supported communications protocols, see *Network Routing Facility Planning (SC27-0598)*.

**SOFTWARE REQUIREMENTS**

The Network Routing Facility is controlled by ACF/VTAM Version 2 (5665-280) operating with OS/VS2 (MVS Release 3.8). The Network Routing Facility Release 1 is designed to operate with ACF/NCP/VS Release 3 (5735-XX1) or ACF/NCP Version 2 (3705, 5735-XX9). The Network Routing Facility Release 1.5 is designed to work with ACF/NCP Version 3 (5667-124).

The Network Terminal Option (NTO) Release 2 or 2.1 (5735-XX7) is required if messages are to be routed to 3780 binary synchronous communications (BSC) devices. The following NTO Release 2 (3705 only) PTFs must be installed in order to use the NTO session continuation function: UR90037.

The following Series/1 licensed products are required if messages are to be routed to and from an IBM Series/1.

- Realtime Programming System (RPS) Release 5.1 (5719-FC5) with: System Network Architecture Extended (SNA-E) Release 1.1 (5719-SN1)

or

- Event Driven Executive (EDX) (5719-XS3) with: System Network Architecture (SNA) (5719-SX1)

The Network Problem Determination Application (NPDA) Version 2 (5668-983) may be used to collect and format network error information.

**Storage Requirements:** The performance of NRF Release 1 or NRF Release 1.5 with the corresponding level of ACF/NCP will vary depending upon particular hardware and network configuration. NRF Release 1 requires approximately 20K bytes of 3705 storage for static control blocks and modules. NRF Release 1.5 requires approximately 30K bytes of 3705 or 3725 storage for static control blocks and modules. Additional storage is required for each logical unit, for routing related tables and for user exit routines and control blocks. Additional storage is required if NTO Release 2 or NTO Release 2.1 is also used.

Since the performance and storage requirements will vary depending upon particular hardware configuration, the 3705 Configurator (CP3705) or the 3725 Configurator (CP3725) should be used to assess individual customer performance capability and storage requirements.

## PROGRAM PRODUCTS

**Network Routing Facility R1.5 (cont'd)**

**Customer Education:** The Communications Systems curriculum will be updated to include the Network Routing Facility.

**MIGRATION**

The Network Routing Facility provides a functional replacement for the SDLC/BSC Path Function of NCP/VS Release 5 and ACF/NCP/VS Releases 2 and 2.1.

**DATA SECURITY, AUDITABILITY and CONTROL**

Network Routing Facility runs on ACF/NCP and is dependent upon ACF/VTAM to authorize terminal connections. The Network Routing Facility does not support the encrypt/decrypt feature. User management is responsible for selection, adequacy and implementation of features and the appropriate application and administrative control.

**RELIABILITY, AVAILABILITY and SERVICEABILITY (RAS)**

- The Network Routing Facility generates error ALERTs when an internal error condition is detected. These messages are formatted and sent to ACF/VTAM in the controlling host. If NPDA Version 2 is installed, NPDA will display the error ALERT and provide an action panel with a probable cause indication. If NPDA Version 2 is not installed, the ALERTs can be captured by activating ACF/VTAM buffer trace. The trace data can be printed using ACF/TAP.
- Message flow through the Network Routing Facility is traced in an internal trace table. This data can be received at the host by activating ACF/VTAM line trace for the Network Routing Facility line. The Generalized Trace Facility (GTF) can be used to format and print the trace data.
- User error routine exits are provided to allow user processing of error conditions.
- The Network Routing Facility will maintain its terminal sessions and continue routing functions in the event of a failure of the owning ACF/VTAM system. The Network Terminal Option (NTO) has been enhanced to provide for session continuation.

**RPQs ACCEPTED:** No

## PROGRAM PRODUCTS

**DIRECT MULTINETWORK LINK (DMNL) for IMS/VIS  
VERSION 1 RELEASE 1  
5668-964****PURPOSE**

Direct Multinetwork Link (DMNL) is an application program product that enables the preparation and processing of messages related to banking transactions.

**HIGHLIGHTS**

As a generalized communication monitor, Direct Multinetwork Link is a base product and provides the following end-user oriented services for the banking environment.

- Message Processing
  - Online message processing
  - Batch message processing
  - User application program support
  - Operator control of the system
- Message Definition Facility
- General Services
  - Routing
  - Message format service
  - Queue management
  - Journaling

**DESCRIPTION**

DMNL is a message processing facility that allows the end user to work with a display terminal or sequential devices. With DMNL, a user can prepare messages based on user-specified or S.W.I.F.T. formats. These messages can be transmitted to the network interface for any public or private network including the S.W.I.F.T. network. Communication network interface functions provide a base to establish and operate the connection to any network including the S.W.I.F.T. network, and allow the concurrent operation of multiple network links within one DMNL installation.

DMNL provides message formatting and routing services to control the message flow from function to function, and to gain access to individual fields within a message. The Message Format Service (MFS) maps the various formats of the messages to a common internal format or maps a message from the internal format to a format compatible with the device where it is to appear. MFS simplifies the access to each individual message field for inspection and further processing. The level of detail to which a message is segmented is determined during DMNL generation by the facilities provided.

Routing services control the movement of input and output messages from one DMNL function to the next. Routing criteria are either found in the message itself or are introduced by the end user handling the message. All messages are stored in queues. The queues of all message processing functions are collected in one data set. Queue management dynamically utilizes this data set. The journal saves information on events that occur during the operation of DMNL. This information can be used for security and reliability purposes.

As a general application package, DMNL is integrable into a banking application environment. Together with other banking applications that can automatically be initiated by the user application interface facility, Direct Multinetwork Link allows a full computer-assisted processing of banking transactions.

**Reference Information:** Direct Multinetwork Link is available in the following environments:

- DMNL-CICS/DOS/VIS (5662-269)
- DMNL-CICS/OS/VIS (5668-965)
- DMNL-IMS/VIS (5668-964)

To communicate with the S.W.I.F.T. network, the user of Direct Multinetwork Link has to install Direct S.W.I.F.T. Network Link (DSNL) (5668-926).

DMNL/DSNL are internally restructured, functional extensions of the program product Direct S.W.I.F.T. Link (DSL), 5746-F14 for DSL-CICS/DOS/VIS, 5740-F15 for DSL-CICS/OS/VIS and 5740-F16 for DSL-IMS/VIS.

**CUSTOMER RESPONSIBILITIES**

Users are responsible for the following prerequisites:

- The operating system and data communication system must be generated and installed as required for Direct Multinetwork Link.
- The required library space must be provided.
- Customization and installation must be performed for DMNL.
- End users must be defined and end-user functions must be selected and defined.
- Routing modules that reflect the bank's organizational requirements must be provided.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Direct Multinetwork Link program product is designed to operate on the following IBM machines.

IBM S/370 mdls 158 and 168  
IBM 303X, 308X and  
IBM 4341

The size of the processor for DMNL depends on the operating system (OS/VIS) and the data communication system (IMS/VIS) used to control the operation of DMNL.

The system requirements of DMNL, in addition to those of the operating system used, are the following:

- At least one IBM 327X display station (i.e., 3278-2, 3279-2).
- If printing services are desired, one IBM 328X Printer (i.e., 3287-2, 3288-2) or equivalent.
- A direct access storage device for DMNL data sets and library.

**SOFTWARE REQUIREMENTS**

The programs that constitute the Direct Multinetwork Link program product are written in IBM S/370 Assembler language.

The operational requirements are:

- IBM Operating System/Virtual Storage 1 (OS/VIS1) Release 6.7 or subsequent releases, or
- IBM Operating System/Virtual Storage 2 (OS/VIS2) Release 3.8 MVS or subsequent releases.
- Information Management System/Virtual Storage (IMS/VIS) Version 1 (5740-XX2), Release 2.0, or subsequent releases.

The DMNL/DSNL queue, user table, journal and the authenticator-key file are VSAM data sets. For OS/VIS, VSAM is a component of the OS/VIS System Control Program.

**Restart/Recovery:** Restart/Recovery assistance is supplied for:

- DMNL restart based on queues.
- Device failures of IBM 3278-2 and 3287-2 and their equivalents.
- Failure of the IBM system covered by the recovery capabilities of the operating and data communication system.

**COMPATIBILITY and MIGRATION**

Direct Multinetwork Link together with the separate program product Direct S.W.I.F.T. Network Link support all S.W.I.F.T. specific services. Direct S.W.I.F.T. Network Link is the interface between Direct Multinetwork Link and the S.W.I.F.T. network. The program products DMNL/DSNL Release 1.0 are internally restructured, functional extensions of the program product Direct S.W.I.F.T. Link (DSL): 5746-F14 - DSL-CICS/DOS/VIS, 5740-F15 - DSL-CICS/OS/VIS, and 5740-F16 - DSL-IMS/VIS. With respect to DSL Release 2.0, DMNL/DSNL Release 1.0 provides the following new functions:

- Direct Multinetwork Link (DMNL)
  - NOPROMPT mode in addition to normal screen processing in PROMPT mode.
  - Compressed printer layout.
  - Dynamic queue-key table.
  - Separated signon processing.
  - Improved console operator messages.
  - Improved Message Format Service error diagnostics.
  - Extended panel command availability.
  - CICS command level interface.
  - 3375 and 3380 support.
  - Online maintenance of the USER-table (passwords, users).
  - Support of customer-added applications, including record formats other than S.W.I.F.T.
- Direct S.W.I.F.T. Network Link (DSNL)
  - Support of all S.W.I.F.T. message types, including message category 7 (documentary credits).
  - Optional automatic retry of LOGIN processing.

To ease migration, DMNL/DSNL are designed to be functionally upward compatible with DSL. However, a customer migrating from DSL to DMNL/DSNL must follow the same installation procedure as a new customer.

The generalization of the facility to define user-specific messages has implied modifications of the message format service, queue management and routing in DSL. User-written application programs that use these services may have to be rewritten.

**User Modifications:** During DMNL installation, each user can determine the customizing options that best meet his requirements. For



PROGRAM PRODUCTS

**DMNL for IMS/VS (cont'd)**

additional, individual changes, the programs are designed so that users can:

- Modify the layout and the language of the panels used to display a message or related data on screens, terminal printers, and line printers.
- Modify the layout of a S.W.I.F.T. message and other related data in internal storage.
- Add individual code of user-specific message processing steps.

**DOCUMENTATION**  
(available from Mechanicsburg)

*DMNL/DSNL 1.0 General Information Manual (GH12-5142).*

The following publications will be provided at availability of DMNL/DSNL 1.0:

*Licensed Program Specifications ... Program Reference Manual ... System and Application Programmer's Guide ... Operations Guide ... Messages and Codes ... Program Logic Manual ... Program Listing Microfiche.*

**RPCs ACCEPTED:** No

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**DIRECT MULTINETWORK LINK (DMNL) for CICS/OS/VS  
VERSION 1 RELEASE 1  
5668-965**

**PURPOSE**

Direct Multinetwork Link (DMNL) is an application program product that enables the preparation and processing of messages related to banking transactions.

**HIGHLIGHTS**

As a generalized communication monitor, Direct Multinetwork Link is a base product and provides the following end-user oriented services for the banking environment.

- Message Processing
  - Online message processing
  - Batch message processing
  - User application program support
  - Operator control of the system
- Message Definition Facility
- General Services
  - Routing
  - Message format service
  - Queue management
  - Journaling

**DESCRIPTION**

DMNL is a message processing facility that allows the end user to work with a display terminal or sequential devices. With DMNL, a user can prepare messages based on user-specified or S.W.I.F.T. formats. These messages can be transmitted to the network interface for any public or private network including the S.W.I.F.T. network. Communication network interface functions provide a base to establish and operate the connection to any network including the S.W.I.F.T. network, and allow the concurrent operation of multiple network links within one DMNL installation.

DMNL provides message formatting and routing services to control the message flow from function to function, and to gain access to individual fields within a message. The Message Format Service (MFS) maps the various formats of the messages to a common internal format or maps a message from the internal format to a format compatible with the device where it is to appear. MFS simplifies the access to each individual message field for inspection and further processing. The level of detail to which a message is segmented is determined during DMNL generation by the facilities provided.

Routing services control the movement of input and output messages from one DMNL function to the next. Routing criteria are either found in the message itself or are introduced by the end user handling the message. All messages are stored in queues. The queues of all message processing functions are collected in one data set. Queue management dynamically utilizes this data set. The journal saves information on events that occur during the operation of DMNL. This information can be used for security and reliability purposes.

As a general application package, DMNL is integrable into a banking application environment. Together with other banking applications that can automatically be initiated by the user application interface facility, Direct Multinetwork Link allows full computer-assisted processing of banking transactions.

**Reference Information:** Direct Multinetwork Link is available for the following environments:

- DMNL-CICS/DOS/VS (5662-269)
- DMNL-CICS/OS/VS (5668-965)
- DMNL-IMS/VS (5668-964)

To communicate with the S.W.I.F.T. network, the user of Direct Multinetwork Link has to install Direct S.W.I.F.T. Network Link (DSNL) (5668-926).

DMNL/DSNL are internally restructured, functional extensions of the program product Direct S.W.I.F.T. Link (DSL), Program Numbers 5746-F14 (DSL-CICS/DOS/VS), 5740-F15 (DSL-CICS/OS/VS) and 5740-F16 (DSL-IMS/VS).

**CUSTOMER RESPONSIBILITIES**

Users are responsible for the following prerequisites:

- The operating system and data communication system must be generated and installed as required for Direct Multinetwork Link.
- The required library space must be provided.
- Customization and installation must be performed for DMNL.
- End users must be defined and end-user functions must be selected and defined.
- Routing modules that reflect the bank's organizational requirements must be provided.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Direct Multinetwork Link program product is designed to operate on the following IBM machines.

IBM S/370 mdls 135 or larger  
IBM 303X, 308X and  
IBM 4341

The size of the processor for DMNL depends on the operating system (OS/VS) and the data communication system (CICS/OS/VS) used to control the operation of DMNL.

The system requirements of DMNL, in addition to those of the operating system used, are the following:

- At least one IBM 327X display station (i.e., 3278-2, 3279-2).
- If printing services are desired, one IBM 328X Printer (i.e., 3287-2, 3288-2) or equivalent.
- A direct access storage device for DMNL data sets and library.

**SOFTWARE REQUIREMENTS**

The programs that constitute the Direct Multinetwork Link program product are written in IBM S/370 Assembler language.

The operational requirements are:

- IBM Operating System/Virtual Storage 1 (OS/VS1) Release 6.7 or subsequent releases, or
- IBM Operating System/Virtual Storage 2 (OS/VS2) Release 3.8 MVS or subsequent releases.
- Customer Information Control System/Virtual Storage (CICS/OS/VS) Version 1 (5740-XX2), Release 5.0, or subsequent releases.

The DMNL/DSNL queue, user table, journal and the authenticator-key file are VSAM data sets. For OS/VS, VSAM is a component of the OS/VS System Control Program.

**Restart/Recovery:** Restart/Recovery assistance is supplied for:

- DMNL restart based on queues.
- Device failures of IBM 3278-2 and 3287-2 and their equivalents.
- Failure of the IBM system covered by the recovery capabilities of the operating and data communication system.

**COMPATIBILITY and MIGRATION**

Direct Multinetwork Link together with the separate program product Direct S.W.I.F.T. Network Link support all S.W.I.F.T. specific services. Direct S.W.I.F.T. Network Link is the interface between Direct Multinetwork Link and the S.W.I.F.T. network. The program products DMNL/DSNL Release 1.0 are internally restructured, functional extensions of the program product Direct S.W.I.F.T. Link (DSL), Program Numbers 5746-F14 (DSL-CICS/DOS/VS), 5740-F15 (DSL-CICS/OS/VS), and 5740-F16 (DSL-IMS/VS). With respect to DSL Release 2.0, DMNL/DSNL Release 1.0 provides the following new functions:

- Direct Multinetwork Link (DMNL)
  - NOPROMPT mode in addition to normal screen processing in PROMPT mode.
  - Compressed printer layout.
  - Dynamic queue-key table.
  - Separated signon processing.
  - Improved console operator messages.
  - Improved Message Format Service error diagnostics.
  - Extended panel command availability.
  - CICS command level interface.
  - 3375 and 3380 support.
  - Online maintenance of the user table (passwords, users).
  - Support of customer-added applications, including record formats other than S.W.I.F.T.
- Direct S.W.I.F.T. Network Link (DSNL)
  - Support of all S.W.I.F.T. message types, including message category 7 (documentary credits).
  - Optional automatic retry of LOGIN processing.

To ease migration, DMNL/DSNL are designed to be functionally upward compatible with DSL. However, a customer migrating from DSL to DMNL/DSNL must follow the same installation procedure as a new customer.

The generalization of the facility to define user-specific messages has implied modifications of the message format service, queue management and routing in DSL. User-written application programs that use these services may have to be rewritten.



PROGRAM PRODUCTS

**DMNL for CICS/OS/VS (cont'd)fcN**

**User Modifications:** During DMNL installation, each user can determine the customizing options that best meet his requirements. For additional, individual changes, the programs are designed so that users can:

- Modify the layout and the language of the panels used to display a message or related data on screens, terminal printers, and line printers.
- Modify the layout of a S.W.I.F.T. message and other related data in internal storage.
- Add individual code of user-specific message processing steps.

**DOCUMENTATION**  
(available from Mechanicsburg)

*DMNL/DSNL 1.0 General Information Manual (GH12-5142).*

The following publications will be provided at availability of DMNL/DSNL 1.0:

*Licensed Program Specifications ... Program Reference Manual ... System and Application Programmer's Guide ... Operations Guide ... Messages and Codes ... Program Logic Manual ... Program Listing Microfiche.*

**RPQs ACCEPTED:** No

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SERVICE LEVEL REPORTER (SLR)  
VERSION 2 RELEASE 1.0  
5668-966****PURPOSE**

Service Level Reporter Version 2 (SLR) program is designed to help DP management with information to help manage the DP installation.

**DESCRIPTION**

SLR runs under VS1, MVS/370, and MVS/XA.

SLR Version 1 reported on data from many systems -- VS1, MVS, MVS/SP Version 1, TSO, RMF Version 2, CICS/VS, and IMS/VS. In addition to these, SLR Version 2 reports on data from MVS/SP Version 2, RMF Version 3, and other systems providing a sequential log. Information is collected in one data base and is presented in a readily understandable format. SLR Version 2 can merge data from several sources into one report.

Graphics and color can be used to present information, thereby giving a versatile, easily-used pictorial display capability for use by data processing professionals at all levels.

An SLR objective is to minimize the number of printed reports presented to management, by presenting the information in an understandable format, and supplementing printed reports with online inquiries to the SLR data base when necessary.

The following list gives some examples on the areas SLR can be used to report on:

**System Overviews** - SLR can produce comprehensive "one-page" management reports combining key measurements from several sources into one report.

**Service Levels** - SLR can be used to monitor the level of service provided to users of data processing, for example, response times. Exception reporting can be used to detect deviations from objectives.

**Availability** - SLR can report on system and subsystem availability, based on data from system log data.

**Performance** - System performance data, (i.e., processor utilization, paging, channel load) can be reported on, and related to IMS/VS, CICS/VS, or TSO response times or transaction load.

**Equipment Utilization** - SLR can provide data on equipment utilization, for example: Processor utilization, channel load, DASD, tape, and printer usage.

**Capacity Planning** - SLR includes a capacity planning application to measure the system load by application area, which helps when forecasting future growth.

**Network** - The customer can use SLR to provide reports giving network information, based, for example, on: VTAM, NPA, or console log data.

**Accounting** - SLR can provide the basis for DP accounting for batch, TSO, CICS/VS, IMS/VS, and other systems. For online systems, chargeout can be based on transactions, providing users with bills in terms they can understand and influence.

SLR is easy to install and operate. Results are available immediately. After installation, which in an MVS TSO environment takes less than one day, users have immediate access to the many SLR reports.

SLR has many powerful functions based on a data base containing historic data, for example: Online inquiry through TSO, processing of user defined log records, multiprocessor and multisystem support, an easy-to-use language to define additional reports and "views" of the data base, and customizing the SLR data base. Two key considerations in developing SLR have been ease-of-use combined with flexibility.

**VERSION 2 RELEASE 1 HIGHLIGHTS**

Users of SLR Version 1 Release 2 (5740-DC3) can use supplied tools and procedures to migrate to SLR Version 2 Release 1 (5668-966).

Expanded capabilities in SLR Version 2 Release 1 are:

**Adaptable Log Layout (ALL Function)**

Users may now use SLR to collect and report on sequential log data that contains timestamped records.

In addition to the logs processed by Version 1 Release 2, the user can now define the record layout of sequential files to SLR and subsequently process such data sets using the SLR data base and reporting functions. This facility enables the user to process log data produced by, for example:

- SYS1.LOGREC
- VSPC
- NPA
- VM accounting data
- VM monitor data

- SMF and IMS (not processed by SLR Version 1)

- User applications

The ALL function allows processing of user defined SMF and IMS records in the same run as the standard SMF and IMS records, thus reducing the need for multiple runs of the SMF and IMS log data sets.

Samples are provided to show the different capabilities of the ALL function.

**VIEW Function**

This is a function that allows the user to combine and manipulate data from one or more tables. The VIEW function enables the user to:

- produce a report with data from more than one table, for example to provide comprehensive one-page reports with data from several subsystems
- calculate percentages based on subtotals from the same table
- allows the user to relate values from different tables, and from different systems
- add new computed columns without re-assembling tables
- change column names in tables without re-assembly

**SPF Interface**

In SLR Version 2 Release 1, the System Productivity Function (SPF, 5668-009) will be the major TSO interface, replacing the use in SLR Version 1 Release 2 of TSO CLISTS for panel definitions. Main features of this interface are:

- Full screen support
- Split screen
- SPF browse of SLR reports, including scrolling
- Rapid access to desired panel by short cut function

Support for the processing of SMF log data from MVS/SP 2.1.0 and processing of RMF 3.1.0 log data.

**Other Enhancements**

- FILTER function to eliminate log records that contain values outside of desired ranges, thus giving more accurate statistics.
- RECALCULATE function, enabling corrections to detail rows in tables being resummarized into total columns without a COLLECT run.
- Selective UNLOAD, allowing selection of specific rows and columns to be unloaded.

**CUSTOMER RESPONSIBILITIES**

Installation of SLR, and tailoring, updating, and maintenance of the SLR data base are customer responsibilities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM machines:

S/370 mdl's 148, 155II, 158, 165II, IBM 30XX Processors, and IBM 4341, 4361 and 4381 Processors.

If SLR is to be used under TSO, without color or graphics, a suitable terminal must be available, either one of the following, or equivalent:

IBM 3276 Control Unit Display Station - Models 2, 3, 4, 12, 13, or 14

IBM 3277 Display Station - Model 2

IBM 3278 Display Station - Models 2, 3, 4, or 5

IBM 3279 Color Display Station - Models 2A or 3A

SLR uses the program GDDM (Graphical Data Display Manager, 5748-XXH) and its feature PGF (Presentation Graphics Feature) to produce color and/or graphics reports. Thus, SLR supports the same devices as GDDM with PGF under MVS TSO. In summary, the following terminals or equivalent devices are supported:

IBM 3278 Display Station - Models 2 or 3 with the ECSA, PS-2, and PS-4 features (monochrome)

IBM 3279 Color Display Station - Models 2B or 3B with the PS-2 and PS-4 features (color).

IBM 3287 Printer - Models 1 or 2 (monochrome)

IBM 3287 Printer - Models 1C or 2C (color)

## PROGRAM PRODUCTS

**Service Level Reporter (SLR) V2.1 (cont'd)**

SLR requires hardware floating-point capability.

SLR requires a minimum of 2.5M bytes of virtual storage in the private area. SLR does not allocate any storage in the common area. When using the COLLECT command it is advisable to request a large buffer pool and use up to 3M bytes of virtual storage.

Additional virtual storage is also required by Sort/Merge and GDDM/PGF.

**SOFTWARE REQUIREMENTS**

This licensed program requires the functions provided by the following IBM programs:

Running SLR requires one of the following:

- OS/VS1 Release 7.0 with VSAM, and subsequent releases, unless otherwise identified
- OS/VS2 (MVS) Release 3.8 with or without MVS/SP Version 2 Release 1 (MVS/XA), or MVS/SP Version 1 Release 1 (MVS/370), and their subsequent releases, unless otherwise identified

Installing and maintaining SLR requires the System Modification Program Release 4 (SMP4).

Optionally, to use certain SLR functions in the applicable environments, the following IBM Program Products are required:

Using the SLR SORT command:  
OS/VS Sort/Merge (5740-SM1), or equivalent.

Using the SPF interface:  
Systems Productivity Facility (SPF, 5668-009).

Producing 3279/3278/3287 color graphics SLR reports:  
Graphical Data Display Manager (GDDM, 5748-XXH) and its feature PGF (Presentation Graphics Feature). Hence ACF/TCAM Version 2 Release 2 (or later), or ACF/VTAM Version 1 Release 2 or 3, or ACF/VTAM Version 2 Release 1 (or later) is required.

Running SLR as a TSO command processor in batch:  
Either the OS/VS2 TSO Command Package (5740-XT6), or the TSO Extensions (TSO/E, 5665-285 for MVS/370, 5665-293 for MVS/XA).

**INPUT LOGS SUPPORTED**

Using the Adaptable Log Layout (ALL) function, SLR can process any sequential data set containing timestamped records. The user can map the input records into SLR log tables. Each field to be entered into an SLR log table must be at a fixed offset in the record. Records that do not have this property may be processed in an exit. This facility enables the user to process log data produced by, for example:

- SYS1.LOGREC
- VSPC
- NPA
- VM accounting data
- VM monitor data
- SMF and IMS (not processed by SLR Version 1)
- User applications

The ALL function allows processing of user defined SMF and IMS records in the same run as the standard SMF and IMS records, thus reducing the need for multiple runs of the SMF and IMS log data sets.

Samples are provided to show the different capabilities of the ALL function.

SLR has log tables defined for processing log data sets produced by the following programs and subsequent releases and modifications unless otherwise stated:

**SMF**

SMF records from:

- OS/VS1 Release 6.7 and 7.0
- OS/VS2 Release 3.8
- MVS/SE Release 2.0
- MVS/SP Version 1 Release 1.0, 2.0, and 3.0
- MVS/SP Version 2 Release 1.0

**RMF**

- RMF Version 2 Release 2.0, 3.0, 4.0, and 4.1
- RMF Version 3 Release 1.0

**IMS/VS**

IMS/VS Version 1 Release 1.5, 1.6, and 2.0

IMS/VS Fast Path transaction records are not supported by SLR. Records from IMS/VS systems with the Multiple Systems Coupling feature are processed by SLR, but without using the MSC information.

**CICS/VS**

CICS/VS Monitoring Facility records produced by CICS/VS Release 1.5. SLR accepts both native CICS/VS logs written under OS/VS or DOS/VSE, or records written via the SMF writer under MVS/SE2 or MVS/SP.

**DOCUMENTATION**

(available from Mechanicsburg)

*Service Level Reporter General Information Manual (GH19-6213) ...  
Service Level Reporter LPS (GH19-6214).*

**MVS SYSTEM INTEGRITY APPLIES: Yes**

**RPOs ACCEPTED: No**



## 5668-967 - INTERACTIVE FINANCIAL SYSTEM 1 - OS/VS POSTINGS AND GENERAL LEDGER RELEASE 1 (5668-967)

### PURPOSE

The Interactive Financial System 1 (IFS 1) is part of the Interactive Financial System (IFS). The Interactive Financial System is a set of application programs designed to perform accounting and related functions. The set consists of IFS 1, IFS 2, IFS 3 and IFS 4. IFS 1 allows for posting either in interactive mode using 3277, 3278 or 3279 Display Stations or in batch mode. Any account and any voucher can be displayed and, if necessary, processed randomly at the terminal. IFS 1 (OS/VS) is functionally compatible with IFS 1 (DOS/VS), 5746-F52, Release 1.5.

### SPECIAL SALES INFORMATION

#### Primary Potential Industries:

- Manufacturing
- Process
- Distribution
- Health

#### Other Potential Industries:

- Transportation
- Insurance
- Media
- Finance

IFS can be run in parallel with other applications.

### HIGHLIGHTS

- IFS 1 provides the accounting data base organization and management functions for the four program products IFS 1 through IFS 4. It is a prerequisite for the installation of IFS2, IFS3 and IFS 4. Accounting data necessary for IFS 1-4 is stored in the following DL/I data bases:
  - The parameter data base contains general information on the installed IFS, for example, the accountant identifications, authorizations of accountants and terminals, table of clients, posting keys and payment conditions.
  - The accounts data base includes the impersonal and personal accounts per client and the related posting entries of the actual posting periods. Included are segments for historical and budget data and user-defined structuring of accounts for the balance sheet, profit and loss reports, or financial status reports (for use by IFS 2).
  - The match-code data base is a secondary index data base for retrieval of accounts using match codes as search arguments.
  - The document data base is a secondary index data base allowing for retrieval of posting entries using voucher numbers as search arguments.
  - The combination data base includes key-reference information useful for the secondary-account coding function and for recording additional data about postings.
- A temporary non-DL/I data set is used as intermediate storage for the posting material (Daily Work File).
- System restart facilities and data base recovery functions are available for IFS 1 through IFS 4.
- Accounting functions for up to 99 separately maintained clients (separately balanced subsidiaries or branches of a company) are possible.
- The main accounting functions that the user can request are:
  - Display, creation and changing of account master data.
  - Entering, verifying and posting in one operation either directly at a display terminal or in machine-readable form. After entry in batch mode, this posting material is available for display and modification in interactive mode at a display terminal.
- Posting Interactively:  
Postings are entered and processed in groups (a sequence of related postings for which control totaling can be performed). IFS 1 provides posting masks on the screen (corresponding to the conventional processing cycle) to handle these groups.
- Posting in Foreign Currencies:  
Posting in foreign currencies is done by entering the values in foreign-currency and/or in local-currency notation in specified foreign-currency accounts. These values are always stored in both local and foreign currency. If an amount is entered only in foreign-currency notation, a stored currency exchange rate is used to calculate the corresponding local-currency amount.
- Posting of Unverified Invoice Receipts:  
Received purchase invoices can be recorded before verification to achieve, for example, tracking of unverified invoices, payment with optimum conditions, or early deduction of pretax. Unverified

invoices are processed by common IFS posting facilities, using specific accounts (suspense accounts). These postings are displayed and reported separately.

- Standing-Journal Entries/Forward Postings:  
Postings with explicit posting dates can be entered beforehand. Once entered, such postings are repeatedly posted at the specified dates (standing-journal entries) or only once (forward postings).
- Match-code Function:  
The accountant can search for the account number of a debtor or creditor by means of match codes he defines himself.
- Posting Group and Account Display:  
Before a short-period summary is produced, the user can display on the screen any posting group as entered or all postings of an account for a certain period.
- Accounting Summaries:  
During short period summary (normally performed daily) IFS 1 provides various reports, such as a list of all postings entered (journal) and a posting group list.  
  
During a monthly summary, IFS 1 prepares a trial balance and a final account report.  
  
In the annual summary, all the accounts of a client, as well as the supplementary postings of the preceding accounting year, are printed.
- Data Integrity Precautions:  
Before using the online facilities, each accountant must enter his name, authorization code and client number so that the system can determine what processing he is allowed to do for the given client, and which operation he is permitted to perform, for instance, display, maintain, or post certain accounts, or open new accounts.
- Creation of the general journal and the general ledger for each client.
- Provisions are made for the adaptation of messages, commands, the date format, the use of a decimal point or comma, and screen text according to national requirements.
- Testing and training can be carried out in parallel to normal operations by simply reserving one client for these purposes.

### CUSTOMER RESPONSIBILITIES

The program products IFS 1-4 constitute an application package affecting several departments within a company.

The organizational prerequisites should be planned and considered early. The departments affected should be made familiar with the arrangements necessary in the financial accounting area.

Before IFS 1 can be installed and executed, the user must provide for:

- The definition of the company's account structure.
- The identification of all necessary accounting data by keys, codes or abbreviations.
- The definition of match codes to facilitate postings of debtors and creditors even if the account numbers are unknown (optional).
- The specification of control information about the different accounting procedures, for example, arrears procedure, sales tax procedure or discount posting procedure.
- The provision of account data in the required format.
- The initial loading of the collected account data into the data bases.
- The adaptation of messages, commands, screen text, report headings and currency amounts to national requirements, if necessary.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

This licensed program is designed to operate on the following IBM processors:

IBM S/370 model 138 or larger  
IBM 3031 or larger  
IBM 3081  
IBM 4331 or larger

**Note:** For the IBM S/370 and the IBM 4300 Processors, the capacity of the processor model must comply with the requirements of the operating system used (see "Software Requirements").

The minimum machine requirements for IFS 1 (OS/VS) are:

- One IBM direct access storage device such as the IBM 3330, 3340, 3350, 3370, 3380, or equivalent devices supported by the operating system used.



PROGRAM PRODUCTS

**IFS 1 R1 (cont'd)**

- One IBM 2540 Card Reader, or any other device supported by the operating system to process SYSIN data.
- One IBM 4245 Printer mdl 1, or an equivalent device supported by the operating system, with at least 132 print positions.
- One IBM tape unit, such as IBM 2400, or IBM 3400, or equivalent.
- One IBM 3277 Display Station mdl 2 or equivalent with data entry keyboard.

**SOFTWARE REQUIREMENTS**

IFS 1 (OS/VS) is written in PL/I and Assembler language and is supplied in the form of object code and source code. It operates under OS/VS1 Release 7.0, program number 5741-VS1, MVS/SP-JES2, program number 5740-XYS, Release 1.0, or MVS/SP-JES3, program number 5740-XYN, Release 1.0 or subsequent releases, unless otherwise specified.

To recompile IFS 1 (OS/VS), the OS/VS PL/I Optimizing Compiler, program number 5734-PL1 and the OS/VS Assembler are required.

To link-edit and execute IFS 1 (OS/VS), the OS/VS PL/I Resident Library, program number 5734-LM4, the OS/VS PL/I Transient Library, program number 5734-LM5 and the OS/VS Sort/Merge, program number 5740-SM1 are required. IFS uses the data management and access methods VSAM and SAM.

The online communication facility CICS/VS, program number 5740-XX1, Version 1 Release 5 or a subsequent release (unless otherwise indicated) is required.

For data base management, IMS/VS, program number 5740-XX2, Version 1 Release 1.6 or subsequent releases are required unless otherwise stated.

**MIGRATION**

It is possible for a user of IFS DOS/VS (Release 1.5 of IFS 1, Release 1.4 of IFS 2, IFS 3 and IFS 4) to migrate to IFS (OS/VS). Existing IFS data bases can be converted from DL/I DOS/VS to IMS/VS by using available utilities of both products.

**PERFORMANCE CONSIDERATIONS**

The performance of the system can be influenced, in online and in batch mode, by VSAM specifications such as the buffer space, the control interval size and the record size. When the data base is distributed over more than one disk drive or when the index data base resides on a separate disk drive or when additional disk storage is allocated, this may result in an increase in performance.

Processing of open items in accounts that have a large number of open items may increase the online response time.

**DOCUMENTATION**

(available from Mechanicsburg)

*IFS 1-4 General Information Manual (GH12-5120) ... IFS 1-4 Program Messages (SH12-5525) ... IFS 1-4 Application User's Guide (SH12-5327) ... IFS 1 Licensed Program Specifications (GH12-5229) ... IFS 1 Program Reference and Operations Manual (SH12-5425) ... IFS 1 Operations Guide (SH12-5519).*

**RPQs ACCEPTED: No**



## PROGRAM PRODUCTS

**5668-968 - INTERACTIVE FINANCIAL SYSTEM 2 - OS/VS  
PROFIT & LOSS, BALANCE SHEET  
RELEASE 1****PURPOSE**

The Interactive Financial System 2 (IFS 2) is part of the Interactive Financial System (IFS). The Interactive Financial System is a set of application programs designed to perform accounting and related functions. The set consists of IFS 1, IFS 2, IFS 3 and IFS 4. IFS 1 Release 1 Modification Level 0 is a prerequisite to IFS 2. With IFS 2, the user can define the profit and loss statement, balance sheet and financial status report to his individual requirements. IFS 2 (OS/VS) is functionally compatible with IFS 2 (DOS/VS), 5746-F53, Release 1.4.

**SPECIAL SALES INFORMATION****Primary Potential Industries:**

- Manufacturing
- Process
- Distribution
- Health

**Other Potential Industries:**

- Transportation
- Insurance
- Media
- Finance

IFS may be run in parallel with other applications.

**HIGHLIGHTS**

IFS 2 is designed to:

- Prepare and print profit and loss statements.
- Prepare and print balance sheets for different posting periods according to a format specified by the user.
- Prepare and print financial status reports in various formats.
- Print a summary of the status of user-selected accounts and account groups, differentiating between the various posting periods.
- Report the balance brought forward, the debit and credit turnover of the corresponding report period, the accumulated annual sales (debit and credit), and the current balance.

Provisions are made for the adaptation of messages, report headings, currency amounts, the date format, and the use of a decimal point or comma according to national requirements.

**CUSTOMER RESPONSIBILITIES**

Before installing and executing IFS 2, the program product IFS 1, Program Number 5668-967, which includes the IFS data base management, must be installed.

In connection with the installation of IFS 1, the appropriate organizational prerequisites must be resolved by the user.

The adaptation of messages, report headings and currency amounts to national requirements must be performed if applicable.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM processors:

IBM S/370 model 138 or larger  
IBM 3031 or larger  
IBM 3081  
IBM 4331 or larger

**Note:** For the IBM S/370 and the IBM 4300 Processors, the capacity of the processor model must comply with the requirements of the operating system used (see "Software Requirements").

IFS 2 uses approximately 130K bytes of real storage in addition to that required by the operating system and IMS/VS.

The minimum machine requirements for IFS 2 (OS/VS) are:

- One IBM direct access storage device, such as IBM 3330, 3340, 3350, 3370, 3380, or equivalent devices supported by the operating system used.
- One IBM 2540 Card Reader, or any other device supported by the operating system to process SYSIN data.
- One IBM 4245 Printer mdl 1, or an equivalent device supported by the operating system, with at least 132 print positions.
- One IBM tape unit, such as the IBM 2400 or IBM 3400 or equivalent.

**SOFTWARE REQUIREMENTS**

IFS 2 is written in PL/I and Assembler language and is supplied in the form of object code and source code. It operates under OS/VS1 Release 7.0, program number 5741-VS1, MVS/SP-JES2, program number 5740-XYS, Release 1.0, or MVS/SP-JES3, program number 5740-XYN, Release 1.0 or subsequent releases, unless otherwise specified.

To recompile IFS 2 (OS/VS), the OS PL/I Optimizing Compiler, program number 5734-PL1 and the OS/VS Assembler are required.

To link-edit and execute IFS 2 (OS/VS), the OS/VS PL/I Resident Library, program number 5734-LM4, the OS/VS PL/I Transient Library, program number 5734-LM5, and the OS/VS Sort/Merge, program number 5740-SM1, are required. IFS 2 uses the data management and access methods VSAM and SAM.

For data base management, IMS/VS, program number 5740-XX2, Version 1 Release 1.6 or subsequent releases are required unless otherwise stated.

**PERFORMANCE CONSIDERATIONS**

The performance of the system may be influenced by VSAM specifications such as the buffer space, the control interval size, and the record size. When the data base is distributed over more than one disk drive or when the index data base resides on a separate disk drive or when additional disk storage is allocated, this may result in an increase in performance.

**DOCUMENTATION**

(available from Mechanicsburg)

*IFS 1-4 General Information Manual (GH12-5120) ... IFS 1-4 Program Messages (SH12-5525) ... IFS 1-4 Application User's Guide (SH12-5327) ... IFS 2 Licensed Program Specifications (GH12-5230) ... IFS 2 Program Reference and Operations Manual (SH12-5323).*

RPOs ACCEPTED: No



## PROGRAM PRODUCTS

**5668-969 - INTERACTIVE FINANCIAL SYSTEM 3 - OS/VS  
OPEN ITEM ACCOUNTING  
RELEASE 1 §****PURPOSE**

The Interactive Financial System 3 (IFS 3) is part of the Interactive Financial System (IFS).

The Interactive Financial System is a set of application programs designed to perform accounting and related functions. The set consists IFS 1, IFS 2, IFS 3 and IFS 4. IFS 1 Release 1 Modification Level 0 is a prerequisite to IFS 3. IFS 3 extends the account management functions provided by IFS 1 by the open item accounting procedure for debtor, creditor and impersonal accounts. IFS 3 (OS/VS) is functionally compatible with IFS 3 (DOS/VS), 5746-F54, Release 1.4.

**SPECIAL SALES INFORMATION****Primary Potential Industries:**

- Manufacturing
- Process
- Distribution
- Health

**Other Potential Industries:**

- Transportation
- Insurance
- Media
- Finance

IFS may be run in parallel with other applications.

**HIGHLIGHTS**

The user can select a display of either all open items, the due items, the matched items (that is, items with identical item match numbers), the settled items, or all stored items of an account. This includes the request for account statements of open item accounts.

- Some information can be changed in an open item account, such as:
  - Payment conditions
  - Item match numbers
  - Arrears-letter level, arrears-letter exclusion
  - Affirmation or negation of automatic matching
  - Textual information
  - Verification department for purchase invoices

With the exception of the update of payment conditions and textual information, this information can be changed in one operation for the entire account.

- Payments can be matched to open items. Various classification methods are available for posting payments and maintaining accounts.
- Open items are allocated to payments and the allocated items are marked as settled. At the same time, the related postings (as a result of the allocation) are established. The sales tax is automatically corrected for the postings involving revenue reductions, and optionally, the cash discount posting is performed.
- Payments in foreign currency can be matched manually against open items in foreign currency. A possible currency exchange difference caused by different exchange rates, is automatically calculated and posted to specific accounts (foreign-currency-exchange profit-and-loss accounts).
- At certain dates determined by the user, all the debtors' accounts, or a specified number of them, are scanned for overdue items to print arrears letters. The accounts excluded from arrears procedures or debtor accounts not treated as open item accounts are ignored.
- An account statement is printed for the due debits and can be furnished for open items that are not yet due.
- The number of arrears letters written for each customer is recorded in the account data base as a basis for judgment on a customer's payment behavior.
- At the end of an arrears letter procedure, an address list of all debtors who have reached the highest arrears level is printed for the legal department.
- A list of settled open items can be written for all open item accounts.
- A list of unverified invoices, sorted by verification department and client number, can be printed on request.
- Provisions are made for the adaptation of messages, commands, screen text, report headings, currency amounts, the date format, and the use of a decimal point or comma according to national requirements.

**CUSTOMER RESPONSIBILITIES**

Before installing and executing IFS 3, the program product IFS 1, program number 5668-967, which includes the IFS data management, must be installed.

In connection with the installation of IFS 1, the appropriate organizational prerequisites must be resolved by the user.

The adaptation of messages, commands, screen text and report headings to comply with national requirements must be performed, if required.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM processors:

IBM S/370 model 138 or larger  
IBM 3031 or larger  
IBM 3081  
IBM 4331 or larger

Note: For the IBM S/370 and the IBM 4300 Processors, the capacity of the processor model must comply with the requirements of the operating system used (see "Software Requirements") below.

IFS 3 uses, in online processing, 30K bytes of real storage in addition to the storage required for the operating system, CICS/VS and IMS/VS. For batch processing, approximately 130K bytes of real storage are required in addition to that required by the operating system and IMS/VS.

The minimum machine requirements for IFS 3 OS/VS are:

- One IBM direct access storage device such as IBM 3330, 3340, 3350, 3370 or 3380, or equivalent devices supported by the operating system used.
- One IBM 2540 Card Reader, or any other device supported by the operating system to process SYSIN data.
- One IBM 4245 Printer mdl 1, or an equivalent device supported by the operating system, with at least 132 print positions.
- One IBM tape unit, such as IBM 2400 or IBM 3400 or equivalent.
- One IBM 3277 Display Station mdl 2 or equivalent with data entry keyboard.

**SOFTWARE REQUIREMENTS**

IFS 3 is written in PL/I and Assembler language and is supplied in the form of object code and source code. It operates under OS/VS1 Release 7.0, program number 5741-VS1, MVS/SP-JES2, program number 5740-XYS, Release 1.0, or MVS/SP-JES3, program number 5740-XYN, Release 1.0 or subsequent releases unless otherwise specified.

To recompile IFS 3 OS/VS, the OS PL/I Optimizing Compiler, program number 5734-PL1 and the OS/VS Assembler are required.

To link-edit and execute IFS 3 OS/VS, the OS/VS PL/I Resident Library, program number 5734-LM4, the OS/VS PL/I Transient Library, program number 5734-LM5, and the OS/VS Sort/Merge, program number 5740-SM1, are required. IFS uses the data management and access methods VSAM and SAM.

The online communication facility CICS/VS, program number 5740-XX1, Version 1 Release 1.6 or a subsequent release is required unless otherwise stated.

For data base management, IMS/VS, program number 5740-XX2, Version 1 Release 1.6, or subsequent releases are required unless otherwise stated.

**PERFORMANCE CONSIDERATIONS**

The performance of the system can be influenced by VSAM specifications such as the buffer space, the control interval size and the record size. When the data base is distributed over more than one disk drive, or when the index data base resides on a separate disk drive or when additional real storage is allocated, this can result in an increase in performance.

**DOCUMENTATION**

(available from Mechanicsburg)

*IFS 1-4 General Information Manual (GH12-5120) ... IFS 1-4 Program Messages (SH12-5525) ... IFS 1-4 Application User's Guide (SH12-5327) ... IFS 3 Licensed Program Specifications (GH12-5231) ... IFS 3 Program Reference and Operations Manual (SH12-5324).*

**RPOs ACCEPTED:** No

## PROGRAM PRODUCTS

**5668-970 - INTERACTIVE FINANCIAL SYSTEM 4 (OS/VS)  
PAYMENT PROCESSING  
RELEASE 1****PURPOSE**

The Interactive Financial System 4 (IFS 4) is part of the Interactive Financial System (IFS). The Interactive Financial System is a set of application programs designed to perform accounting and related functions. The set consists of IFS 1, IFS 2, IFS 3 and IFS 4. IFS 1 Release 2 Modification Level 0 and IFS 3 Release 2 Modification Level 0 are prerequisites to IFS 4. IFS 4 is designed to determine the maturity of open items by user-specified criteria, such as settlement periods and payment strategy, and to prepare and print a payment proposal list of the selected items. The user can change and release the payment proposal at the display terminal. When the user has released the payment proposal, IFS 4 can automatically post the related payments and print the payment orders. IFS 4 (OS/VS) is functionally compatible with IFS 4 (DOS/VS), program number 5746-F55, Release 1.4.

**SPECIAL SALES INFORMATION****Primary Potential Industries:**

- Manufacturing
- Process
- Distribution
- Health

**Other Potential Industries:**

- Transportation
- Insurance
- Media
- Finance

IFS can be run in parallel with other applications.

**HIGHLIGHTS**

- An automatic account payment procedure can be performed for user-defined accounting periods.
- A payment proposal list is prepared that shows the individual due invoices, the total amount of all due invoices per payment method, and the amounts for credit notes, prepayments, and cash discounts, separated according to the specified terms of payment.
- For due invoices in foreign currencies, the amounts are printed in both local and foreign currency and proposed for manual payment during payment processing. The foreign-currency amounts are summed up and printed as totals per currency.
- Unverified invoices are processed in the payment procedure in accordance with the payment option as specified for the creditor.
- The following alterations are possible using a display terminal before a payment proposal is released for payment processing:
  - A client's payment proposal can be withdrawn.
  - Individual open items per creditor can be withdrawn.
  - New terms of payment can be specified.
  - Manually-processed items can be inserted.
  - Payment information, such as payment-due date or payment methods can be changed.
  - Individual items can be removed for manual processing.

Using the accepted payment proposal and the specified bank and method of payment, IFS 4 is designed to perform the postings automatically, that is, to creditors and cash accounts, and open items are matched and marked as settled.

- Payment orders, collective lists, and accompanying letters for the banks are printed in a format as required in Germany, but a payment file, containing payment order information, is prepared so that individual payment order forms can be created by user-written print programs.
- Provisions are made for the adaptation of messages, commands, screen text, report headings, currency amounts, the date format, and the use of a decimal or comma according to national requirements.

**CUSTOMER RESPONSIBILITIES**

Before installing and executing IFS 4, the program product IFS 1, program number 5668-987, which includes the IFS data base management, must be installed. In addition, IFS 3, program number 5668-969, must be installed.

In connection with the installation of IFS 1 and IFS 3, the appropriate organizational prerequisites must be resolved by the user.

The adaptation of messages, commands, screen text and report headings to comply with national requirements must be performed, if required.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM processors:

IBM S/370 model 138 or larger  
IBM 3031 or larger  
IBM 3081  
IBM 4331 or larger

**Note:** For the IBM S/370 and IBM 4300 Processors, the capacity of the processor must comply with the requirements of the operating system used (see "Programming Requirements" below).

IFS 4 uses, in online processing, 30K bytes of real storage in addition to the storage required for the operating system, CICS/VS and IMS/VS. For batch processing, approximately 130K bytes of real storage are required in addition to that required for the operating system and IMS/VS.

The minimum machine requirements for IFS 4 OS/VS are:

- One IBM direct access storage device such as IBM 3330, 3340, 3350, 3370, 3380 or equivalent devices supported by the operating system used.
- One IBM 2540 Card Reader, or any other device supported by the operating system to process SYSIN data.
- One IBM 4245 Printer mdl 1, or an equivalent device supported by the operating system, with at least 132 print positions.
- One IBM tape unit, such as IBM 2400 or IBM 3400 or equivalent.
- One IBM 3277 Display Station mdl 2 or equivalent with data entry keyboard.

**SOFTWARE REQUIREMENTS**

IFS 4 is written in PL/I and Assembler language and is supplied in the form of object code and source code. It operates under OS/VS1 Release 7.0, program number 5741-VS1, MVS/SP-JES2, program number 5740-XY5, Release 1.0 or MVS/SP-JES3, program number 5740-XYN, Release 1.0 or subsequent releases, unless otherwise specified.

To recompile IFS 4 OS/VS, the OS PL/I Optimizing Compiler, program number 5734-PL1, and the OS/VS Assembler are required.

To link-edit and execute IFS 4 OS/VS the OS/VS PL/I Resident Library, program number 5734-LM4, the OS/VS PL/I Transient Library, program number 5734-LM5, and the OS/VS Sort/Merge, program number 5740-SM1, are required. IFS 4 uses the data management and access methods VSAM and SAM.

The online communication facility CICS/VS, program number 5740-XX1, Version 1 Release 5 or a subsequent release (unless otherwise indicated) is required.

For data base management, IMS/VS, program number 5740-XX2, Version 1 Release 1.6 or a subsequent release is required unless otherwise stated.

**PERFORMANCE CONSIDERATIONS**

The performance of the system can be influenced by VSAM specifications such as the buffer space, the control interval size and the record size. When the data base is distributed over more than one disk drive, or when the index data base resides on a separate disk drive or when additional real storage is allocated, this can result in an increase in performance.

**DOCUMENTATION**

(available from Mechanicsburg)

*IFS 1-4 General Information Manual (GH12-5120) ... IFS 1-4 Program Messages (SH12-5525) ... IFS 1-4 Application User's Guide (SH12-5327) ... IFS 4 Licensed Program Specifications (GH12-5232) ... IFS 4 Program Reference and Operations Manual (SH12-5325).*

RPOs ACCEPTED: No



PROGRAM PRODUCTS

**5668-971 - NLDM R1 and R2  
NETWORK LOGICAL DATA MANAGER  
RELEASES 1 and 2 for OS/VS2 MVS**

**PURPOSE**

Network Logical Data Manager (NLDM), a Network Communications Control Facility (NCCF) application program, develops and maintains an image of the active network configuration. The data describing the active configuration is used directly to aid session-oriented problem determination. NLDM is an interactive network management product which, because it can capture session data prior to an incident, is useful in identifying and isolating hardware and software problems.

NLDM Release 2, because of its interactions with ACF/VTAM Version 2 Release 2 and ACF/NCP Version 3, can present complete configuration data for the active network. NLDM R2 is effective in single and multiple-domain networks or in interconnected SNA networks

**HIGHLIGHTS**

- NLDM is an online, interactive facility which collects selected access method data and Network Control Program data and makes them available for display at an NCCF operator station.
- The collected data include recent path information unit headers from the access methods, PIU sequence numbers from NCP, and configuration information for the session including the primary and secondary logical unit names and addresses and the route description.
- The operator can commence NLDM R2 operations on an active network. With Release 2, synchronizing NLDM activity with network and session initialization is no longer required.
- The collected data is displayed in full-screen mode, utilizing seven-color support for highlighting and user prompting. NLDM also can be used with a monochrome display.
- NLDM provides useful data for doing problem determination when software problems occur, which otherwise may not produce problem-related information.
- The operator can select the session(s) to be traced.
- Data is maintained in virtual storage for active sessions. When the session is terminated, the data is transferred to a data base for later reference.
- NLDM Release 1 provides information for local or remote resources in the same SNA domain or in cross-domain sessions.
- NLDM Release 2 provides information for local or remote resources in the same SNA domain, in cross-domain sessions, or in cross-network sessions (i.e., within an SNA Network Interconnection environment).
- NLDM R2 can, automatically or under operator request, test the connectivity of a session up to the boundary node.
- In Release 2, the NLDMs, at the multiple hosts involved in a session, automatically cooperate in preparing a session description, for example, when presenting the configuration or trace data.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

NLDM Release 1 and NLDM Release 2 are designed to run in a virtual storage environment in any IBM system configuration that supports MVS as specified in the "Software Requirements". The estimated amount of virtual storage required by NLDM R1 is 280,000 bytes and by NLDM R2 is 330,000 bytes, plus (for both releases) a variable amount of storage depending upon the number of active sessions being monitored. NLDM executes in the same address space as NCCF. For additional information about storage requirements for NLDM:

- For Release 1, see the *NLDM General Information Manual* (GC30-8081).
- For Release 2, see the *Network Program Products Planning Manual* (SC27-0658).

Any terminal supported by NCCF as a communications network operator station can be used to operate NLDM. NLDM can use seven-color displays when appropriate.

**SOFTWARE REQUIREMENTS**

NLDM Release 1 and NCCF Release 2 (with the required PTF) operate with MVS/370\*, and for reasons of compatibility and coexistence with MVS Extended Architecture (MVS/XA) in 24-bit addressing mode. The access method and NCP levels supported are:

- ACF/VTAM Version 1 Release 3\*\* (with the required PTF)
- ACF/VTAM Version 2 (with the required PTF)
- ACF/TCAM Version 2 Release 4
- ACF/NCP Version 2 (IBM 3705)
- ACF/NCP Version 2 (IBM 3725)

NLDM Release 2 and the prerequisite NCCF Version 2 operate with MVS/370\* and MVS/XA (compatibility mode). The access method and NCP levels necessary for full function of NLDM Release 2 are:

- ACF/VTAM Version 2 Release 2, and
- ACF/NCP Version 3 (for the IBM 3705 and 3725).

Other access methods and NCP levels are:

- ACF/VTAM Version 1 Release 3\*\* (with the appropriate PTF) in single-domain networks
- ACF/VTAM Version 1 Release 1 (with the appropriate PTF)
- ACF/TCAM Version 2 Release 4 - in single-domain networks
- ACF/NCP Version 2 (IBM 3705)
- ACF/NCP Version 2 (IBM 3725)

\* MVS/370 is a generic term used to refer to MVS operating systems which operate with S/370 architecture, i.e.:

- OS/VS2 (MVS) Release 3.8
- OS/VS2 (MVS) Release 3.8 with the MVS/SE program product
- OS/VS2 (MVS) Release 3.8 with the MVS/SP V1 program product

\*\*ACF/VTAM Version 1 Release 3 is supported in MVS/370 mode only.

**DATA SECURITY**

NLDM uses the data security, auditability and control facilities of NCCF.

**DOCUMENTATION**

(available from Mechanicsburg)

**Release 1:**

*NLDM General Information* (GC30-3081) ... *NLDM Licensed Program Specifications* (GT30-9555) ... *NLDM Installation and Operation* (ST30-3165).

**Release 2:**

*NLDM Licensed Program Specification* (GC30-9555) ... *Network Program Products General Information* (GC27-0657) ... *Network Program Products Planning* (SC27-0658) ... *NLDM Installation and Operation* (SC30-3165).

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No

**LICENSED PROGRAM MATERIAL AVAILABILITY**

**Restricted Material:** No. This licensed program will be available without source licensed program materials. It will be available with object code.

## QUERY MANAGEMENT FACILITY (QMF) RELEASE 1 5668-972

### PURPOSE

Query Management Facility (QMF) is a program product designed to provide interactive data base facilities to users with little or no data processing background. It can also be highly useful to the data processing professional as a high productivity programming tool for use in application development and prototyping. Query Management Facility operates against IBM Database 2 (DB2) data in the MVS/XA and MVS/370 environments. Query Management Facility also operates against SQL/DS R2 data in the VM/SP environment. Query Management Facility also utilizes companion IBM program products: Interactive System Productivity Facility (ISPF) Dialog Manager and Graphical Data Display Manager (GDDM).

Query Management Facility provides an interface, designed principally for use by non-programmers, to enable users to access a relational (tabular) data base. The following are some specific characteristics:

- Both structured query language (SQL) style and query-by-example (QBE) style query and data manipulation capabilities.
- Data definition functions through the SQL language.
- An easy-to-specify interactive reports definition and generation capability.
- A simple set of commands that allows handling of queries, report forms, and procedures.

Users of QMF can produce meaningful results utilizing only a portion of the SQL or QBE language facility and/or QMF commands. To facilitate the use of QMF, a set of HELP panels and sample SQL queries are provided.

The functions available within QMF have been designed to support typical user tasks so that the performance of those tasks is easy for the non-data processing professional end user. At the same time, Query Management Facility offers flexibility regarding the order in which the steps of such tasks are performed.

**Early Support Program:** To assist IBM in introducing the significant new Query Management Facility product, QMF is currently being tested in a number of customer and IBM locations. Early experience with a limited number of users will assist IBM in evaluating the product in varied environments and in developing additional support material prior to general availability.

An Early Support Program (ESP) is being planned for QMF. This ESP will be conducted by the NAD Dallas Systems Center; nominations will be through the NAD regions and NMD areas.

### HIGHLIGHTS

Typical functions which an end user might perform include:

- Ad-hoc query in SQL or QBE languages.
- Report preparation.
- Preparation of data for graphic presentation
- Definition and execution of a procedure consisting of a series of query/report functions.
- Definition of a data extract request in an interactive mode by dialogs which can invoke Data Extract (DXT), a companion IBM program product.

### DESCRIPTION

**Ad-Hoc Query** - Either SQL or QBE may be used to retrieve selected information that is formatted and displayed at the user's terminal. Scrolling commands may be used to browse through the data. The user may then display the original query and modify it in order to obtain different results. Subsequently, the user may save the data, print it, save the request that produced the data, or simply go on to another task.

**Report Preparation** - The results of executing a query will be displayed to the user as a simple table. A form is generated which describes the default format for presentation of the result. Alternatively, a user-defined, pre-stored form may be specified at the time the query is run. The user can then describe the nature of the report (headings and other text, format and summarization required) by filling and changing the values in the form. With only a few specifications, the user can produce a variety of different report types including listing, summary or across-style reports. Once the form is satisfactory, the user merely requests the selected data be redisplayed. QMF will format and display the report at the user's terminal. Since preparing a report can often be an iterative process, QMF makes it easy for a user to move from one step to another. That is, display the report format, and redisplay the data using the updated form. These commonly performed command functions are available via program function (PF) keys as well. Once the user is satisfied with the report, he or she can print the report and also save the report description form.

**Graphic Presentation Preparation** - A sample program is provided with QMF which can invoke the Interactive Chart Utility (ICU) to present the data prepared using QMF. The ICU is a facility provided with the

Presentation Graphics feature of the licensed program GDDM (5748-XXH).

**Procedures** - For periodic reports, users can create a 'procedure' definition that allows the execution of a series of commands which can be invoked through a single command. The execution of both SQL- and QBE-style queries can be included in a single procedure.

Because QMF takes advantage of features of ISPF and GDDM, the creation and alteration of queries and procedures is easy for the user. As examples, corrections and insertions are simply typed over incorrect information or into blank spaces. Deletions can be made by simply blanking out the unnecessary data. Also, prompts and HELP panels are provided to guide the user as he or she performs a task.

**Interactive DXT Requests** - As a convenience, special ISPF dialogs are available in support of DXT. These dialogs are also part of the DXT program product (5668-973). This facility provides an easy, interactive way to specify extract requests for DXT. The user of these special dialogs is intended to be a technical person with data base knowledge sufficient to formulate an IMS/V5 V1 DL/I, virtual storage access method (VSAM), or physical sequential access method (SAM) request. These dialogs are the only part of QMF which requires some DP knowledge. QMF has otherwise been developed for the non-programmer.

The dialogs consist of ISPF menu-driven screen facilities which guide a user through the process of creating an extract request from a terminal. If DXT is not installed on the system where the extract request was constructed, the request can be sent to a system which contains DXT, and the requested data routed to its destination, via the appropriate operating system telecommunications facilities.

### CUSTOMER RESPONSIBILITIES

A customer installing Query Management Facility must:

- Have installed the prerequisite products.
- Assure that appropriate MVS/XA, MVS/370, VM/SP and S/370 training (including terminal and direct access storage education) be given to system analysts, application programmers, system programmers, and system operators.
- Have MVS/XA, MVS/370 or VM/SP successfully installed.
- Have personnel educated in Query Management Facility.
- Provide adequate protection against the accidental loss or misuse of his data.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

Query Management Facility will operate on any IBM Processor supported by MVS/SP V2 R1 and MVS/SP V1 R3, or VM System Product (VM/SP) Release 3 (5664-167). For the IBM 3033 Processor running MVS, it is recommended that hardware cross-memory extension feature (#6850) be used. The processors must have sufficient real storage to satisfy the combined requirements of IBM Database 2, MVS/XA or MVS/370, or SQL/Data System (SQL/DS) Release 2 and VM/SP, Query Management Facility, appropriate Data Facility Product, appropriate access methods, batch requirements, and other customer-required applications. The configuration must include sufficient I/O devices to support the requirements for system output, system residence, and system data sets. Sufficient direct access storage must be available to satisfy the user information storage requirements, and may consist of any direct access facility supported by the system configuration and the programming system.

**DASD:** Query Management Facility is independent of DASD device type. Any disk devices supported by either MVS/XA Data Facility Product or MVS/370 Data Facility Product in an MVS system, or by VM/SP Release 3 in a VM system, may be used. Query Management Facility uses disk devices for the following data sets:

- Spill file data set which holds the data for the report which a user is viewing (used only when the data does not fit in virtual storage)
- Data base data sets (managed by IBM Database 2 or SQL/Data System (SQL/DS) Release 2)
- Import/export data sets which hold queries, forms, and procedures which can be maintained outside of QMF control or which can be transferred between different QMF users (optionally, tape)

**Tape:** Query Management Facility is also independent of tape device type. Any tape device supported by either MVS/XA Data Facility Product or MVS/370 Data Facility Product in an MVS system, or by VM/SP Release 3 in a VM system, may be used. Query Management Facility uses tape devices for the following data sets:

- The print data set, and the debug (trace) data set

**Data Communications Devices:** Query Management Facility supports terminals supported by TSO, ISPF and GDDM in the MVS/SP environment, and by VM/SP, ISPF and GDDM in the VM/SP

## PROGRAM PRODUCTS

**QMF R1 (cont'd)**

environment. See the appropriate TSO, VM/SP, ISPF, or GDDM pages.

**SOFTWARE REQUIREMENTS**

**Operating System and Support Programs:** In the MVS/TSO Environment, programs required are as follows:

- IBM Database 2 Release 1 (5740-XYR) and its prerequisites as stated for either the MVS/XA or MVS/370 environment
- Interactive System Productivity Facility, Release 1.1 (5668-960)
- Interactive System Productivity Facility/Program Development Facility-MVS, Release 1.1 (5665-268) (if DXT Dialogs are planned to be used)
- Graphical Data Display Manager, Release 3 (5748-XXH)
- System Modification Program, (SMP) Release 4

or alternatively,

In the VM/SP environment:

- SQL/Data System (SQL/DS) Release 2 (5748-XXJ) and its prerequisites
- Interactive System Productivity Facility Release 1.1 (5668-960)
- Interactive System Productivity Facility/Program Development Facility-VM, Release 1.1 (5664-172) (if DXT Dialogs are planned to be used)
- Graphical Data Display Manager Release 3 (5748-XXH)

**COMPATIBILITY/CONVERSION**

Query Management Facility, Data Extract, IBM Database 2, SQL/Data System (SQL/DS) Release 2 and Information Management System/Virtual Storage Version 1 are complementary products designed to provide solutions to end-user information needs. Data managed by IBM Database 2 or SQL/Data System (SQL/DS) Release 2 is available to end-users through the Query Management Facility (subject to appropriate authorization). Data managed by IMS/VS V1 DL/I or on VSAM or SAM files may first be extracted by the Data Extract program product and loaded into IBM Database 2 or SQL/Data System (SQL/DS) Release 2 tables. This 'snapshot' data is then accessible to end users using the Query Management Facility.

**Virtual Storage Considerations:** The design of the support for the MVS/XA 31-bit virtual storage addressing capability will allow most QMF modules to be resident in the extended pageable link pack area (EPLPA) or pageable link pack area (PLPA). In the MVS/XA environment, each Query Management Facility user requires at least a 2M byte region. If Query Management Facility modules are placed in the MVS/XA EPLPA/PLPA, up to 680K bytes may be located in the MVS/XA EPLPA and 20K bytes may be located in the MVS/XA PLPA; however, the size of the region is reduced accordingly. In the MVS/370 environment, each Query Management Facility user requires at least a 2M byte region. If Query Management Facility modules are placed in the MVS/370 pageable link pack area (PLPA), up to 700K bytes may be located in the MVS/370 PLPA; however, the size of the region is reduced accordingly.

In the VM/SP environment, each Query Management Facility user requires at least a 1.5M byte virtual machine. 700K bytes of storage is required in the discontinuous shared segment (DCSS).

**DATA SECURITY and AUDITABILITY**

In a QMF installation, facilities which will allow customer installation management to control its usage and impact are provided by the relational data base manager. Additionally, QMF itself controls the authorization for stored queries, forms, and procedures. Through the facilities of the data base manager, QMF users can specify security authorization for access to their data. Multiple levels of authorization make it possible to place restrictions on the different users' accessibility to data. For example, one user may be given unlimited access to the data for all types of operations. Another user may be allowed to read information, but not alter it. Still another user may be restricted to reading a subset of the information (for example, only information pertaining to a particular department within an organization).

**PERFORMANCE CONSIDERATIONS**

The primary objective of Query Management Facility is ease of use. The actual system resource requirements vary and depend on many factors such as number of records searched, complexity of the query, and availability of indexes. Response time and throughput depend on the allocated system resources, the priority of the executing task, and the nature of the transaction.

**DOCUMENTATION**  
(available from Mechanicsburg)

The following task-oriented publications will be provided for QMF:  
*Query Management Facility: General Information ... Query Management Facility: Licensed Program Specifications ... Query Management Facility: Planning and Administration Guide for MVS ... Query Management Facility: Planning and Administration Guide for VM/SP ... Query Management Facility: Installation Guide for MVS ... Query Management Facility: Installation Guide for VM/SP ... Query Management Facility: Learner's Guide ... Introduction to Query Management Facility ... Query Management Facility: User's Guide and Reference ... Query Management Facility: Reference Summary ... Query Management Facility: Diagnosis Guide ... Query Management Facility: Diagnosis Reference.*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing situations where the installation of Query Management Facility introduces an exposure to the system integrity of MVS. This program is intended to run unauthorized. Refer to Programming Announcement dated October 21, 1981.

RPQs ACCEPTED: No

## PROGRAM PRODUCTS

**DATA EXTRACT (DXT) RELEASE 1  
5668-973****PURPOSE**

Data Extract (DXT) is a program product which extracts data from files residing in Information Management System/Virtual Storage Version 1 data bases, virtual storage access method (VSAM) or sequential access method (SAM) data sets. DXT is designed for use in obtaining periodic 'snapshots' of subsets of existing data for use in end-user query and report writing. Data is extracted into a form suitable for loading using the IBM Database 2 (DB2) or SQL/Data System (SQL/DS) Release 2 load utilities. Extracted data can be sent to another processor by means of JES2 or JES3 networking. This data may then be loaded into DB2 tables or SQL/DS R2 tables. DXT operates in both MVS/XA and MVS/370 environments.

Data descriptions stored in the OS/VS DB/DC Data Dictionary may be used by DXT.

Dialogs, included with Data Extract and the Query Management Facility program products, will enable users to interactively construct extract requests through Interactive System Productivity Facility (ISPF) menu-driven screen facilities.

**Early Support Program:** To assist IBM in introducing the significant new Data Extract product, DXT is currently being tested in a number of customer and IBM locations. Early experience with a limited number of users will assist IBM in evaluating the product in varied environments and in developing additional support material prior to general availability.

An Early Support Program (ESP) is being planned for DXT. This ESP will be conducted by the NAD Dallas Systems Center; nominations will be through the NAD regions and NMD areas.

**HIGHLIGHTS**

- Extracts data using one or two views of an IMS/VS V1 data base or VSAM or SAM data sets in one request.
- Output data ready for loading into IBM Database 2 or SQL/Data System (SQL/DS) Release 2 tables.
- Optional use of OS/VS DB/DC Data Dictionary for stored IMS/VS V1 data base, VSAM or SAM data descriptions.
- Interactive dialogs for extract request construction and submission.

**DESCRIPTION**

DXT has three functions, independently executable, which collectively provide the DXT capabilities. These functions are:

- DXT dictionary access function
- DXT user input manager
- DXT data extract manager

Through the use of these three functions, a description of the data to be extracted is built, an Extract Request is submitted, validated and enqueued, and the data is extracted.

The data descriptions may be prepared manually or can be obtained by the DXT dictionary access function from the OS/VS DB/DC Data Dictionary. The descriptions are then input to the DXT user input manager for verification and subsequent storage in a data set called the file description table library (FDTLIB).

Extract requests are submitted to the DXT User Input Manager for verification, and, if valid, are then queued in a data set called the extract request library (EXTLIB). When the DXT data extract manager is scheduled and initiated, these requests cause data to be extracted from the data bases or files and made available to the requester. When finished, the extract requests are removed from the EXTLIB.

These activities may be independently executed. A typical execution sequence might be as follows:

- The DXT dictionary access function is executed in advance of anticipated extract requests to retrieve data descriptions.
- The DXT user input manager is then executed to store the descriptions in the FDTLIB.
- The DXT user input manager is then executed to verify and save incoming extract requests in EXTLIB.
- The DXT data extract manager is then executed to process Extract Requests awaiting execution in the EXTLIB.

The DXT data extract manager has the ability to restrict execution to those requests meeting pre-specified priority and volume criteria. For example, a copy of the DXT data extract manager might run continuously during prime shift to process extract requests with high priority and small output volumes. Then, one or more copies of the same program could run at night to process the other extract requests.

The DXT data extract manager also has the capability to batch extract requests, so that many requests can be fulfilled in one pass against the data. Typically, a copy of the DXT data extract manager might be dispatched nightly to process extract requests against certain large files.

For processing VSAM or SAM files, the DXT data extract manager runs as a job step under direct control of the operating system. For processing IMS/VS Version 1 DL/I data bases, the DXT data extract manager runs as an IMS application program, either as a BMP (batch message processing) job or as a batch application.

From the user's point of view, the DXT user input manager is the principal interface. The DXT data extract manager places a greater load on system resources than do the other two functions. Thus it can be run asynchronously to allow appropriate use of these resources.

**DXT Dialogs:** DXT dialogs provide an easy, interactive way for users to create and submit extract requests for DXT. The user is expected to be a technical person with data base knowledge sufficient to formulate an IMS/VS Version 1 DL/I, VSAM, or SAM extract request.

The dialogs consist of ISPF menu-driven panels which guide a user through the process of creating an extract request at a computer terminal. The dialogs feature:

- Panels that prompt the user for information needed to build an extract request
- Model extract statements that the user may tailor to his needs
- Panels that help the user with JCL, including sample JCL
- Request submission capability

Usage of the DXT dialogs requires both the ISPF and the ISPF/Program Development Facility program products.

The Data Extract dialogs provide four main functions:

- Building, maintaining and submitting DXT requests.
- Building and maintaining descriptions of the source data.
- Building and maintaining JCL files.
- Controlling processing options by updating variables in the user's profile.

An extract request prepared through DXT dialogs can be sent to a DXT system on another processor, and the resulting data can be routed back to the requesting system or another system using standard networking facilities.

The DXT dialogs will also be shipped with the Query Management Facility product (5668-972) so that extract requests can be prepared on the Query system.

**CUSTOMER RESPONSIBILITIES**

A customer installing Data Extract must:

- Have installed at least the minimum machine configuration.
- Have installed the prerequisite products.
- Assure that appropriate MVS/XA, MVS/370, and S/370 training (including terminal and direct access storage education) be given to system analysts, application programmers, system programmers, and system operators.
- Have MVS/XA, MVS/370, IMS/VS V1, VSAM or SAM files successfully installed.
- Apply necessary programming changes associated with the installation of Data Extract.
- Have personnel educated in Data Extract.
- Provide adequate protection against the accidental loss or misuse of his data (functions exist in Data Extract to assist in providing security).

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Data Extract will operate on any IBM processor supported by MVS/SP V2 R1 or MVS/SP V1 R3. The processors must have sufficient real storage to satisfy the combined requirements of MVS/XA or MVS/370, Data Extract, appropriate Data Facility Product, appropriate access methods, batch requirements, and other customer-required applications. The configuration must include sufficient I/O devices to support the requirements for system output, system residence, and system data sets. Sufficient direct access storage must be available to satisfy the user information storage requirements and may consist of any direct access facility supported by the system configuration and the programming system.

**DASD:** Data Extract is independent of DASD device type. Any disk devices supported by either MVS/XA Data Facility Product or MVS/370 Data Facility Product installed may be used. Data Extract uses disk devices for the following data sets:

- Request library
- File Description library
- Extracted output (optionally, tape, internal reader)

**Tape:** Data Extract is also independent of tape device type. Any tape devices supported by either MVS/XA Data Facility Product or

## PROGRAM PRODUCTS

**DXT R1 (cont'd)**

MVS/370 Data Facility Product installed may be used. Tape or MSS may be used for extracted output.

**Data Communications Devices:** DXT operations can be controlled from the MVS console. DXT dialogs support terminals supported by TSO and ISPF. See the appropriate TSO or ISPF documentation.

**SOFTWARE REQUIREMENTS**

**Operating System and Support Programs:** Data Extract requires the following MVS/XA and MVS/370 configurations:

- For MVS/Extended Architecture (MVS/XA) environment (with the appropriate prerequisites for each product):
  - MVS System Product-JES2 (5740-XC6) or -JES3 (5665-291) Version 2 Release 1.1
  - MVS/XA Data Facility Product Release 1.1 (5665-284)
  - MVS TSO Extensions (TSO/E) Release 1 (5665-285)
  - Mass Storage System Extensions with MSSE MVS/XA Facility (5740-XYG) (for IBM 3850 Mass Storage System use only)
  - Interactive System Productivity Facility Release 1.1 (5668-960) (for Data Extract dialogs only)
  - Interactive System Productivity Facility/Program Development Facility-MVS Release 1.1 (5665-268) (for Data Extract dialogs only)
  - IMS/VS Version 1 (5740-XX2) (for customers extracting data from IMS/VS Version 1 DL/I data bases)
  - OS/VS DB/DC Data Dictionary, Release 4 (5740-XXF) (for customers obtaining data descriptions from this source)
  - System Modification Program (SMP) Release 4
  - Resource Access Control Facility (RACF) (5740-XXH) Release 5
- For MVS/370 environment (with the appropriate prerequisites for each product):
  - MVS/System Product-JES2 (5740-XY5) or -JES3 (5740-XYN) Version 1 Release 3
  - MVS/370 Data Facility Product Release 1 (5665-295)
  - MVS TSO Command Package Release 1.1 (5740-XT6) or MVS TSO Extensions (TSO/E) Release 1 (5665-285)
  - Interactive System Productivity Facility Release 1.1 (5668-960) (for Data Extract dialogs only)
  - Interactive System Productivity Facility/Program Development Facility-MVS Release 1.1 (5665-268) (for Data Extract dialogs only)
  - IMS/VS Version 1 (5740-XX2) (for customers extracting data from IMS/VS Version 1 DL/I data bases)
  - OS/VS DB/DC Data Dictionary Release 4 (5740-XXF) (for customers obtaining data descriptions from this source)
  - System Modification Program (SMP) Release 4
  - Resource Access Control Facility (RACF) (5740-XXH) Release 5

**COMPATIBILITY/CONVERSION**

Data Extract aids movement of data from IMS/VS Version 1 DL/I data bases, VSAM or SAM data sets into IBM Database 2 or SQL/Data System (SQL/DS) Release 2 tables to facilitate usage of these new products. It is not intended as a tool to migrate IMS/VS Version 1 DL/I users to IBM Database 2. DXT uses a language similar to the Structured Query Language (SQL) used by the IBM relational data base products. However, the languages are not identical and compatibility is neither implied nor required.

**Virtual Storage Considerations:** Storage used by the DXT set of functions will vary depending on the nature of the extract request. The minimum Data Extract virtual storage requirements are as follows:

- DXT Extract Dictionary Access function
  - 140K bytes to store the load module
  - 1,024K bytes to run in an IMS batch region (in addition to DB/DC Data Dictionary requirements)
- DXT User Input Manager
  - 380K bytes to store the load module
  - 800K-byte region size for a typical job
- DXT Data Extract Manager
  - 430K bytes to store the load module
  - 1,300K bytes to run an IMS batch job
  - 900K bytes to run a non-IMS job or an IMS BMP job
- DXT dialogs
  - 60K bytes to store the load module
  - ISPF/PDF-recommended region size to run a job

**DATA SECURITY and AUDITABILITY**

Protection of actual user data bases and files is provided by the appropriate system or program product, i.e., MVS, RACF, IMS/VS Version 1, DB2 or SQL/DS.

The Data Extract user input manager optionally uses RACF to control user access to data descriptions stored in the DXT data set FDTLIB.

The data descriptions constitute a new resource class independent of actual files and data bases.

**PERFORMANCE CONSIDERATIONS**

Data Extract is a set of three functions. Optimization of design is directed at minimizing the instruction path length and I/O requirements of the DXT search algorithm. The capability to execute more than one request at a time, that is, to scan a file once for several requests, is designed to reduce resource utilization and to enhance overall throughput. The actual system resource requirements vary and depend on many factors such as number of records searched, complexity of the extract request, and availability of indexes. Overall throughput depends on the allocated system resources, the priority of the executing task, and the nature of the request(s).

**DOCUMENTATION**

(available from Mechanicsburg)

The following task-oriented publications are planned for Data Extract:  
*Data Extract: General Information ... Data Extract: Licensed Program Specifications ... Data Extract: Planning and Administration Guide ... Data Extract: Administering and Using Dialogs ... Data Extract: Installation Guide ... Data Extract: Dialogs Installation Guide ... Data Extract: Operation ... Data Extract: User's Guide and Reference ... Data Extract: Diagnosis Guide ... Data Extract: Diagnosis Reference ... Data Extract: Dialogs Diagnosis ... Data Extract: Messages and Codes.*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing situations where the installation of Data Extract introduces an exposure to the system integrity of MVS. This program is intended to run unauthorized. Refer to Programming Announcement dated October 21, 1981.

**RPQs Accepted:** No

## PROGRAM PRODUCTS

**GRAPHICS ACCESS METHOD/SYSTEM PRODUCT  
5668-978****PURPOSE**

The Graphics Access Method/System Product (GAM/SP) program product provides basic programming support for the IBM 3250 Graphics Display System and IBM 2250 Display Unit Model 3, and for application programs designed for those graphics systems and devices. GAM/SP extends to users of the CMS component of VM/System Product graphics support that previously has been available only under MVS and VS1 operating systems.

**HIGHLIGHTS**

- Supports IBM 3250 (and 2250 mdl 3) interactive vector-graphics display system in the user-oriented, highly interactive environment of VM/System Product.
- Enables migration to VM/SP of graphics applications previously usable only under MVS or VS1.

**DESCRIPTION**

GAM/SP is a program product required for the use of interactive, vector-graphics systems and application programs under VM/SP. It provides input/output control, attention handling and enqueueing facilities, graphical data management, and graphic-order management facilities necessary for the creation and use of graphics applications designed for the IBM 3250 Graphics Display System. By enabling the operation of IBM 3250 (and 2250 mdl 3) under VM/SP, it provides graphics users, such as designers, engineers and draftsmen, with access to a highly interactive and flexible operating system for support of their graphics display system.

Graphics application programs developed for support of IBM 3250 (and 2250 mdl 3) under MVS and VS1 will operate under VM/SP using GAM/SP with little or no change, except where the application program depends upon system features that are not supported by VM/SP (e.g., applications that rely on VS multitasking, or depend on asynchronous operation under an interrupt request block (IRB), may require modification). GAM/SP provides a macro interface for graphics application programs written in IBM S/370 Assembler language.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

GAM/SP is designed to operate in any IBM S/370, 303X, 3081 or 43XX Processor to which IBM 3250 Graphic Display System or IBM 2250 Display Unit mdl 3 can be attached, and in which the host control program can run. GAM/SP is designed to operate under control of VM/System Product (5664-167) only.

IBM 3250 Graphics Display System consists of the following devices:

- IBM 3258 Control Unit
- IBM 3255 Display Control
- IBM 3251 Display Station

GAM/SP will also support IBM 3250 with the Increased Capacity RPQ (7J0040-41) and the Additional Workstation RPQ (7J0042-43) applied.

An IBM 2840 Display Control mdl 2 is required for support of IBM 2250 Display Unit mdl 3.

GAM/SP will operate under control of VM/SP (5664-167). In addition to the machine and storage requirements of that host control program, GAM/SP requires the following storage:

- Auxiliary storage for product installation - 640 blocks of 800 bytes.
- Two discontinuous shared segments, to be allocated for the following purposes:
  - One shared segment for GAM/SP code.
  - One shared segment for device buffer tables. (Buffer table size is dependent upon graphics hardware system configuration, and typically requires 1K byte to support 8 display stations.)

**SOFTWARE REQUIREMENTS**

GAM/SP will operate under VM/System Product (5664-167). In particular, GAM/SP utilizes macros contained in the OSMACRO and OSMACRO1 macro libraries which are distributed with VM/System Product.

In order to use GAM/SP for support of the IBM 3250 or 2250 mdl 3, it will be necessary to apply PTF number UV90005 to VM/SP. This PTF was distributed with VM PUT 8107 in October, 1981.

GAM/SP provides macros and routines required for the creation and execution of graphics application programs written in S/370 Assembler language.

**COMPATIBILITY**

Many application programs designed for use with IBM 3250 and 2250 mdl 3 under control of OS/VS2 (MVS) and OS/VS1 should run unchanged with GAM/SP under VM/SP. This overall state of

compatibility is enabled by GAM/SP inclusion of all the functions performed by the Graphics Programming Services (GPS) component of the MVS and VS1 SCPs, except for those facilities provided by the Problem Oriented Routines (PORs) of GPS.

Incompatibilities may be apparent in application programs that depend upon functions in MVS and VS1 that are not supported by VM/SP CMS. Examples of known incompatibilities, necessitating changes to enable movement of application programs from MVS or VS1 to VM/SP CMS, are as follows:

- Applications dependent on OS/VS multitasking.
- Applications dependent on asynchronous processing under an IRB (interrupt request block).
- Applications relying on use of a DD statement to set the GNCP value in a graphics DCB. (Note that GAM/SP will assume a value of one (1) if GNCP is zero (0) in the DCB.)
- Applications which rely on specific timing or on performance characteristics of the system in which they operate, may execute differently in a CMS environment compared with their execution under MVS or VS1.

**DOCUMENTATION:** (available from Mechanicsburg)

Available now:

*GAM/SP General Information* (GC33-0125).

Available with initial orders:

*Licensed Program Specifications: GAM/SP* (GC33-0128) ... *GAM/SP User's Guide* (LC33-0126).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**X.25 NCP PACKET SWITCHING INTERFACE  
5668-981**

**PURPOSE**

The X.25 NCP Packet Switching Interface is a program product providing users of IBM's ACF/NCP program product with the capability to attach IBM's 3705-II, 3705-80, or 3725 Communication Controllers to data transmission services supporting interfaces complying with CCITT Recommendation X.25 (Geneva, 1980).

The X.25 NCP Packet Switching Interface is designed to operate with ACF/NCP Version 1 Release 2.1 or 3.0 and ACF/NCP Version 2 for the 3705 and 3725.

**HIGHLIGHTS**

**Release 1**

- Support of a subset of X.25 services conforming to CCITT Recommendation X.25 (Geneva, November 1980).
  - Permanent virtual circuit and virtual call management.
  - Modulo 8 packet sequence numbering.
  - Packet length selection (up to 4,096 characters).
- Support of selected user facilities:
  - One way logical channel.
  - Reverse charging.
  - Closed user group.
- Support of protocol conversion facilities for non-SNA equipment.
- Support of IBM cryptographic subsystem/access methods products.
- SNA communication via X.25 networks to selected SNA devices via Network Interface Adapter (RPQ 5973-LO2).
- IBM program product subsystem support, e.g., CICS/VS, IMS/VS, TSO, NCCF, VSPC.
- Coexistence with other 3705 program products, e.g., NTO (5735-XX7).
- Link speeds from 1,200 to 56,000 bps.

**Release 2**

- Integrated support of a subset of CCITT Recommendation X.29 allowing communication with terminals corresponding to CCITT Recommendation X.28, e.g., Start/Stop and TTY 33/35 terminals.
- Control facilities enabling the user to provide his own Packet Assembly/Disassembly (PAD) support at the application program level, e.g., for BSC.
- Capability allowing for a host application to manage X.25 control functions.
- Modulo 128 packet sequence number.
- Link Access Procedure Balanced (LAPB) only.
- Delivery Confirmation Bit (D-bit) and Qualified Data Packet (Q-bit) support for non-SNA equipment.
- Flow control negotiation at call set-up time.
- X.25 diagnostic packet support.
- Optional retries on clear/reset packets.
- Specific encoding of diagnostic and cause field in clear/reset packets through host application interface.

**Release 3**

- SNA Network Node Interconnection (ACF/NCP) through X.25 networks.
- X.21 Nonswitched Adapter.

**Release 3.1**

- Provides X.25 NPSI Release 3 level support for ACF/NCP V2 for the 3705. Release 3.1 has the same functions as Release 3, plus:
  - usage of the qualified bit for logical link control at the boundary network node
  - control facilities enabling the user to provide his own Packet Assembly/Disassembly (PAD) support at the application program level for HDLC connections.

**Release 4**

- Provides X.25 NPSI Release 3.1 level support for ACF/NCP V2 for the IBM 3725. Link access support in X.25 NPSI Release 4 is LAPB (Link Access Procedure Balanced) only. In addition, NPDA support, unavailable with X.25 NPSI Release 1, 2, 3, and 3.1, is provided by X.25 NPSI Release 4 in conjunction a later version or release of NPDA. For Release 4 prerequisites, refer to the "Program Service Considerations" section.
- X.21 Nonswitched Adapter.

**SUMMARY and ADVANTAGES**

Operating in conjunction with its prerequisite ACF/NCP program product, the X.25 Packet Switching Interface program product provides X.25 SNA boundary node function (initial release) and SNA Network Node Interconnection (follow-on release) through an X.25 network.

**Release 1**

**Subsystem/Program Product Support:** IBM program products (CICS/VS, IMS/VS, TSO, NCCF, and VSPC) which support SNA/SDLC communication with specific IBM controllers and devices via ACF/VTAM, ACF/TCAM and ACF/NCP can, without modifications, utilize this X.25 NCP Packet Switching Interface program product, in conjunction with the IBM 5973-LO2 Network Interface Adapter, and obtain the same SNA support for those controllers and devices via X.25 networks (reference M2700 pages for further information).

**Expanded Networks:** Offers in a single communications controller the capability for users to attach to multiple network offerings.

**Single and Multiple System Networking:** Allows ACF/NCP network nodes to be connected using X.25 NCP Packet Switching services in both single and multiple system environments.

**Network Sharing:** Permits a wide range of S/370 configurations supporting growth in both SNA and X.25 networks.

**Standards:** Conforms to worldwide CCITT Recommendation X.25 (Geneva, November 1980).

**Protocol Conversion:** The Protocol Converter for Non-SNA Equipment facility enabling support of non-SNA equipment attached to X.25 networks.

**Release 2**

**Modulo 8, 128:** Supports two levels of packet numbering.

**Host Application Interface:** Allows a host application to manage X.25 control functions such as those for call control (call request, incoming call connected and call accepted packets), and those during data transfer (interrupt, reset, and qualified data packets).

**Packet Assembly/Disassembly:** Provides support conforming to a subset of CCITT Recommendation X.29 allowing communication with terminals corresponding to CCITT Recommendation X.28, e.g., Start/Stop and TTY 33/35 terminals (TRANSPAC, including access through French telex) - control facilities enabling the user to provide his own PAD support at the application program level, e.g., for BSC.

**Release 3**

**SNA Network Node Interconnection:** Allows two IBM Communication Controllers (3705-II or 3705-80), each using the X.25 NCP Packet Switching Interface program product with ACF/NCP Release 3 to communicate via X.25 Packet Switching Networks using SNA Intermediate Network Node protocols.

**X.21 Nonswitched Adapter:** Allows the physical attachment to the X.25 network, using the X.21 Nonswitched Adapter.

**Release 3.1**

- Provides X.25 NPSI Release 3 level support for ACF/NCP V2 for the 3705. Release 3.1 has the same functions as Release 3, plus:
  - usage of the qualified bit for logical link control at the boundary network node
  - control facilities enabling the user to provide his own Packet Assembly/Disassembly (PAD) support at the application program level for HDLC connections.

**Release 4**

- Provides X.25 NPSI Release 3.1 level support for ACF/NCP V2 for the IBM 3725. Link access support in X.25 NPSI Release 4 is LAPB (Link Access Procedure Balanced) only. In addition, NPDA support, unavailable with X.25 NPSI Release 1, 2, 3, and 3.1, is provided by X.25 NPSI Release 4 in conjunction a later version or release of NPDA. For Release 4 prerequisites, refer to the "Program Service Considerations" section.

**CUSTOMER RESPONSIBILITIES**

To install and use the X.25 NCP Packet Switching Interface, the customer must:

- Insure that the X.25 network conforms to CCITT Recommendation X.25 (Geneva, November 1980).
- Order and install all required communications equipment.
- For the 3705: Order and install ACF/NCP Version 1 Release 2.1 or 3.0, of ACF/NCP Version 2; System Support Programs for ACF/NCP Version 1 Releases 2.1 or 3.0 and prerequisite System Control Programming, or ACF/SSP Version 2.
- For the 3725: Order and install ACF/NCP Version 2, and ACF/SSP Version 2 Release 1.1

PROGRAM PRODUCTS

**X.25 NCP Packet Switching Interface (cont'd)**

- Generate X.25 NCP Packet Switching Interface, using the System Support Programs for ACF/NCP Release 2.1 or 3.0 or ACF/SSP Version 2.
- Load the 3705-II, 3705-80, or 3725 with the generated X.25 NCP Packet Switching Interface load modules, using, for example, the System Support Programs for ACF/NCP Release 2.1 or 3.0 or ACF/SSP Version 2.
- Meet the requirements of the host access method products to be operational with ACF/NCP Release 2.1 or 3.0 or ACF/NCP Version 2.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The X.25 NCP Packet Switching Interface Release 1, 2, 3, and 3.1 are designed to operate on an IBM 3705-II or 3705-80 Communication Controller equipped with a CS2 or CS3 communications scanner with the appropriate FDX line set. When operating with one X.25 line at speeds above 20.4 kbps, a CS3 communication scanner is required.

X.25 NPSI Release 4 is designed to operate on an IBM 3725 Communication Controller with the appropriate FDX line interface card.

**SOFTWARE REQUIREMENTS**

The X.25 NCP Packet Switching Interface program product requires the installation of its prerequisite Advanced Communications Function for NCP/VS (ACF/NCP/VS) Program Product Release 2.1 or 3.0, or ACF/NCP Version 2.

**Network Requirements:** The X.25 NCP Packet Switching Interface program product is designed to operate with data transmission services having interfaces complying with CCITT Recommendation X.25 (Geneva, 1980) as delineated in the IBM SRL GA27-3345, *The X.25 Interface for Attaching IBM SNA Nodes to Packet-Switched Data Networks*. Announcement of support of X.25 networks will depend on network attachment availability and evaluation. Selection of X.25 networks for attachment will be based on IBM's technical and business judgment in addressing the requirements of its customers.

**Program Service Considerations:**

Program services for this licensed program used in other than the Specified Operating Environment are subject to limitation occasioned by the difference between the Specified Operating Environment and the customer's environment and by the extent of the local IBM representative's knowledge of the equipment, programs and networks involved. Users of Release 4 who desire program service support of the X.25 NCP Packet Switching Interface program product, or hardware maintenance service support for the lines controlled by the X.25 NPSI program product, must install the later version or release of NPDA.

**COMPATIBILITY**

IBM cryptographic subsystem/access method products compatible with this program product are:

- Programmed Cryptographic Facility, program product 5740-XY5, announced for OS/VS2 (MVS) Release 3.8 and OS/VS1 Release 7.0.
- Cryptographic Unit Support, program product 5740-XY6, announced for OS/VS2 (MVS) Release 3.8 and OS/VS1 Release 7.0.
- ACF/VTAM Encrypt/Decrypt Feature #6010, Program Number 5735-RC2, announced for OS/VS2 (MVS) Release 3.8 and OS/VS1 Release 7.0.
- ACF/TCAM Version 2 for OS/VS2 (MVS) Release 3.8 and OS/VS1 Release 7.0.

**Note:** IBM cryptographic line bracketing products (3845 and 3846 data encrypt devices) *cannot be used*.

**RESTRICTIONS:** The ACF/NCP dynamic reconfiguration capability is not supported for X.25 access links or virtual circuits controlled by the X.25 NCP Packet Switching Interface program product.

Fast select and Datagram facilities are not supported.

Remote loading and/or dumping of an ACF/NCP is not supported through the X.25 network. Should it be required, alternative (non-X.25) communication facilities may be used.

**MIGRATION and PLANNING CONSIDERATIONS**

**Migration:** This program product is compatible with the World Trade PRPQ 5799-BAK (ZA4239). Users of 5799-BAK may migrate to Release 1 of Program Product 5668-981 without changes to their network or host applications.

**Planning:**

**Software:** The following matrix defines the support alternatives available to OS/VS and DOS/VSE operating system environments.

**X.25 NCP Packet Switching Interface  
(Program Product 5668-981)**

	Rel. 1.2	rel.3	Rel. 3.1*	Rel. 4**
ACF/VTAM V1R2	yes	no	no	no
ACF/VTAM V1R3	yes	yes	yes	yes ***
ACF/VTAM V2	yes	yes	yes	yes
ACF/TCAM V2R2	yes	no	no	no
ACF/TCAM V2R3	yes	yes	yes	no
ACF/TCAM V2R4	yes	yes	yes	yes
ACF/NCP V1R2.1	yes	no	no	no
ACF/NCP V1R3	no	yes	no	no
ACF/NCP V2	no	no	yes	yes

\* Support available July, 1983

\*\* Support available ... MVS/VS1: November, 1983 ... VSE: December, 1983

\*\*\* MVS only.

**Hardware:** SNA terminal support will be provided through the Network Interface Adapter RPQ 5973-LO2 (Y96635). Information on the supported terminals and other details can be obtained through normal RPQ information system procedures.

Other hardware support is provided through the X.25 NCP Packet Switching Interface program product's Protocol Conversion for Non-SNA Equipment facility and packet assembly/disassembly (PAD) support.

**PERFORMANCE and STORAGE CONSIDERATIONS**

The X.25 NCP Packet Switching Interface requires, in addition to its own storage requirement, the storage required by its own prerequisite ACF/NCP/VS program product. The functions provided by the X.25 NCP Packet Switching Interface program product will increase the ACF/NCP storage requirements and path lengths. The actual performance level will vary depending upon the user's particular hardware and software configuration.

3705 or 3725 configurator programs, IBM aids available via the HONE system, has been updated for X.25 and should be used to access individual customer performance capability and storage estimates.

**DOCUMENTATION**

(available from Mechanicsburg)

**Available Now:** *NCP Packet Switching Interface Program Product Summary (GC30-9544) ... X.25 Interface for Attaching IBM SNA Nodes to Packet Switched Data Networks General Information (GA27-3345) ... X.25 Primer (GG22-9103) ... X.25 NCP Packet Switching Interface Program Product General Information (GC30-3080) ... X.25 NCP Packet Switching Interface Program Product Installation and Operation (SC30-3163) ... X.25 NCP Packet Switching Interface Program Product Reference Summary (SC30-3079) ... X.25 NCP Packet Switching Interface Program Product Diagnosis Guide (SC30-3164).*

**RPQs ACCEPTED:** Yes

**TERMS and CONDITIONS:** See PP Index

**Program Service Considerations:** Program services for this licensed program used in other than the Specified Operating Environment are subject to limitations occasioned by the difference between the Specified Operating Environment and the customer's environment and by the extent of the local IBM representative's knowledge of the equipment, programs and networks involved.

**5668-983 - NPDA VERSION 2  
NETWORK PROBLEM DETERMINATION APPLICATION  
VERSION 2 MVS, VS1, VSE**

**PURPOSE**

The Network Problem Determination Application Version 2 (NPDA Version 2) program assists users in performing problem determination. NPDA generates situation alerts to the appropriate personnel about potential problems. NPDA also collects and interprets records of detected events and statistical data originating in those hardware and software components that provide such information and recommends possible user activities to locate and relieve problems. NPDA Version 2 expands the function of the Network Problem Determination application (NPDA) program product (5735-XX8). NPDA Version 2, which runs as an application of the Network Communications Control Facility (NCCF), expands the alert support for resources of the 3600 and the 4700 Finance Communication Systems. NPDA Version 2 also expands the function of NPDA for OS/VS users by extending device error support to selected tape, DASD and 3800 printer devices attached to a network host processor and to the CPU (OS/VS2 MVS only) and channels of the network host processor, in addition to the previously supported communications network resources. The 3600 Threshold Analysis and Remote Access feature of NPDA is separately orderable for NPDA Version 2.

**HIGHLIGHTS**

The Network Problem Determination Application Version 2 (NPDA Version 2), which expands upon facilities available in NPDA, assists users in performing problem determination tasks by providing:

- Online, interactive viewing of recorded information that assists users in locating an unidentified hardware problem.
- An alert facility which will:
  - Dynamically display key events which warrant operator attention from both network and selected OS/VS tape and DASD devices.
  - Generate alerts based upon user specified thresholds.
  - Generate alerts for Network Routing Facility Licensed Program.
- A hierarchical view of event and statistical data for network problems occurring on lines, modems, cluster controllers, control units and terminals for OS/VS and VSE and for selected tape, DASD and network devices locally attached to the network host.
- Operator data on the following:
  - A description of alerts and events.
  - A probable cause description.
  - Recommended user action(s).
- Data base and display filters which permit user selection of which alerts/events are recorded and/or viewed:
- Permanent and/or temporary events/alerts associated with:

**Resources Attached to 3705/NCP Communications Controller:**

SDLC Lines  
BSC Lines  
Start/Stop Lines  
X.21 Networks  
3271 Control Unit mdls 1, 2  
3274 Control Unit mdls 1C, 21C, 31C, 51C, 52C  
3275 Display Station mdls 1, 2 (via BSC line)  
3276 Control Unit Display Station  
mdls 1, 2, 3, 4, 11, 12, 13, 14  
360X Control Unit under Communications Network Management  
Controller Support (CNM/CS)  
3770 MLU Models (3776 mdls 3, 4; 3777 mdl 3)  
386X Modems  
3867 Link Diagnostic Unit  
470X Control Unit under Communications Network Management  
Controller Support (CNM/CS)  
8775 Display Terminal mdls 11, 12  
8815 Scanmaster 1 mdls 1, 3, 4  
8100 Information System  
System/38

**Resources Attached to Communications Adapter on 4331 Processor:**

3271 Control Unit mdls 1, 2  
3274 Control Unit mdls 1C, 21C, 31C, 51C, 52C  
3275 Display Station mdls 1, 2 (via BSC line)  
3276 Control Unit Display Station  
mdls 1, 2, 3, 4, 11, 12, 13, 14  
360X Control Unit under Communications Network Management  
Controller Support (CNM/CS)  
3770 MLU Models (3776 mdls 3, 4; 3777 mdl 3)  
470X Control Unit under Communications Network Management  
Controller Support (CNM/CS)  
8100 Information System

8775 Display Terminal mdls 11, 12  
System/38

**Resources Attached to Loop Adapter on 4331 Processor:**

3274 Control Unit mdls 51C, 52C  
3276 Control Unit mdls 11, 12, 13, 14  
8775 Display Terminal mdls 1, 2

**Resources of the Network Host when the Network System is in Operation (for OS/VS only):**

CPUs (those models of the S/370, 4300, 30XX operating under OS/VS2 (MVS) only)  
Channels (2860, 2870, 2880)  
Communications Controllers (370X)  
DASD (3330, 3340, 3350, 3375, 3380, 3880)  
Integrated Channels  
Tapes (3410, 3420)  
Transmission Control Units (270X)  
3272 Control Unit mdls 1, 2 (channel status, unit status and sense data)  
3274 Control Unit mdls 1A, 1B, 1D, 21A, 21B, 21D, 31A, 31D  
3790 Communications System (as an SNA Controller - Unit check only)

**3800 Printing Subsystem Resources Attached to 370X/EP Communications Controller or 270X Transmission Control Unit (OS/VS only)**

BSC Lines  
Start/Stop Lines  
3271 Control Unit mdls 1, 2  
3274 Control Unit mdl 1C, 21C, 31C  
3275 Display Station mdls 1, 2  
3276 Control Unit Display Station mdls 1, 2

**DESCRIPTION**

**Summary and Advantages of NPDA Version 2:** The Network Problem Determination Application Version 2 (NPDA Version 2) program product assists users in performing the problem determination task by:

- Collecting records of detected error events from those hardware and software components that provide error information.
- Collecting and interpreting statistical data about permanent and temporary errors.
- Generating alerts to the appropriate personnel about potential problem situations.
- Recommending possible user activities to relieve detected problems.
- Transferring selected information to the data base of the Information/Management feature of Information/System program product (5735-OZS).

The NPDA Version 2 user has access, via a display terminal, to this accumulated information. This data is presented as:

- Identification of the component causing a specific event.
- Description of the event.
- Probable cause of the event based on an analysis of the recorded data.
- Recommended actions that the user may follow to correct or override any problems caused by the event.
- Accumulated statistics about temporary, or recoverable, errors. This data may be used to analyze performance degradation or unresolved intermittent failures.

The cross-domain capability of SNA communication subsystems is used by NPDA Version 2 to permit displays of event, alert and statistical data collected in remote network domains running NPDA Version 2.

NPDA Version 2 is logically composed of three entities:

- Data services command processors (DSCP) that select, analyze for alert service, and route to the NPDA Version 2 data base those records containing alert, event and statistical data from the components supported.

These command processors also serve to retrieve data from the NPDA Version 2 data base for user presentation and to perform maintenance services for that data base.

- Presentation services command processors (PSCP) that process user requests and format displays from the NPDA data base.
- A mapper which converts and routes non-SNA error data records to the data base (OS/VS only).

PROGRAM PRODUCTS

**NPDA Version 2 (cont'd)**

An important feature of NPDA Version 2 is the "filter" function. Filters are designed to screen out data before it is recorded in the NPDA Version 2 data base and are also used to screen out recorded data from each user's display.

Filters can be defined by the user to control the recording and viewing of:

- Specific event types.
- Specific resources.
- Specific resource type.
- Combinations of the above.
- Events based on the time of occurrence (viewing only).

Filters are supported in NPDA Version 2 by a number of status displays and explicit commands that are available to a user with proper authorization. For added convenience, the user can display the current status of recording and viewing filters that affect the data being viewed.

NPDA Version 2 has access to a single data base. The NPDA Version 2 data base records alerts, events and statistics occurring in an SNA controlled communications environment, a non-SNA controlled communications environment, and in a local environment.

NPDA Version 2 uses system functions provided by the Network Communications Control Facility (NCCF) Version 1 Release 2 or Version 2 program product for transparency to the operating system and the communications access methods.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

NPDA runs under NCCF on any IBM processors that meet the minimum requirements of the NCCF program product. These include the IBM S/370, 43XX, and the 30XX processors.

**User Terminals:** Among the display devices running under NCCF as user terminals are:

- 3275 mdls 2 and 12.
- 3276 mdls 2, 3, 4, 12, 13 and 14.
- 3277 mdl 2.
- 3278 mdls 2, 3, 4 and 5
- 3279 mdls 2A, 2B, 3A and 3B (monochrome and base color modes).
- 8775 mdls 1, 2, 11 and 12

**Storage:** The virtual storage requirement for NPDA Version 2 varies with the number of users, but is approximately 260K bytes. NPDA has no real storage or system area requirements.

**DASD:** The disk storage requirement for the NPDA data base is dependent upon the network configuration and user options, but is approximately 120 cylinders (3330), including program library space.

**SOFTWARE REQUIREMENTS**

NPDA is provided as a program product running with the Network Communications Control Facility (NCCF) Version 1 Release 2 or Version 2. NCCF Release 2 is provided as a program product on OS/VS2 (MVS) Release 3.8 and OS/VS1 Release 7 with the following access methods: ACF/VTAM Version 1 Releases 2 and 3, ACF/VTAM Version 2 and ACF/TCAM Version 2 Releases 2, 3 and 4 under any of their supported operating systems. NCCF Version 2 is provided as a program product on MVS with the following access methods: ACF/VTAM Version 1 Release 3, ACF/VTAM Version 2 and ACF/TCAM Version 2 Release 4.

NPDA Version 2 operates in a VM/370 environment under OS/VS2 (MVS) and OS/VS1 operating systems and supports remote resources only. The VM/370 environment requires VM/SP and VM/VCNA, while the OS/VS systems require: NCCF Version 1 Release 2 and ACF/VTAM Version 1 Releases 2 or 3, ACF/VTAM Version 2 Release 1, or ACF/TCAM Version 2 Releases 2, 3, or 4 under any of their supporting operating systems (OS/VS2 (MVS) and OS/VS1); NCCF Version 2 and ACF/VTAM Version 1 Release 3, ACF/VTAM Version 2 Releases 1 and 2, and ACF/TCAM Version 2 Release 4 under MVS.

NPDA Version 2 requires ACF/NCP Release 2.1 for 386X support of link quality monitoring.

**Currency:** For purposes of IBM providing program services, NPDA (5735-XX8) will be supported until discontinued by IBM upon at least twelve (12) months written notice.

**MIGRATION**

NPDA Version 2 is a replacement product for the Network Problem Determination Application (NPDA) program product. The functional extensions incorporated in NPDA Version 2 make the NPDA Version 2 data base incompatible with the NPDA data base. However, NPDA and NPDA Version 2 may coexist in the same system for viewing purposes.

The NPDA Version 2 terminal use procedures and commands are similar to those implemented in NPDA. NPDA Version 2 will not support DEMF coexistence.

Users of the IBM 3600 Threshold Analysis and Remote Access feature need to order feature #6008 for NPDA Version 2. The functions are the same as those in the NPDA Version 1 feature. The feature is supplied to provide compatibility with NPDA Version 2.

**DEPENDENCIES**

NPDA Version 2 is dependent upon the System Modification Program (SMP) for installation on OS/VS2 MVS and OS/VS1 and on MSHP for VSE. The NCCF Version 1 Release 2 or Version 2 program product is a prerequisite for operation of NPDA.

**SECURITY**

This program accesses hardware and software failure data, but not the customer data involved in the failure. The program acquires no customer data which is not directly supplied to the program by the customer and explicitly covered in customer documentation.

Customer management is responsible for the selection, application and adequacy of these controls for their environments.

**DOCUMENTATION**  
(available from Mechanicsburg)

NPDA Version 2 will be supported by the following publications:

*NPDA Version 2: Program Summary* (GC34-2062) NC ... *NPDA Version 2: General Information Manual* (GC34-2061) ... *NPDA Version 2: Installation* (SC34-2066) ... *NPDA Version 2: Terminal Use* (SC34-2063) ... *NPDA Version 2: Recommended Action Guide* (SC34-2064) ... *NPDA Version 2: Messages and Codes* (SC34-2065) ... *NPDA Version 2: Logic* (LY25-0012).

**MVS SYSTEM INTEGRITY**

IBM will accept APARs where installation of NPDA Version 2 introduces an exposure to the integrity of OS/VS2 MVS. Refer to Programming Announcement of April 21, 1980. This program is intended to run authorized.

## 5668-985 - HOST COMMAND FACILITY VERSION 2

### PURPOSE

Host Command Facility Version 2 (HCF V2) extends the capabilities of the first version in ACF/VTAM environments by allowing operation with the Terminal Access Facility, a feature of the Network Communication Control Facility (NCCF) Release 2 and an integrated function of NCCF Version 2. This capability, when used in a VTAM environment, will allow the central network operator to establish multiple concurrent sessions with 8100 Distributed Systems from a single NCCF terminal at the central-site S/370 or 4300. When communicating with 8100/DPPX or DPPX/SP systems, these sessions can be full-screen sessions or line-by-line sessions. Full-screen sessions require that the control terminal be dedicated to one session at a time. Line-by-line sessions provide for an interleaved display of messages from multiple 8100 systems, thereby allowing operational monitoring of multiple 8100 systems from a single terminal. Sessions with 8100/DPCX systems are limited to full-screen sessions. In addition to the operation with the Terminal Access Facility of NCCF, HCF V2, when used in DPPX or DPPX/SP environments, also allows use of the 3767 Communication Terminal for HCF functions.

### SPECIAL SALES INFORMATION

Host Command Facility Version 2 is particularly useful to those 8100 users who are part of a S/370 or 4300 VTAM-based network and who want to manage that network from a central site through use of IBM-supplied network management tools such as NCCF. It is especially useful to those users who want to perform the operation, control and problem determination functions for multiple 8100 DPPX or DPPX/SP systems from a single host terminal, and to those users who want hardcopy capability for HCF functions.

### HIGHLIGHTS

- Working in conjunction with the Terminal Access Facility of NCCF and ACF/VTAM, HCF V2 provides:
  - The management of multiple network nodes, both DPPX and DPCX, from a single NCCF terminal via a full-screen session temporarily dedicated to HCF V2. HCF commands are then utilized to establish and drop full-screen sessions to 8100 DPPX or DPPX/SP and 8100 DPCX applications in a serial manner.
  - The ability to operationally monitor multiple 8100/DPPX nodes from a single NCCF terminal. These sessions are line-by-line sessions which provide for an interleaved display of messages from multiple 8100 DPPX or DPPX/SP systems.
  - In DPPX environments, a dynamic switching capability between operator control environment (line-by-line) and the currently established full-screen session for HCF V2.
- Independent of the Terminal Access Facility feature of NCCF, HCF V2, when used in DPPX or DPPX/SP environments, allows use of the 3767 Communication Terminal for HCF functions. This provides a hard copy capability for installations requiring it, and also provides an alternative to those installations where display availability is a problem.
- In each of the above environments (i.e., with and without the Terminal Access Facility of NCCF, HCF V2 will provide a new operator facility which will enable graceful termination of HCF V2.

**Other Features:** When operating in DPPX or DPPX/SP VTAM environments, Host Command Facility Version 2 includes all of the functions of the first version among which are:

- Remote control and operation of one or more 8100 systems selected by the terminal operator.
  - Remote initiation and termination of work.
  - Remote configuration control.
- Remote examination of DPPX or DPPX/SP data sets, including dumps and logs, using the DPPX or DPPX/SP interactive editor.
- Remote problem determination and isolation.
  - Examination of error logs and error log summaries.
  - Examination of dumps, traces, etc.
  - Invocation of test programs, online tests and diagnostics, and examination of their results.
  - Application of program patches via the DPPX or DPPX/SP interactive editor.
- Remote program development, using the full set of DPPX or DPPX/SP tools for interactive program writing, compiler invocation and problem determination.
- Submission of transactions and control commands to DPPX or DPPX/SP and the Data Base and Transaction Management (DPPX or DPPX/SP DTMS) user.

In general, Host Command Facility Version 2 allows a host NCCF terminal operator access to any function available to the command facility or DPPX or DPPX/SP DTMS user.

In addition, Host Command Facility Version 2 will provide the S/370-to-8100/DPPX or -DPPX/SP or 4300-to-8100/DPPX or -DPPX/SP logical connection verification (LCV) function. This function verifies the logical connection path between the host S/370 or 4300 and the 8100/DPPX or DPPX/SP System. LCV can be initiated through HCF V2 by the host terminal operator. The test involves the transmission of a 'canned pattern' or operator-entered pattern from the corresponding DPPX or DPPX/SP LCV program to the initiating host terminal. The number of times the pattern is transmitted is controlled by the host terminal operator. When used in conjunction with the DPPX Data Stream Compatibility licensed program or the DPPX/SP Data Stream Compatibility component, the purpose of this facility is to verify the logical connection path (program-to-program, including links) between the S/370 or 4300 and 8100/DPPX or DPPX/SP.

When operating in DPCX VTAM environments, HCF V2 includes all of the functions of the first version among which are:

- Central control and operation of an 8100 System selected by the network operator, including:
  - Initiation of system services such as packing of transactions and printing data sets.
  - Access to user full-screen programs.
  - Enabling and disabling devices for reconfiguration control.
  - Ability to set IPL parameters and access to security controls in DPCX.
- Central problem diagnosis, including:
  - Initiation of tests and traces.
  - Display of distributed system status information, condition incident log, and attached devices error logs.
- Initiation and examination of traces and application program dumps.
- Retrieval of unique system information messages.
- Central access to the Program Execution Monitor for debugging DPCX application programs.
- Central system performance control, including system performance data collection.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

HCF V2 requires 64K to 128K bytes of IBM S/370 or IBM 4300 virtual storage depending on the number of users. It will operate on a DOS/VSE, OS/VS1 or OS/VS2 (MVS) system with sufficient real storage to satisfy the combined requirements of HCF V2, VTAM/VTAME, and other customer required programs.

The configuration must include an IBM S/370 or IBM 4300 attached (local or 370X, BSC or SDLC) IBM 3276-1,-2,-3,-4,-11,-12,-13,-14 or 3277-2 or 3278-1,-2,-3,-4 display, using a 3271-2, 12 or 3272-2 or 3274-1A,-1B,-1C,-1D or 3275-2,-12 or 3276-1,-2,-3,-4,-11,-12,-13,-14 as a control unit, or an IBM 3767 Communication Terminal.

**Note:** Although HCF V2 supports BSC, SDLC and local attachment for displays, it only supports SDLC links to the 8100 systems.

#### SOFTWARE REQUIREMENTS

HCF V2 is designed to run with:

DOS/VSE	VSE/Advanced Functions and ACF/VTAM Version 1 Releases 2 and 3, ACF/VTAM Version 2 Release 1, or ACF/VTAME.
OS/VS1	Release 7.0 with ACF/VTAM Version 1 Release 3 and ACF/VTAM Version 2 Releases 1 and 2.
OS/VS2	Release 3.8 with ACF/VTAM Version 1 Release 3 and ACF/VTAM Version 2 Releases 1 and 2.

In order to concurrently control multiple 8100 systems from a single terminal, HCF V2 must be used with the Terminal Access Facility, a feature of the Network Communications Control Facility (NCCF) Release 2 and an integrated function of NCCF Version 2.

#### COMPATIBILITY

Host Command Facility Version 2 is designed to work in VTAM environments in support of 8100 Information Systems with DPPX or DPPX/SP or DPCX as the Operating System. When used in these environments, HCF V2 includes all of the functions provided by the first version and is upwards compatible with it.

#### DATA SECURITY, AUDITABILITY and CONTROL

HCF V2 runs under OS/VS1, OS/VS2 (MVS) and DOS/VSE and is subject to the controls that they provide. User management is responsible for the selection, application, adequacy and implementation of these features and for appropriate application controls.



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PP 5668-985.2  
Nov 83

PROGRAM PRODUCTS

**Host Command Facility V2 (cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*HCF V2 General Information Manual (GC27-0453) ... HCF V2 User's Guide (SC27-0455) ... HCF V2 Diagnosis Guide (LY38-3052) ... HCF V2 Licensed Program Summary (GC27-0516) ... HCF V2 Licensed Program Specification.*

**SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No

**DISTRIBUTED SYSTEMS EXECUTIVE (DSX)  
VERSION 2 RELEASE 1  
5668-986**

**PURPOSE**

Distributed Systems Executive Version 2 Release 1.0 (DSX 2.1.0) is a network management tool designed to assist the user in achieving the controlled distribution of data and software in IBM 8100 and 3790 networks. DSX 2.1.0 includes: The host libraries, holding files and control files ... the transmission, formatting and reporting functions ... the flexible operator control capabilities that are needed for effective network management. This program is applicable to the 8100 and 3790 configuration #9431, #9165 or #9169 which have the ability to communicate with the host via SNA sessions.

DSX 2.1.0 consists of three major parts: Central library support ... automatic transmission control ... interactive operator control.

**DESCRIPTION**

The central library support supplies the functions and facilities needed at the host to maintain an inventory of network and processor resources (hardware, software and data), and to report on the status of these resources. One library contains a complete current set of 8100/DPPX or DPPX/SP programs, panels and CLISTS. Another library contains an equivalent set for the 3790 or 8100/DPCX (FSPs, FPs, DSCBs and DPCX category and category update data sets). The central files also include holding files for all the other data transmitted by DSX 2.1.0 (see below), a cluster master file for a complete inventory of network hardware and software, and a transmission control file of scheduled transmissions.

The automatic transmission control supplies function and service definitions needed by the host to start and control the exchange of data between the host and one or more processors. These include:

ACTION	DPPX	DPCX	3790
1. SENDING or DELETING			
Programs	yes	yes	yes
Panels	yes	yes	yes
DSCBs	no	yes	yes
CLISTS	yes	no	no
Data sets	yes	no	no
Category data sets	no	yes	no
Category updates	no	yes	no
2. SENDING			
Messages	yes	yes	yes
Print data	yes	yes	yes
File Update data	no	yes	yes
Power off command	no	yes	yes
PTF data sets	yes	no	no
Storage Dumps	yes	no	no
Category updates	no	yes	no
3. RETRIEVING			
Messages	no	yes	yes
Transactions	no	yes	yes
Programs	yes	no	no
Panels	yes	no	no
Data sets	yes	no	no
CLISTS	yes	no	no
Storage dumps	yes	yes	yes
PTF data sets	yes	no	no
Errorlog data	yes	no	no
4. INITIATE a FUNCTION	yes	yes	yes
5. CLEAR CATEGORY DATA SETS	no	yes	no

Variable length request units (RUs) are allowed for transmission to or from 8100/DPPX or DPPX/SP

The transmission control program sets up sessions and performs all requested functions according to session definitions previously entered by the user in the transmission control file. Messages to the operator are sent if any problems are encountered. Sessions will be executed according to the function sequence ordered by the user or by DSX. Defined sessions are initiated automatically by the transmission control program when the time conditions specified in session definition are met, or by an 8100/DPPX or DPPX/SP terminal request for a DSX initiation of a predefined session.

The transmission control program maintains complete records of the progress of scheduled transmissions. In the event of a failure in transmission, users are able to determine the exact point at which the failure occurred. For 8100/DPPX or DPPX/SP systems, failed transmissions are restarted at a logical block level, within a transmitted data set. Additionally, the DSX user may specify error conditions on which a session is to be terminated at subfunction level.

Through the Interactive Operator Facility, an operator at a 3270 Display Station can monitor the progress of transmissions and intervene as necessary. The 3270 Display Station used by the Interactive Operator Facility can be either native to DSX 2.1.0 or owned by Network Communications Control Facility (NCCF) and made accessible to DSX

2.1.0 via Terminal Access Facility. Users can choose the degree of control desired by selecting among three options:

- Operator control through the Interactive Operator Facility.  
A sequence of displays on the 3270, with menu selection, fill-in-the-blank entry, and messages to prompt the correct data entry, gives the operator flexibility in monitoring and controlling transmissions.
- Simply replying to DSX messages requesting operator response (for example, RETRY or SKIP).

This option is available either on the 3270 Display Station or, for MVS systems, on the designated system console. In the latter case, the operator also has the ability to query session status and halt sessions if necessary. This capability is supported by commands entered in response to an outstanding write-to-operator reply (WTOR) maintained throughout the transmission run.

- Fully automatic operation with no operator intervention.

The degree of operator control is specified at DSX installation and may be overridden at each DSX invocation.

The Interactive Operator Facility is available for:

- MVS (ACF/VTAM or ACF/TCAM).
- VSE (ACF/VTAM or ACF/VTAME).
- OS/VS1 (ACF/VTAM or ACF/TCAM).

With TCAM, DSX 2.1.0 is available only through the Access Control Block (ACB) interface.

**HIGHLIGHTS**

- Central Library Support  
Since modules and functions can be stored by version and modification level, the network administrator can recover earlier copies for backup, and store future versions before they are needed.
- Network Inventory  
DSX 2.1.0 maintains complete, orderly records of cluster configurations and resource assignments.
- Problem Analysis  
Host system retrieval of storage dumps, as well as of information on other user-noted problems, helps in problem analysis.
- Flexibility
  - Variable size request/response units (RUs) are allowed for 8100/DPPX or DPPX/SP systems to improve transmission performance.
  - Users are given many options in report writing; definition of user-noted problems, initiation of transmission by time, date, cluster, groups, or some combination.
  - Session planning and execution.
    - Ability for the DSX user to specify the sequence of execution of functions within a session.
    - Ability for the DSX user to have a session terminated at subfunction level if an error occurs.
    - Ability for the 8100/DPPX or DPPX/SP user to release an already-defined session for his node.
  - Transmission can be fully automatic, according to preset schedules, or, through the Interactive Operator Facility, a control operator can exercise extensive, flexible control:
    - Start transmission activity.
    - Display DSX transmission activity at subfunction level.
    - Quiesce/resume DSX transmission activity. The operator can choose if this command must become effective immediately or upon the completion of the subfunction in progress.
    - Hold/release a selected session. This command becomes effective upon the completion of the subfunction in progress.
    - Change session date and time.
    - Delete sessions.
    - Execute unscheduled but predefined sessions.
    - Terminate DSX transmission activity. The operator can choose if this command must become effective immediately or upon completion of all the sessions in progress.
    - Restart a session that did not complete.

PROGRAM PRODUCTS

DSX V2 R1 (cont'd)

- The Interactive Operator Facility allows operator communication through a 3270 Display Station, with full-screen data entry panels, menu selection, forward and backward paging, and messages to prompt the operator for the next appropriate entry.

- Means of Controlling Change

With the network equipment and data inventory maintained in the DSX 2.1.0 file, DSX 2.1.0 becomes a useful tool for keeping track of cluster configurations and modifications. Since DSX 2.1.0 checks the cluster master file before scheduling transmissions (to see if a program is assigned to a particular cluster, for example), users are prevented from making some time-consuming mistakes. Reports of cluster configurations, assigned programs, data sets, and so on, and of incidents occurring in the clusters may help to identify and correct problems resulting from incorrectly planned or implemented changes.

- Reporting

Users can obtain complete, current information on a specific cluster, data library contents, scheduled transmission sessions, abend dumps, or recorded problems. Reports can be current summaries or can show historical details and averages.

- Productivity

DSX 2.1.0 contributes to the productivity of everyone concerned with maintaining a distributed network by giving them:

- A common control statement language for maintenance functions.
- Syntax checking to minimize erroneous file updates; meaningful reports showing the status of files and transmission results; reusable session schedules.
- Operator commands to allow retry, restart and skipping of problem transmissions without terminating the session.
- Dynamic monitoring of transmission status and handling of emergencies by the operator through the Interactive Operator Facility.

- Auditability

- Programs, panels, command lists and data set control blocks are not sent to clusters unless they have been previously assigned to the cluster by a DSX 2.1.0 function.
- Time and date are stamped on all DSX 2.1.0 records in the system whenever the record is created or updated.
- A logging exit is provided for a user-written logging program or recovery system.
- DSX 2.1.0 archives the results of each session initiated.

- Security

DSX 2.1.0 has an extensive set of security functions in order to cover:

- Batch environment, to protect, by DSX passwords, utility runs.
- 8100/DPPX or DPPX/SP system access, via logon-ids and passwords to obtain authorization credentials whenever a session is initiated with the cluster.
- Online environment, to prevent unauthorized logons to Interactive Operator Facility via logon-ids and passwords.

Session logons and passwords for 8100/DPPX or DPPX/SP processors can be protected by DSX passwords. These controls only operate within the scope of DSX and depend on customer use of system protection options, e.g., RACF and MVS. Customer management is responsible for the selection, adequacy and use of these controls for their environment.

- Recovery

8100/DPPX or DPPX/SP can restart without retransmitting data in a partially transmitted data set. Attempts to format or send data sets only partially received are prevented and the DSX user is notified by message.

- Reliability, Availability and Serviceability

- Interference between transmission control program and the Interactive Operator Facility is minimal.
- User errors are detected as close to the source of input as possible. This is done for inputs to the batch utilities and for inputs to Interactive Operator Facility.
- The transmission control program can run without the Interactive Operator Facility.
- The Interactive Operator Facility can reconnect to a different terminal if terminal problems occur.
- In addition to the traces provided by the host environment, DSX maintains a trace table of TP I/O activities. The contents of the

DSX trace table will be part of the printed output provided by the operating system in case of a DSX abend.

- A tracking facility stores audit information concerning DSX file update operations in a reserved field of the updated records.

CUSTOMER RESPONSIBILITIES

For the cluster master file, the customer must collect and load the required data and set up a method to ensure that the information in this file is kept current and accurate.

DEPENDENCIES

In order to:

- Benefit from the transmission error recovery capability provided for 8100/DPPX or DPPX/SP systems
- Provide the capability for the 8100/DPPX or DPPX/SP user to release predefined held session for his node

8100/DPPX BASE enhancements or DPPX/SP is required and, at DSX 2.1.0 shipment time, the proper level of DPPX or DPPX/SP to be used will be documented.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

DSX 2.1.0 is designed to operate on any IBM S/370 mdl 125 or larger, or 30XX or 4300 processor capable of operating with software as shown below under "Software Requirements".

The host system must include IBM control units and features necessary for operation with the 8100 or 3790.

3790 Communication Systems must have one of the following feature codes:

- #9431 (at EC742305 or higher)
- #9165 (at EC 742042 or higher)
- #9169 (at EC 742051 or higher)

A full-screen display device must be available for the Interactive Operator Facility. This device must be one of the following IBM display stations:

- 3277 Display Station mdl 2 attached to one of the following controllers:
  - 3271 mdl 12
  - 3272 mdl 2
  - 3274 mdl 1B or 1C
- 3276 Display Station mdl 12 (or mdl 13 or 14 operating as a mdl 12)
- 3278 Display Station mdl 2 (or mdl 3 or 4 operating as a display station with 24 rows of 80 characters)
- 3279 Color Display Station (operating as a 3278 Display Station with 24 rows of 80 characters and default use of color)

In order to take advantage of the copy function provided with the Interactive Operator Facility, one of the printers attached to the 3270 Information Display System must be available. The copy function is supported in 3284/3286 mode.

The terminal support is provided through VTAM or through TCAM via the Access Control Block (ACB) interface.

SOFTWARE REQUIREMENTS

This licensed program is released to work with the specified minimum level of the following IBM system control programs (SCPs) and licensed products (LPs):

MVS		5752-VS2	Rel. 3.8
with	MVS/SP	5740-XYS	Rel. 1
or	MVS/SP	5740-XYN	Rel. 1
or	MVS/SP	5740-XC6	Ver. 2
			(when available)
or	MVS/SP	5665-291	Ver. 2
			(when available)
OS/VS1		5652-VS1	Rel.7
VSE		5745-030	
with	VSE/AF	5746-XE8	
ACF/VTAM		5735-RC2	Rel.2
with	VTAM SCP	5752-VS2	(MVS)
or	VTAM SCP	5652-VS1	(OS/VS1)
ACF/VTAM		5746-RC3	Rel. 2
with	VTAM SCP	5747-CF1	(VSE)
ACF/VTAME		5746-RC7	
with	VTAM SCP	5747-CG2	(VSE)

## PROGRAM PRODUCTS

**DSX V2 R1 (cont'd)**

ACF/VTAM V2	5665-280	(MVS)
	5662-280	(OS/VS1)
	5666-280	(VSE)
ACF/TCAM	5735-RC3	Rel. 2 (MVS & VS1 only)
VSE/VSAM	5746-AM2	Rel. 2

The Interactive Operator Facility may also be accessed by an operator in session with the IBM Network Communication Control Facility (NCCF) through the Terminal Access Facility (5735-XX6, Feature #6001).

Program Validation Services (PVS) is required for preparing 3790 or 8100/DPCX programs, panels, and DSCBs for processing by DSX.

For DSX 2.1.0 used with 8100/DPPX or DPPX/SP, sequential data sets may originate at the host or at the 8100/DPPX or DPPX/SP processor. Programs and panels originate at the 8100/DPPX or DPPX/SP processor.

This licensed program is distributed in object code.

**VIRTUAL STORAGE REQUIREMENTS:** Minimum virtual storage requirements are:

- MVS: 800K private storage
- OS/VS1 and VSE: 800K partition size

plus VSAM and VTAM requirements.

**CONVERSION from DSX VERSION 1 RELEASE 2.2**

In the conversion from DSX Version 1 Release 2.2 to DSX 2.1.0, the DSX system files may be used without change.

The DSX cluster master file needs to be updated with the user IDs and passwords for the DSX control operators.

The transmission control file and the catalog work file must be redefined with IDCAMS, specifying variable-length instead of fixed-length records.

New VSAM Relative Sequential Data Sets (RSDS) files are needed for the Interactive Operator Facility.

**COMPATIBILITY**

Existing DSX Version 1 Release 2.2 input job streams will require minor modifications to run with DSX 2.1.0, as described in the DSX 2.1.0 *Installation Guide* (SH19-6233).

Coexistence of DSX Version 1 Release 2.2 and DSX 2.1.0 in the same host is not supported.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual* (GH19-6229) ... *Licensed Program Specifications* (GH19-6230) ... *User's Guide and Reference* (SH19-6231) ... *Reference Summary* (SH19-6232) ... *Installation Guide* (SH19-6233) ... *Control Operator's Guide* (SH19-6234) ... *Messages and Codes* (SH19-6235) ... *Logic Manual, Volume 1, Batch Programs* (LY19-6215) ... *Logic Manual, Volume 2, Online Program and Diagnostic Aids* (LY19-6216).

**MVS SYSTEM INTEGRITY**

IBM will accept APARS where installation of DSX 2.1.0 introduces an exposure to the system integrity of MVS. Refer to Programming Announcement dated October 21, 1981. This program is intended to run authorized.

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**DISTRIBUTED SYSTEMS EXECUTIVE (DSX)  
VERSION 2 RELEASE 2  
5668-986**

**PURPOSE**

Distributed Systems Executive Version 2 Release 2 (DSX-V2.2) is a S/370-based network management tool designed to give a central site user administrative and management control over the distribution of software and data across his distributed 8100, 3790, Series/1 network.

DSX-V2.2 consists of three major parts: Central repository support ... automatic transmission control ... operator control.

**DESCRIPTION**

The central repository provides the following services:

- Central libraries for permanent storage of copies of distributed user software resources (e.g., programs, panels, CLISTS for 8100/DPPX and Series/1, and FPs, FSPs, DSCBs, KEYS, Category Defines, Category Updates, CLISTS for 8100/DPCX). Associated maintenance functions allow the user to keep libraries complete and current.
- Holding files for temporary storage of transient transmission data such as user application data and maintenance data (e.g., storage dumps). Functions are provided to move data in and out of holding files, and to delete data which is no longer needed.
- A cluster master file for a complete and current inventory listing of hardware, software, and data resources at each distributed system in the network.
- Reporting facilities to allow the user to review the contents of the central repository.

The automatic transmission control supplies the facilities needed at the host to plan, automatically execute, track and report on the exchange of data between DSX and distributed systems. Figure 1 lists the automatic control capabilities provided for each type of distributed operating system.

The transmission control program is directed by session definitions, previously entered in the transmission control file, to set up sessions with the distributed systems, and to perform the requested functions (e.g., add program, retrieve data set, delete panel). Normally, sessions are started automatically by the time-directed schedule definitions. The functions requested in a session are executed either in the sequence defined or by a DSX-ordered sequence.

Sessions, which have been placed in a hold state, may be started by the central site DSX control operator, or by a remote site 8100/DPPX or Series/1 Control Program Support user. DSX allows user-definable transmission request-response units (RU) to be sent between DSX and distributed systems of up to 32K bytes in size.

The following is the current RU support provided by the various node types:

- 8100/DPPX: User-definable up to 4K bytes.
- 8100/DPCX and 3790: Fixed 256 bytes.
- Series/1: User-definable up to 16K bytes.

The transmission control program maintains complete records of the progress of scheduled transmissions. In the event of a transmission failure, users are able to determine the exact point at which the failure occurred. Failed transmissions are restarted at a more granular level than the data set being transmitted (e.g., at a logical block level for 8100/DPPX and Series/1 systems, and System Configuration data sets for 8100/DPCX). Additionally, the DSX user can specify error conditions under which a session is to be terminated at subfunction level. This protects the user from running into a compounded problem which may occur if subsequent session functions are conditionally dependent on the failing operation. During the running of the transmission control program, messages are sent to the DSX operator, if there are any DSX network transmission or service problems.

ACTION	DPPX	DPCX	3790	RPS	EDX	CPS
<b>SENDING or DELETING</b>						
Programs	yes	yes	yes	yes	yes	yes
Panels	yes	yes	yes	yes	yes	yes
DSCBs	n/a	+yes	yes	n/a	n/a	n/a
CLISTS	yes	-yes	n/a	yes	yes	yes
Data sets	yes	*yes	n/a	yes	yes	yes
Category/Subcategory	n/a	yes	n/a	n/a	n/a	n/a
Keys	n/a	yes	n/a	n/a	n/a	n/a
<b>SENDING</b>						
Cat/Subcat. updates	n/a	yes	n/a	n/a	n/a	n/a
Messages	yes	yes	yes	yes	yes	yes
Print data	yes	yes	yes	yes	yes	yes
File update data	no	+yes	yes	no	no	no
Power off command	n/a	yes	yes	n/a	n/a	n/a
PTF data sets	yes	no	no	no	no	no
Storage dumps	yes	no	no	yes	yes	yes
<b>RETRIEVING</b>						
Messages	n/a	yes	yes	n/a	n/a	n/a
Transactions	n/a	yes	yes	n/a	n/a	n/a
Programs	yes	no	no	yes	yes	yes
Panels	yes	no	no	yes	yes	yes
Data sets	yes	*yes	n/a	yes	yes	yes
CLISTS	yes	-yes	n/a	yes	yes	yes
Dumps	yes	yes	yes	yes	yes	yes
PTF data sets	yes	n/a	n/a	no	no	no
Error logs	yes	no	no	no	no	no
<b>EXECUTING</b>						
Functions	yes	yes	yes	yes	yes	yes
<b>CLEARING</b>						
Category/subcategory	n/a	yes	n/a	n/a	n/a	n/a

n/a = not applicable.

- \* Configuration data sets are supported only with DPCX Release 3.0.
- + Including RSDS support.
- CLIST support of commands is available only with DPCX Release 3.0.

Figure 1. DSX-V2.2 Automatic Transmission control capabilities

Through the operator control capabilities, users can choose the degree of control desired by selecting among three options:

1. Operator control through the interactive operator facility.

An operator at a 3270 Display Station can monitor the progress of transmissions and intervene if necessary. A menu-ordered sequence of displays on a 3270 directs the user via prompting messages and fill-in-the-blanks entries to the various monitoring and controlling services. Transmission monitoring services are enhanced by a sorting and paging facility.

The monitoring and control capabilities which are available with the interactive operator facility are:

- Start transmission control program.
- Display DSX transmission sessions at subfunction level.
- Quiesce/resume DSX transmission to all distributed systems. The operator can request an immediate transmission stop or a subfunction completion stop. An immediate stop is at the current transmission block level. A subfunction completion stop brings the session to a halt as soon as the current subfunction is completed.
- Hold/release a selected session. This command becomes effective upon the completion of the subfunction in progress.
- Change session date and time of pending sessions.
- Delete pending or running session.
- Release sessions which have originally been defined as unscheduled.
- Restart a session that did not complete.
- Receive unsolicited messages generated by the transmission control program.
- Terminate DSX transmission control program. The operator can choose if this command must become effective immediately or upon completion of all the sessions in progress.

2. Limited operator control through the system console.

PROGRAM PRODUCTS

DSX V2 R2 (cont'd)

Unsolicited messages are displayed on the system console and, for system messages requiring a response (for example, RETRY or SKIP), the operator is prompted. For MVS and OS/VS1 systems, the operator also has the ability to query session status and halt sessions if necessary. This capability is supported by commands entered in response to an outstanding write-to-operator reply (WTOR) maintained throughout the transmission run.

3. Fully automatic operation with no operator intervention.

The degree of operator control is specified at DSX installation and may be overridden at each DSX invocation.

HIGHLIGHTS

• Central Library Support

Since copies of distributed software resources can be stored by version and modification level, the network administrator can recover earlier copies for backup, and store future versions before they are needed.

• Network Inventory

DSX-V2.2 maintains complete, orderly records of distributed system hardware configurations and software and data resource assignments.

• Problem Analysis

Host system retrieval of storage dumps, as well as of information on other user-noted problems, helps in problem analysis.

• Flexibility

- Mixed 8100, Series/1 and 3790 networks are supported in all combinations of distributed operating systems.

- User-definable RU sizes are allowed for 8100/DPPX and Series/1 systems to improve transmission performance.

- Users are given many options in:

- Report writing.
- Definition of user-noted problems.
- Initiation of transmission by time, date, group of distributed systems, or under a user request.

- Session planning and execution.

- Ability for the DSX user to specify the sequence of execution of functions within a session.

- Ability for the DSX user to have a session terminated at subfunction level if an error occurs.

- Ability for the 8100/DPPX and Series/1 Control Program Support user to release an already defined session for his node.

- Transmission can be fully automatic, according to preset schedules, or, through the interactive operator facility, a control operator can exercise extensive, flexible control:

• Means of Controlling Change

With the hardware, software and data resources inventory listings maintained in the cluster master file, DSX-V2.2 becomes a useful tool for keeping track of distributed system configurations and modifications. Since DSX-V2.2 checks the cluster master file before scheduling transmissions (to see if a program is assigned to a particular distributed system, for example), users are prevented from making mistakes that may introduce system and/or data integrity exposures. Reports of distributed system hardware configurations, assigned programs, data sets, and so on, and of incidents occurring in the distributed systems may help to identify and correct problems resulting from incorrectly planned or implemented changes.

• Reporting

Users can obtain complete, current information on a specific distributed system, holding file and library contents, scheduled transmission sessions, abend dumps, or recorded problems. Reports can be current summaries or can show historical details and averages.

• Productivity

DSX-V2.2 contributes to the productivity of everyone concerned with maintaining a distributed network by giving them:

- A common control statement language for maintenance functions.
- Syntax checking to minimize erroneous file updates.
- Meaningful reports showing the status of files and transmission results.
- Reusable session schedules.

- Operator commands to allow retry, restart and skipping of problem transmissions without terminating the session.

- Dynamic monitoring of transmission status and handling of emergencies by the operator through the interactive operator facility.

• Auditability

- Programs, panels, command lists and data set control blocks, keys, category data sets and category updates are not sent to distributed systems unless they have been previously assigned to the distributed system by a DSX-V2.2 function.

- Time and date are stamped on all DSX-V2.2 records in the system whenever the record is created or updated.

- A logging exit is provided for a user-written logging program or recovery system.

- DSX-V2.2 archives the results of each session initiated.

• Security

DSX-V2.2 has an extensive set of security functions in order to cover:

- Batch environment: To protect utility runs by DSX passwords.

- Online environment: To prevent unauthorized logons to the interactive operator facility via logon-ids and passwords.

- 8100/DPPX and Series/1 Control Program Support system access, via logon-ids and passwords to obtain authorization credentials whenever a session is initiated with the distributed system.

Session logon-ids and passwords for 8100/DPPX and Series/1 Control Program Support systems can be protected by DSX passwords. These controls only operate within the scope of DSX and depend on customer use of system protection options, e.g., RACF for MVS. Customer management is responsible for the selection, adequacy and use of these controls for their environment.

• Recovery

Transmissions can restart without resending the data of a partially transmitted data set. Attempts to format or send data sets only partially received are prevented and the DSX user is notified by message.

• Reliability, Availability and Serviceability

- Interference between transmission control program and the interactive operator facility is minimal.

- User errors are detected as close to the source of input as possible. This is done for inputs to the batch utilities and for inputs to interactive operator facility.

- The transmission control program can run without the interactive operator facility.

- The interactive operator facility can reconnect to a different terminal if terminal problems occur.

- In addition to the traces provided by the host environment, DSX maintains a trace table of TP I/O activities. The contents of the DSX trace table will be part of the printed output provided by the operating system in case of a DSX abend.

- A tracking facility stores audit information concerning DSX file update operations in a reserved field of the updated records.

TECHNICAL SALES INFORMATION

This program is applicable to 8100s, Series/1s and 3790s which have the ability to communicate with the host via SNA sessions.

CUSTOMER RESPONSIBILITIES

For the cluster master file, the customer must collect and load the required data and set up a method to ensure that the information in this file is kept current and accurate.

DEPENDENCIES

• 8100 systems must have one of the following licensed programs at the service level specified:

- DPPX: Base Level 0900 (FEP6), or subsequent service level.

- DPCX: Release 2.2 with feature #6001, or Release 3.0, or subsequent service level.

Note: Send/retrieve/delete data set functions and CLIST support of commands are available only with DPCX Release 3.0. If DPCX Release 2.1 is run with DSX-V2.2, the new DSX functions are not supported.

• 3790 systems must have one of the following feature codes:

- #9431 (at EC 742035 or higher)



PROGRAM PRODUCTS

DSX V2 R2 (cont'd)

- #9165 (at EC742042 or higher)
- #9169 (at EC 742051 or higher)
- Series/1 systems must have one of the following licensed programs at the service level specified:
  - Realtime Programming System: 5719-RM6 V1.0, upon availability, or subsequent service level.
  - Event Driven Executive: 5719-RM1 V1.0, upon availability, or subsequent service level.
  - Control Program Support: 5799-TFA SNA PRPQ.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

DSX-V2.2 is designed to operate on any IBM S/370 mdl 125 or larger, or IBM 30XX or 4300 Processor capable of operating with software as shown below under "Software Requirements".

The host system must include IBM control units and features necessary for operation with the IBM 8100, Series/1 or 3790.

A full-screen display device must be available for the interactive operator facility. This device must be one of the following IBM display stations:

- 3277 Display Station mdl 2 attached to one of the following controllers:
  - 3271 mdl 12
  - 3272 mdl 2
  - 3274 mdl 1B or 1C
- 3276 Display Station mdl 12 (or mdl 13 or 14 operating as a mdl 12)
- 3278 Display Station mdl 2 (or mdl 3 or 4 operating as a display station with 24 rows of 80 characters)
- 3279 Color Display Station (operating as a 3278 Display Station with 24 rows of 80 characters and default use of color)

In order to take advantage of the copy function provided with the interactive operator facility, one of the printers attached to the 3270 Information Display System must be available. The copy function is supported in 3284/3286 mode.

The terminal support is provided through VTAM or through TCAM via the Access Control Block (ACB) interface.

SOFTWARE REQUIREMENTS

This licensed program is released to work with release levels of the following IBM system control programs (SCPs) and licensed products (LPs) that are current at DSX-V2.2 availability time:

MVS		5752-VS2	
with	MVS/SP	5740-XYS	
or	MVS/SP	5740-XYN	
or	MVS/SP	5740-XC6	
or	MVS/SP	5665-291	
OS/VS1		5652-VS1	
VSE		5745-030	
with	VSE/AF	5746-XE8	
ACF/VTAM		5735-RC2	
with	VTAM SCP	5752-VS2	(MVS)
or	VTAM SCP	5652-VS1	(OS/VS1)
ACF/VTAM		5746-RC3	
with	VTAM SCP	5747-CF1	(VSE)
ACF/VTAME		5746-RC7	
with	VTAM SCP	5747-CG2	(VSE)
ACF/VTAM V2		5665-280	(MVS)
		5662-280	(OS/VS1)
		5666-280	(VSE)
ACF/TCAM		5735-RC3	(MVS and OS/VS1 only)
VSE/VSAM		5746-AM2	

With TCAM, DSX-V2.2 is available only through the Access Control Block (ACB) interface.

The interactive operator facility may also be accessed by an operator in session with the IBM Network Communication Control Facility (NCCF) through the Terminal Access Facility (5735-XX6, feature #6002).

Program Validation Services (PVS, 5735-XR3) is required for preparing IBM 3790 or 8100/DPCX programs, panels, DSCBs, 8100/DPCX Keys, Category Data Sets and Category Updates for processing by DSX. Minimum PVS releases are: Release 4.1 for DPCX Release 2.2 or Release 5.0 for DPCX Release 3.0.

This licensed program is distributed in object code.

VIRTUAL STORAGE REQUIREMENTS: Minimum virtual storage requirements are:

- MVS: 900K bytes private storage
  - OS/VS1 and VSE: 800K bytes partition size
- plus VSAM and VTAM requirements.

CONVERSION

- Conversion from DSX Version 1 Release 2.

The DSX system files may be used without change.

The DSX cluster master file needs to be updated with the user IDs and passwords for the DSX control operators and to reflect the acquisition of new distributed system and resource types, if required.

The transmission control file and the catalog work file must be redefined with IDCAMS, specifying variable-length instead of fixed-length records.

New VSAM Relative Sequential Data Sets (RSDS) files are needed for the interactive operator facility.

- Conversion from DSX Version 2 Release 1

All files are upward compatible.

Cluster master files must be updated to reflect the acquisition of new distributed system and resource types, if required.

COMPATIBILITY

Existing DSX Version 1 Release 2 input job streams will require minor modifications to run with DSX-V2.2, as described in the DSX-V2.2 Installation Guide (SH19-6233).

Existing DSX Version 2 Release 1 input job streams may be used with DSX-V2.2 without change.

DSX-V2.2 and previous DSX releases may coexist in the same host under the following restrictions:

- They should not deal with the same resources at the same distributed system.
- DSX files can be shared only if they do not run at the same time.

DOCUMENTATION

(available from Mechanicsburg)

General Information Manual (GH19-6229) ... Licensed Program Specifications (GH19-6230) ... User's Guide and Reference (SH19-6231) ... Reference Summary (SH19-6232) ... Installation Guide (SH19-6233) ... Control Operator's Guide (SH19-6234) ... Messages and Codes (SH19-6235) ... Logic Manual, Volume 1, Batch Programs (LY19-6215) ... Logic Manual, Volume 2, Online Program and Diagnostic Aids (LY19-6216).

MVS SYSTEM INTEGRITY

IBM will accept APARS where installation of DSX-V2.2 introduces an exposure to the system integrity of MVS. Refer to Programming Announcement dated October 21, 1981. This program is intended to run unauthorized under MVS and authorized under OS/VS1.

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**4700 FINANCE COMMUNICATION SYSTEM  
COBOL SUPPORT OS/VS (5668-987)**

**PURPOSE**

The 4700 Finance Communication System COBOL Support OS/VS, Program Number 5668-987, executes under OS/VS1 or OS/VS2 (MVS). Output of the compiler is object programs that will execute on the 4700 controllers.

The 4700 COBOL compilers should provide customers with a powerful, comprehensive, easy-to-use language for use in preparation and execution of finance application programs. The language offers a wide range of features, plus facilities for handling input/output, and debugging COBOL programs.

**HIGHLIGHTS**

- Language
  - Support of American National Standard (ANS) COBOL X3.23-1974 (except for the RERUN clause.)
- User Options
  - Source Listings.
  - Cross reference.
  - Storage map of variables.
  - Statement offset listing.
  - Object listing.
- Program Development and Productivity Aids
  - Symbolic debug.
  - Flow trace.
  - Extensive error checking.
  - Generalized CALL.

**I/O Capabilities:** 4700 Finance Communication System COBOL Support programs can work with SEQUENTIAL, RELATIVE and INDEXED files. The access methods supported are as follows:

- Sequential Organization
  - Sequential processing.
- Relative Organization
  - Sequential processing.
  - Random processing by relative record number.
- Indexed Organization

**Table Handling:** Define and process fixed length tables up to three dimensions.

**Segmentation:** The segmentation feature permits:

- Dividing the Procedure Division of a COBOL program into a series of segments.
- Specifying that some segments (fixed segments) must be resident in main storage while the program is running, and cannot be overlaid, while others (independent segments) are loaded into an overlay area when needed.
- Reducing main storage requirements during program execution.

**Interprogram Communication:** This facility allows transferring of control from one COBOL program to another. Control can also be transferred to an appropriate controller assembler language program. Programs can access the same or unique data.

**Data Communications:** Data Communications support for COBOL is via a CALL interface.

**Industry Standards:** Designed in accordance with the American National Standard (ANS) COBOL X3.23-1974 as understood and interpreted by IBM as of January, 1980, with the exception of the RERUN clause. ANS COBOL is identical to ISO 1989-COBOL approved February, 1978 by the International Organization for Standardization.

**Processing Modules:** The following processing modules are supported:

- 1 NUC 1, 2
- 1 TBL 1, 2
- 1 SEQ 1, 2 \*
- 1 REL 0, 2 \*
- 1 INX 0, 2
- 1 SEG 0, 2
- 1 LIB 0, 2
- 1 DEB 0, 2
- 1 IPC 0, 2

\* RERUN clause is checked for syntactic correctness only.

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level specified for the American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the Standard.

In addition to the above, the following NUCLEUS Level 2 features are also supported:

- COMPUTE statement.
- Qualification.
- Arithmetic operators.
- Complex conditions.
- CORRESPONDING phrase.
- ACCEPT and DISPLAY verbs.
- Multiple operand support for arithmetic statements.
- Nested IFs.
- PERFORM UNTIL.
- 01 through 49 level numbers.
- String/Unstring from level 2 of the ANS 1974 COBOL nucleus module.

**Language Extensions:**

- Support for Terminal I/O.
- Symbolic characters facility for defining and referencing hexadecimal values.
- Initial attribute to optionally cause program to be in its initial state each time it is called.
- Program access to the system global segments 13 and 15.

**I/O File Support:**

- EDAM file on diskette and disk via sequential, relative and indexed files I/O modules.
- CALL interface to handle unique 4700/3600 device characteristics.
- CALL interface to handle temporary files.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI Section, in the installation of IBM Licensed Programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation and day-to-day operation lies solely with the customer. Installation of IBM licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Compilation with the IBM 4700 COBOL-OS/VS Host Compiler and Library, Program Number 5668-987, requires at least 192K bytes of virtual storage as well as a configuration sufficient to run the selected operating system.

Object program execution can be on any 4700 system that has sufficient user storage and 4700 Controller Support including the optional zoned decimal support. The actual user storage requirements are a function of the COBOL source program.

**CONVERSION/COMPATIBILITY**

Some degree of upward compatibility does exist between the 4700 COBOL compiler and the OS/VS and DOS/VS compilers. However, differences do exist and some conversion will be necessary. The differences include I/O and communications support and language features introduced to support specific 4700 controller functions.

**DOCUMENTATION**

(available from Mechanicsburg)

*4700 Finance Communication System COBOL Support General Information Manual (GL23-0078) ... IBM 4700 Finance Communication System: System Summary (GC31-2016) ... IBM 4700 Finance Communication System: System Configurator (GC31-2017) ... IBM 4700 COBOL OS/VS Host Compiler and Library Licensed Program Specifications (GL23-0079) ... IBM 4700 Finance Communication System: COBOL Programmer's Guide (SL23-0082) ... IBM 4700 COBOL Language Reference Manual (SL23-0081) ... IBM 4700 COBOL Problem Diagnosis and Reference Manual (SL23-0083).*

RPOs ACCEPTED: No





## PROGRAM PRODUCTS

**5668-989 - 4700 FCS HOST SUPPORT  
4700 FINANCE COMMUNICATION SYSTEM  
HOST SUPPORT  
SSX/VSE, DOS/VSE, OS/VS1, MVS and MVS/XA****PURPOSE**

The 4700 Finance Communication System Host Support will provide support for the following new and improved functions, over existing 3600 support: CPGEN enhancements for 4700 support ... Increased application program maximum size ... 4700 host transmission facility (enhanced diskette update capability, unattended diskette create/update capability, host transmission facility log file available, integrated SDLC and BSC3 image transmission facility) ... Host Diskette Image Create Facility (HDIC) Support ... Application Program/Diskette Dump Enhancements.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation and day-to-day operation lies solely with the customer. Installation of IBM Licensed Programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT****SOFTWARE REQUIREMENTS**

**Support:** The IBM Finance Communications System 4700 Host Support will support the current levels of the following operating systems: SSX/VSE, DOS/VSE, OS/VS1, MVS and MVS/XA.

All 4700 Host Support functions are also supported by the latest levels of BTAM, BTAM-ES, ACF/VTAM, ACF/TCAM R2 and VTAME. **Note:** ACF/TCAM V2 support for the 4700 host transmission facility is provided via the Subsystem Interface.

**MIGRATION and COEXISTENCE**

User application programs designed to be processed by current 3600/3624 host support will continue to be processed by 4700 host support with no source code changes required. However, the user programs will require reassembly and CPGENs will require minimum source code changes to take advantage of the new 4700 functions. The users of 3600/3624 and 4700 libraries may coexist on the same host system.

**Action Required:** 4700 Host Support must be ordered to match the operating system to which it will be applied. The orderable program number for 4700 Host Support is 5668-989.

4700 Host Support supports the 4700 controllers and terminals.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Finance Communication System: System Summary (GC31-2016) ... IBM Finance Communication System: System Configurator (GC31-2017) ... IBM Finance Communication System: Installation and Planning Guide (GC31-2018) ... IBM 4700 Finance Communication System: Host Support Problem Diagnosis and Logic (SC31-0021) ... IBM 4700 Finance Communication System: Licensed Program Specifications (GC31-0019) ... IBM 4700 Finance Communication System: Host Support User's Guide (SC31-0020) ... IBM 4700 Finance Communication System: Principles of Operation (GC31-2029).*

For more information concerning these publications, refer to the *System Summary*.

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**COMPOSED DOCUMENT PRINTING FACILITY (CDPF)**

**5668-997**

**PURPOSE**

Composed Document Printing Facility (CDPF) program provides support for the 4250 Printer to produce high-quality master pages. CDPF processes the output from text programs such as Document Composition Facility Release 3 and graphics programs using Graphical Data Display Manager Release 3, and produces a format appropriate for printing on the 4250 Printer. CDPF operates under MVS/SP, MVS/XA, VM/SP CMS or DOS/VSE.

**HIGHLIGHTS**

- Provides an application program interface to the 4250 Printer.
- Provides high-quality printing at a resolution of 600 x 600 dots (pels) per square inch.
- Accepts hexadecimal-coded character output from text programs such as Document Composition Facility Release 3, and converts it into an appropriate image page layout using a font library designed for printing on the 4250 Printer.
- Accepts hexadecimal characters as input and converts them into an image pattern using a font library.
- Accepts non-coded dot patterns that have been generated by graphics programs using the Graphical Data Display Manager (GDDM) Release 3 licensed program or user-written routines.
- These text and graphics objects can be placed anywhere within a page by means of control information supplied to the CDPF program.
- Provides for merging of text and graphics data within a single page.
- CDPF can save its binary image output on disk, either as a complete document or as a single page segment for later processing.
- Page segments generated by CDPF or graphics programs can be merged with the text processed by text formatting programs.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation of the Composed Document Printing Facility licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Composed Document Printing Facility supports the IBM 4250 Printer on the following when supported by VSE, VM/SP or MVS/SP: All IBM S/370 mds 138 and above, the IBM 303X, 308X processors and the IBM 4321, 4331 and 4341 processors.

An IBM 4250 Printer must be attached to the system.

**Processor Storage:** Composed Document Printing Facility uses the paging facilities of the operating system. Therefore, it requires significantly less processor storage than the amount of virtual storage used. The system programmer responsible for the installation of the program determines the amount of real storage to be used.

**Virtual Storage:** The Composed Document Printing Facility program uses about 120K bytes of virtual storage. The amount of additional space for control blocks and various buffers is a function of the page width, the size of the largest font in the document, and the number of input files in use at any one time.

As an example, a job that files the output document and prints on 22cm (8-1/2 inch-wide) paper, using a maximum font size of 24 points and three parallel secondary input files, requires approximately 800K bytes of virtual storage.

**Direct Access Storage:** The Composed Document Printing Facility load module requires approximately 120K bytes of direct access storage. Composed Document Printing Facility does not require any temporary direct access storage.

The space required for input and output files depends on the content and complexity of the formatted document. An input file containing only text uses between 4K and 10K bytes per page. If this output is filed, it requires between 300K and 400K bytes per page on the DASD.

The font library requirements depend on the number of fonts, the number of characters in each font, and the size and shape of the character images.

The UNIVERS typeface family out of the IBM Typographic Fonts for the IBM 4250 Printer contains the greatest number of typefaces. It consists of eight typefaces and requires a maximum of 12MB of disk storage. The typical typeface family consists of four typefaces and requires approximately 6.2MB of disk storage.

Storage requirements for each typeface family are listed in the *IBM 4250 Printer Type Font Catalog* (G520-0004).

**SOFTWARE REQUIREMENTS**

Composed Document Printing Facility processes the composed output from text formatting programs such as Document Composition Facility and graphics programs such as Graphical Data Display Manager into a form suitable for printing on the IBM 4250 Printer.

The following are prerequisite programs for the Composed Document Printing Facility licensed program:

**MVS Operating System**

- MVS/370 (MVS/SP Version 1 Release 3 or later) and MVS/XA (MVS/SP Version 2 Release 1 or later).
- Either one of ACF/VTAM Release 3 or ACF/VTAM Version 2.
- Font library (see Note below).

**VM Operating System**

- VM/SP: Operation under VM/SP Releases 1 and 2 is possible by specifying the IBM 4250 as an unsupported device. Beginning with VM/SP Release 3, the IBM 4250 will be supported as a dedicated device.
- Font library (see Note below).

**VSE Operating System**

- VSE/Advanced Functions Release 3
- Either one of ACF/VTAM Release 3 or ACF/VTAM Version 2 or ACF/VTAME. In case of ACF/VTAME, the IBM 4250 Printer must be attached via an IBM 3274 mdl 1A, 31A or 41A.
- VSE/VSAM Release 2.
- VSE/VSAM Space Management for SAM feature.
- Font library (see Note below).

**Input to Composed Document Printing Facility:** The following program products or their equivalents furnish the input to Composed Document Printing Facility:

- Document Composition Facility (DCF) Release 3.
- Graphical Data Display Manager (GDDM) Release 3: GDDM provides input to CDPF under MVS and VM but not under VSE.
- One or more typeface families of the IBM Typographic Fonts for the IBM 4250 Printer.

**Note:** A font library is not required if the user runs only graphics applications (for example, via GDDM) without text applications.

**PERFORMANCE**

Composed Document Printing Facility has been designed to maximize the 4250 Printer speed. The actual time to print a document is dependent upon:

- Whether a document needs to be composed or not at printing time.
- Complexity of the system.
- Concurrent System activities (job mix, priorities assigned, etc.).
- Operating System used.
- Central Processor storage size.
- Central Processor speed.
- Type of devices used for paging.
- Type of 4250 Printer attachment (3274 Control Unit or Display/Printer Adapter on the 4321 or 4331 Processors).

**DOCUMENTATION**

(available from Mechanicsburg)

*Composed Document Printing Facility: General Information* (GC33-6133) ... *Composed Document Printing Facility: Installation and Operation* (SC33-6135) ... *Composed Document Printing Facility: Licensed Program Specifications* (GC33-6132) ... *Composed Document Printing Facility: Input Interface Description* (SC33-6134) ... *IBM 4250 Printer Component Description and Programming Information* (GA33-1554) ... *IBM 4250 Printer Operator's Guide* (GA33-1551) ... *IBM 4250 Printer Font Catalog* (G520-0004) ... *Document Composition Facility and Document Library Facility General Information* (GH20-9158) ... *Document Composition Facility: Language Reference Guide* (SH35-0070) ... *Document Composition Facility: SCRIPT/VS Text Programmer's Guide* (SH35-0069) ... *Document Library Facility Guide* (SH20-9165) ... *Graphical Data Display Manager (GDDM) General Information* (GC33-0100) ... *Graphical Data Display Manager Base: Programming Reference* (SC33-0101).

RPQs ACCEPTED: Yes

**PARAMETER TABLE GENERATION FACILITY  
For the IBM 3644 AUTOMATIC DATA UNIT  
GEN3644 (5668-998)****PURPOSE**

The Parameter Table Generation Facility (GEN3644) provides a means for customizing the IBM 3644 Automatic Data Unit. This customization consists of selecting 3644 functions and specifying the initial values of stored data items. GEN3644 translates the customization data (developed on worksheets) into the format necessary for transmission to the 3644. Translation is performed by editing the source data created by the user and converting it into a parameter table format for loading into the 3644. The resulting parameter table works with the 3644 microcode provided by IBM.

GEN 3644 also produces a listing of the source data entered by the user. Edits are performed both on a record basis and on an overall table basis. In most cases, editing continues despite errors, but the parameter table is not usable if any errors are found. Errors noted on the 3644 program listings are corrected by changing the original input and resubmitting the job.

The output of GEN3644 is a sequential file containing the Parameter Table Load (PTL) data as required for transfer to the 3644. The records on the sequential file are 256 bytes long.

**HIGHLIGHTS**

Worksheets are used to guide the customer through the procedure of defining the 3644 PTL. The worksheets are distributed as a set of reproduction masters (GA24-3203) for use in a customer's office copier or similar equipment.

Messages identify errors encountered during the processing of the source statements.

Symbolic naming of 3644 channels and common data items is supported.

A program listing is produced in a format similar to the source worksheets.

Parameter Table Load (PTL) is produced that is usable with the IBM supplied Control Storage Load (CSL) to customize the operation of the 3644.

The PTL is placed in a sequential data set. The Downstream Load Utility (DSL) program product can be used to transfer both the CSL and PTL to the 3644 at required times. The DSLU is also used to handle CSLs and PTLs for library inclusion.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for installing the GEN3644 licensed program.

The customer is responsible for creating and managing the libraries of source statements and parameter tables for the 3644 through the use of DSLU and system utilities. The source statements must be sorted into ascending sequence based on columns 1 to 9.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

GEN3644 is designed to operate on the IBM 4331 processor. The minimum configuration must include a 4331 processor with a supported disk, tape and console. A printer is recommended.

**SOFTWARE REQUIREMENTS**

GEN3644 operates under control of DOS/VSE. 100K bytes of virtual storage is required. DASD space is required in the system library and the source statement library. Additional space is required for the PTL data.

**COMPATIBILITY**

The input source statements (from the worksheets) and the output PTL records of the DPPX/GEN3644 licensed program and the input and output of the 3630 Plant Communication System - 3644 Translation Services system control programming are compatible with the input and output of GEN3644.

**AUTHORIZATION and AUDITABILITY**

This licensed program supports and is subject to the isolation, authorization, auditability and integrity rules of the DOS/VSE Operating System.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual* (GS31-0009)

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



**SYSTEM/3 UNIT INVENTORY TECHNIQUES  
5701-D11****PURPOSE**

This IBM System/3 licensed program provides the retailer with meaningful reports on merchandising activity and inventory status to effect a more efficient and profitable operation. The system keeps management informed on the performance of all classes of merchandise and is designed to report exceptional performance of individual styles to the buyers.

**HIGHLIGHTS**

- Early recognition of fast and slow moving merchandise based on user-supplied standards.
- Early recognition of low stock levels based on user-supplied standards.
- Status inquiry at buyer's request.
- Variety of merchandise management reports.
- Automatic maintenance of file at the style level.
- Optional color/size reporting.

**DESCRIPTION**

This licensed program provides a comprehensive inventory control system for retailers, consisting of nine program elements. Four of these maintain a master file of sales and inventory information; five provide a comprehensive set of reports to assist retailers in managing the merchandising of their inventory. The file maintenance routines insure the validity of the transactions, update the master file, and identify exceptional sales and onhand conditions. The report routines produce reports with merchandise information at various levels: Color/size, style/store, vendor, price line, and age.

This system has been developed to assist retailers in installing a unit control system. It is intended as an entry level system for either new or current IBM users. The minimum configuration can handle up to nine store locations. With additional core storage, the system can be modified to handle more than nine stores. The initial efforts of this system should be to establish and maintain an accurate master file and provide basic operating reports. Installation of the system will give retailers mechanized record keeping and report preparation and will provide historical information. The experience and knowledge gained from installing this system will provide a base for expanding the retailers inventory application into more sophisticated areas.

On a daily basis, transaction cards are analyzed for correct format and valid field contents. The transactions may pertain to customer sales, order placements or receipts, customer or vendor returns, transfers between stores, reconciliation of inventory count, and so on.

On a weekly basis the master file is updated and styles are examined for fast or slow sales performance and low inventory levels. Style and color/size reports can be generated for buyer action. The reports can vary in detail from only the styles which are exceptional (fast, slow or low level) to styles which have been specifically requested to a complete stock report.

On a monthly, quarterly, or as required basis, the age, price line and/or vendor reports can be printed for evaluation and analysis.

**CUSTOMER RESPONSIBILITIES**

The users of this licensed program will need operating personnel who are knowledgeable in System/3 Card RPG II, Card Sort/Collate, and card system operating procedures. The buyers and/or merchandise managers must have a thorough understanding of the types and uses of transaction codes, the report contents, and the available reporting controls.

Prior to installation the user must be familiar with the functions and operation of the routines in this system. A disciplined procedure for data capture must be established and maintained.

Each user of this system must collect the required data and create the master card file. Due to the open-ended design of the system, the extent of the data which is considered to be required may be determined by the user.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

An IBM System/3 CPU (5410 model A3 - 12K) with the MFCU and printer attachments (#4100 or #4101 and #3970, #3971, or #3972), an IBM 5424 Multi-Function Card Unit (any model), and an IBM 5203 Printer (any model).

**SOFTWARE REQUIREMENTS**

This licensed program is written in Card RPG II. The file maintenance routine (update) has an IBM System/3 Basic Assembler subroutine incorporated into it.

IBM System/3 Card RPG II (5701-RG1) is required for compiling, modifying and maintaining the programs. IBM System/3 Basic Assembler (5702-AS1) and the use of an IBM Disk System/3 are required for the modification of the Basic Assembler subroutine in the update routine. The card sort/collate program, part of the IBM System/3 Card System Utilities (5701-UT1), can be used for sequencing the transaction file and merging the style/store master file with the color/size master file.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Application Description Manual* (GH20-0931)

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 APPAREL BUSINESS CONTROL  
(ABC) SYSTEM  
5701-D12****PURPOSE**

The IBM System/3 Apparel Business Control (ABC) System provides the apparel industry with a low cost, easily installed order processing system designed to complement the capabilities of the IBM System/3.

**HIGHLIGHTS**

- Applications are self-sustaining; additional programs are not required.
- Programs are modular; all applications need not be installed.
- Programs can be tailored based on the application questionnaire; user programming is minimized.
- Tailored system is generated on the user's System/3; new versions can be generated if desired.
- All applications are order-oriented; basic system provides an excellent source of data for additional applications.

**DESCRIPTION**

The system provides a basic set of order-related functions. These functions are self-supporting; the system can be installed and operated without additional programming. The following functions are included:

- **Order Edit:** Consists of two programs, order edit and pricing. The order edit program checks new orders for valid codes, crossfoots the order detail cards, and balances the totals from the order detail cards against the totals in the order miscellaneous data cards. The pricing program validates the style and color numbers, and prices the order detail cards.
- **Order Writing:** The order writing program prepares printed orders for use as internal documents and as order acknowledgments. The order register program prints a register of the orders.
- **Bookings Reporting:** Prints a combined bookings and over/under report by style, color, dimension and size. The bookings report includes a summary of sales received prior to the last report, a detailed listing of key orders received since the last report, a summary of the remaining orders received since the last report, a summary of all outstanding or completed cuts, and an over under summary.
- **Fabric Requirements Reporting:** Consists of two programs, fabric requirements explosion and fabric requirements. The output shows seasonal fabric requirements based on actual or projected sales.
- **Finished Goods Requirements Reporting:** Produces a report showing finished goods requirements by time period, based on the start shipping and complete shipping dates specified on the orders.
- **Stock Allocation:** Matches outstanding orders against completed cuts. The results of the allocation are printed on an allocation report, and allocated order details are stacker-selected for review and shipment.
- **Invoicing:** Consists of three programs, invoice edit, invoicing and invoice register. The invoice edit program crossfoots the order detail cards and balances the order details against the invoice detail card. The invoicing program prepares extended and totaled invoices. The invoice register program prints an invoice register and punches invoice summary cards.

**CUSTOMER RESPONSIBILITIES**

Customer must accurately complete the application questionnaire, train operating personnel, generate the tailored system, organize support activities, test the tailored system, prepare input, operate the system, and analyze output.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum configuration for tailoring, compiling, and operating the system consists of an IBM System/3 5410 Processing Unit, mdl A2 (card; 8192 bytes), comprised of an IBM 5203 Printer, mdl 1 (100 lines-per-minute, 96 print positions, with attachment), an IBM 5424 and Multi-Function Card Unit, mdl A1 (read 250 cpm; punch 60 cpm, interpret 60 cpm, with attachment). In addition, the system must include an IBM 5496 Data Recorder, mdl 1, or a 5475 Data Entry Keyboard.

Availability of 120 or 132 print positions will allow greater flexibility in formatting reports. The programs use tables in storage during processing. The only table that can significantly affect storage requirements is the color code table. Under standard options the system can accommodate 150 color codes and their descriptive entries. Use of more codes may require additional storage.

**SOFTWARE REQUIREMENTS**

All ABC programs are written in IBM System/3 Card RPG II (5701-RG1). Online sorting or collating requires the use of System/3 Card Utilities (5701-UT1).

**DOCUMENTATION**

(available from Mechanicsburg)

*Application Description Manual* (GH20-0822).

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SYSTEM/3 OPTIMUM BLENDING  
5701-D51****PURPOSE**

IBM System/3 Optimum Blending is a small linear programming system specifically designed for blending applications in the agriculture and food processing industries.

**HIGHLIGHTS**

- Easy to install, no customer programming is required.
- Optimal solutions to most blending problems are obtained in 3 to 6 minutes; this time includes card reading and report printing.
- Cost justified; in many cases the cost of both the program and System/3 can be justified by direct savings from formula cost reductions alone.
- The linear programming algorithm used is the standard simplex method augmented by lower and fixed level bounding.

**DESCRIPTION**

The licensed program consists of a blend function that does linear programming and a batch report function that prints mixing instructions for various quantities of the optimal blend produced by the blend function. The blend function produces an optimal combination of raw material ingredients based on user-supplied product specifications and ingredient analysis information.

This licensed program has wide application among commercial feed manufacturers, cattle feedlots, fertilizer manufacturers, and sausage blenders. The programs are application oriented and do not require that the user have previous training in mathematics or data processing.

Optimum Blending is used to find a least cost combination of raw materials that will satisfy a set of user-supplied product specifications. The licensed program also creates printed mixing instructions for user-selected quantities of the least-cost combination of raw materials.

**CUSTOMER RESPONSIBILITIES**

Preparation of the punched card product specifications and ingredient analysis information and compilation of the batch report program are the only prerequisites to implement the licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

For program execution and batch report program compilation, the minimum configuration required is one IBM 5410 Processing Unit, mdl A2 (8,192 bytes), an IBM 5203 Printer mdl 1 (100 lpm, 96 print positions), and an IBM 5424 MFCU mdl A1 (read 250 cpm, punch 60 cpm, interpret 60 cpm).

For blend program assembly, the minimum configuration required is one IBM 5410 Processing Unit mdl A13 (12,288 bytes), an IBM 5203 Printer mdl 1 (100 lpm, 96 print positions) with Universal Character Set feature and a PN (60-character set) interchangeable chain cartridge, an IBM 5424 MFCU mdl A1 (read 250 cpm, punch 60 cpm, interpret 60 cpm), and an IBM 5444 Disk Storage Drive mdl 1 (2.45 million bytes).

Because of computer memory limitations, the size of the linear programming problems is limited to a certain number of ingredients, nutrients, and problem restrictions (constraints). Since there are many acceptable combinations of ingredients, nutrients, and constraints for any given memory capacity, a formula is provided below to determine the memory requirements for any given problem:

$$MR = 4320 + 30(N) + 40(I) + 3(I+R+1) + 5(I+1)(R+1)$$

where:

- R = computer memory requirement in bytes
- N = number of nutrients or raw material attributes
- I = number of ingredients or raw materials
- R =  $R_1 + R_2 + R_3 + R_4 + R_5$
- R1 = number of nutrients with fixed limit (lower limit = upper limit)
- R2 = number of nutrients with lower limit other than zero
- R3 = number of nutrients with upper limit other than infinity
- R4 = number of ingredients with upper limit other than infinity
- R5 = number of nutrients with neither an upper nor lower limit specified

**SOFTWARE REQUIREMENTS**

System Control Program - the licensed program is dependent upon the system communication area established by the execution of the IBM System Initialization Program (5701-SC1), IBM System/3 Basic Assembler language (5702-AS1) and IBM System/3 Card RPG II language (5701-RG1).

**DOCUMENTATION**

(available from Mechanicsburg)

*Application Description Manual (GH20-0933) ... Least-cost Feed Blending with a Least-cost Computer (G520-2447).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 LAW ENFORCEMENT SYSTEM  
5701-G21**

**PURPOSE**

The IBM System/3 Law Enforcement System provides local government police departments with management, statistical, and investigative information. A complete set of Card RPG II and IBM System/3 Card Utility routines has been incorporated within six subsystems, each of which is significant to the law enforcement environment. The six subsystems are:

- Offense Reporting
- Arrest Reporting
- Accident Reporting
- Radio Dispatch Analysis
- Field Interview Reporting
- Police Personnel Reporting

Together, these subsystems can provide the local government police department with an extensive data processing capability for law enforcement purposes.

**DESCRIPTION**

Reports produced by the System/3 Law Enforcement System offer the local police administrator an opportunity to retrieve statistics on crime and traffic rapidly. Statistics may be accumulated on crime, traffic, radio dispatch, field interview, and personnel data. Data analysis, so vital in allocating police manpower, may be performed from recurring crime, arrest, traffic, and dispatch data. Investigative information and personnel information, covering days worked and leave of absence reporting, are readily available.

**HIGHLIGHTS**

The modular design of the System/3 Law Enforcement System encourages a step-by-step phased implementation of the six subsystems. Customer options have been incorporated to satisfy individual report generation and input processing requirements. Open fields are provided for unique data elements, if necessary. Special user-written reports may also be processed from the comprehensive data base provided by the System/3 Law Enforcement System.

Reports generated by the system provide a reservoir of information for the police department. Some of these reports are:

- Uniform Crime Reports (FBI) Offenses Known to Police - These reports provide the required information for the preparation of Return A - Monthly Return of Offenses Known to the Police, and Return B - Annual Return of Offenses Known to the Police. (Return A and Return B reports can assist the local police administrator in evaluating local conditions in relation to trends and activity in other local jurisdictions. They also can be used in determining the effectiveness of the police department in the clearing of crimes, recovery of property, and in follow-up investigations.)
- Uniform Crime Report (FBI) Return of Persons Charged - Uniform Crime Reports (arrests) provide the required information to prepare the Annual Return of Persons Charged, which is forwarded by local jurisdictions to the FBI. Persons Charged reports can also be produced on a monthly basis for use by the local police department.
- Uniform Crime Reports Age, Sex, and Race of Persons Arrested (18 Years and Over - Under 18 Years) - The Uniform Crime Reports - Age, Sex, and Race of Persons Arrested - provide the required FBI information. A local jurisdiction can also produce this report on a monthly basis.
- Accident Reports - Reports are generated in accordance with National Safety Council standards. Traffic accident statistics are provided for the police administrator to keep up with current trends and changing situations in specific areas. In addition to the National Safety Council Reports, a report on violations contributing to accidents by location is also produced.
- Dispatch Analysis - Dispatch Analysis provides information pertaining to events by geographic and time distribution. (This information is useful in allocating the police resources.)
- Field Interview Reports - This reporting function relates information on persons who have had field contact with police officers at unusual hours and in locations where they appeared to have no legitimate interest. This system is of value to police investigators in correlating field interviews against unsolved crimes.
- Police Personnel - The Police Personnel System provides a series of essential reports to modern police administration. Leave of Absence Reports and Daily Man Days Worked Reports are printed.

The primary potential customer for the System/3 Law Enforcement System is the local jurisdiction with a population of 25,000 to 250,000 inhabitants.

Each local government police department may choose to implement one or more of the six major subsystems in any desired order. Some

jurisdictions will implement all six subsystems. Others may only implement one or two from which the major local benefits are derived.

**CUSTOMER RESPONSIBILITIES**

To implement the System/3 Law Enforcement System, the customer must (1) capture the required source document information, (2) code the prescribed data from the source documents for the offense, arrest, and traffic programs, and (3) establish the required master files.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

An IBM 5410 Processing Unit mdl A2 (8K) with feature #4100 MFCU attachment, feature #3970 Printer Attachment, and feature #9496 Print Position Additions; an IBM 5424 Multi-Function Card Unit mdl A1; and an IBM 5203 Printer mdl 1 with feature #5560 (132 print positions).

**SOFTWARE REQUIREMENTS**

The IBM System/3 Law Enforcement System is coded in Card RPG II (5701-RG1) with feature #9011. Card System Utilities (5701-UT1) with feature #9011 are also utilized.

**TERMS and CONDITIONS:** See PP Index



## SYSTEM/3 APPROPRIATION ACCOUNTING SYSTEM 5701-G22

### PURPOSE

This IBM System/3 licensed program is an appropriation, revenue, and general ledger accounting system for public institutions.

### HIGHLIGHTS

The comprehensive set of user options that is featured in the Appropriation Accounting System offers many advantages in effectively matching user requirements, including:

- Appropriation/Revenue/General Ledger processing
- Posting frequencies
- Reporting frequencies
- Variable account structures
- User-specified report sequences, controls, and content
- Prebatch/postbatch balancing
- Transaction audit trails
- Multiple account distributions
- Transaction code/General Ledger account relationships
- Allotment frequencies
- Open-ended architecture

### DESCRIPTION

Appropriation, revenue, and general ledger accounting are vital administrative instruments that mirror public policy and the service commitments of cities, counties, states, school districts, hospitals, colleges, universities, and other public institutions. They help these institutions to conserve public property, and to plan, direct, and control revenues and dollar costs.

The Appropriation Accounting System records, accumulates, analyzes, and presents financial data by fund, source, organizational unit, project, function, activity, line item, object code, and/or any other user-determined classifications. This permits revenue and expenditure analyses to be accomplished by project and/or other categories as well as by traditional fund, departmental organization, and object code account structures. It enables public institutions to be more responsive to a citizen-oriented environment.

Computer processing facilitates rapid retrieval and effective presentation of vital data at frequent intervals and on a demand basis. In the appropriation accounting application, the Appropriation Accounting System automatically:

- Balances, edits, and posts appropriation, revenue, general ledger, allotment, encumbrance, and expenditure transactions.
- Controls project, organizational, and other commitments through constant checks to determine that encumbrances and expenditures do not exceed authorized allotment and appropriation limits.
- Maintains appropriation, revenue, general ledger, transaction, and purchase order files.
- Prepares control and audit registers, trial balances, status reports, and ledger cards.
- Constructs historical files of appropriation, revenue, and general ledger data.

Appropriation Accounting has three independent subsystems - the Appropriation Subsystem, the Revenue Subsystem, and the General Ledger Subsystem. Each user decides whether to process one, two, or all three subsystems. The user may elect to install one subsystem first and phase the other two in later.

Account files, the open purchase order file, and the transaction file may be posted or updated as frequently as an individual installation desires. One installation may choose to post the appropriation account file weekly, another may post biweekly, and a third may post daily. Appropriation accounts may be posted more frequently than revenue or general ledger accounts.

Reports may be printed on fixed schedules and/or upon demand. Other printing options include the decision to print or not to print updated account registers as individual appropriation, revenue, or general ledger accounts are being posted.

Any chart of accounts structure up to twenty characters in length may be accommodated. A given user's appropriation, revenue, and general ledger account structure may also vary. For example, the appropriation accounts could consist of twelve characters that have been subdivided into five categories, while at the same time, the revenue accounts contain eight characters subdivided into four categories, and the general ledger accounts have six characters with three categories.

One or more reports of a given type may be printed. Users specify the level of detail that is wanted to appear, up to five levels of summary

totals, and the page breaks. A separate report program is automatically generated for each variation the user specifies.

To provide positive controls and audit procedures:

- All transactions are edited and prebalanced to batch totals before they are posted to appropriation, revenue, general ledger, and other files.
- Asterisks are printed below data fields in error, and specific error messages are printed to the right of the transaction data on the Prebalance Transaction Register.
- Prebalanced batches are edited and balanced again as they are posted.

Multiple accounts may be debited and/or credited from a single source document. Two-digit suffixes are sequentially assigned and appended to the (preprinted) source document number to facilitate this option. This permits up to 99 accounts to be posted from a single source document.

The System/3 Appropriation Accounting System permits every institution to prescribe the specific general ledger account numbers to be debited and credited for each user-determined transaction code. Transaction code/general ledger account number assignments are established before the system is installed. They are recorded in a prepunched master deck which may be changed from time-to-time at the individual institution's discretion. Subsidiary account numbers are punched into the revenue and appropriation transaction cards themselves. Account numbers are also punched in the journal entry transaction cards that effect general ledger accounts.

Provisions have been made in the transaction cards, files, reports, and procedures for either quarterly or monthly allotments, or no allotments at all. This allows the system to be responsive to individual preferences and changing requirements.

All transactions, files, reports, and programs have been designed with an open-ended architecture. The defined structure will interface with all accounting applications including billing, accounts receivable, payroll and personnel, purchasing, accounts payable, inventory, and other applications. Transaction codes, files, and reports may be added or deleted without disturbing the effected programs. Historical data may be automatically accumulated for budget preparation and other purposes. Vendor Analysis Reports may be obtained by coding additional programs to process purchase order transactions.

The Appropriation Accounting System contains three independent subsystems—the Appropriation Subsystem, the Revenue Subsystem, and the General Ledger Subsystem. Each user may choose to process one, two, or all three subsystems. The user may elect to install one subsystem first and phase the other two in later. Files may be posted daily, biweekly, weekly, etc., to coincide with user requirements. Reports are printed on demand.

### CUSTOMER RESPONSIBILITIES

Installation plans for the Appropriation Accounting System should include education, program evaluation, forms procurement, conversion, parallel operation, external procedure development, and final cutover.

Knowledgeable financial and data processing middle management personnel should study, evaluate, and plan for the installation. This middle management group should evaluate the programs in detail and prepare a preliminary implementation plan at least five months prior to the final program cutover date. The preliminary implementation plan should identify any program modifications, the options to be utilized, each task to be performed, the person or persons responsible for each task, and the schedules to be met.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The minimum system configuration required is an IBM 5410 Processing Unit mdl A2 (8K) with (#4100) MFCU Attachment, (#3970) Printer Attachment, and (#9496) Print Position Additions; an IBM 5424 Multi-function Card Unit mdl A1; and an IBM 5203 Printer mdl 1 with (#5560) 132 Printer Positions.

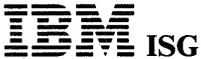
#### SOFTWARE REQUIREMENTS

The program is coded in Card RPG II (5701-RG1) with feature #9011. Card System Utilities (5701-UT1) with feature #9011 are also utilized.

#### DOCUMENTATION (available from Mechanicsburg)

*General Information Manual* (GH20-1049).

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 CITATION PROCESSING SYSTEM  
5701-G23****PURPOSE**

The IBM System/3 Citation Processing System is designed to handle the moving and parking citation accounting and control requirements of local governments. Reports and follow-up processing pertinent to this application are provided. This extremely flexible system recognizes that individual customer requirements vary from jurisdiction to jurisdiction.

A complete set of Card RPG II and System/3 Card Utility subprograms have been incorporated within four major subsystems, each of which pertains to a particular segment of this application area. The four subsystems are:

- Daily Parking and Follow-Up
- Daily Moving and Follow-Up
- Disposition Processing
- Monthly Statistical Reporting

Together, these subsystems can provide the local government with an extensive data processing capability for handling moving and parking citations.

The System/3 Citation Processing System is a low-cost, automated way to handle parking and moving citations for local governments. The system provides editing features and efficient follow-up procedures on delinquent parking and moving citations. Its violation and revenue accounting features allow for control of citations and efficient collection of fines and forfeitures.

As a traffic enforcement index and a significant source of revenue, citation processing has long been important to local governments. The system can expedite the handling of traffic citations and the collection of revenue. It can reduce manual operations and improve control.

The modular design of the system encourages step-by-step implementation. Options have been incorporated to satisfy individual processing requirements. Open fields in the data records are provided for individual users' unique data elements, if necessary.

**HIGHLIGHTS**

The primary market for this program is local jurisdictions with a population of 25,000 to 250,000 inhabitants. Provisions have been incorporated to allow the users to enter their unique statute descriptions and fines into the system through tables.

Delinquent notices and warrants are produced at user-defined time intervals (without program modification).

The system has been designed to fit a variety of situations through optional processing steps and program routines. Generally, any given operational system will be made up of something less than the total package. The user has the capability to handle moving and/or parking violations, partial payments, court dockets, juvenile violators, etc. In addition, the monthly statistical reports can be run at other than monthly intervals without program modification.

A user would be well advised to take a phased approach in implementing this program product. The recommended approach is to install:

- Parking violation processing without partial payment and court docket program functions
- Install partial payment processing, if needed
- Install parking court docket processing when the volume of parking cases going to court warrants it
- Install moving violation processing, if needed. Customers with less than 35 to 50 moving violation transactions per day should not be encouraged to use the moving violation processing functions.

The System/3 Citation Processing System offer customers:

- Editing and balancing of citations and revenue
- Precise audit trails
- Flexible reporting frequencies
- Traffic enforcement information by specific areas
- Automatic generation of court dockets
- Flexible user-defined tables relating statutes and fines
- Open-ended capability for implementing user-designed preprinted courtesy notices, partial payment notices, and warrants.
- Partial payment processing
- Selection of juvenile violators for separate processing
- Name and address lookup capability for parking violators
- Production of warrant indices
- Officer ticket book accounting
- State notification of guilty moving violators

**CUSTOMER RESPONSIBILITIES**

To implement, the customer must:

- Determine which programs will be used
- Create master files

- Create statute and fine tables
- Create city code table
- Design preprinted forms
- Determine codes for statutes and voided tickets
- Design audit control logs and journals
- Standardize recording and punching of violation data

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration is an IBM 5410 Processing Unit mdl A2 (8K) with feature #4100 MFCU attachment, feature #3970 Printer Attachment, and feature #9495 Print Position Attachment; an IBM 5424 Multi-Function Card Unit mdl A1, and an IBM 5203 Printer mdl 1 with feature #5558 (120 print positions).

**SOFTWARE REQUIREMENTS**

The program is coded in Card RPG II (5701-RG1) with feature #9011. IBM System/3 Card System Utilities (5701-UT1) with feature #9011 are also utilized.

**DOCUMENTATION**

(available from Mechanicsburg)

*Promotional Flyer* (G520-2507).

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 UTILITY BILLING SYSTEM  
5701-G24****PURPOSE**

The IBM System/3 Utility Billing System is designed to handle the utility billing requirements of local governments and small utility companies. All reports and billing requirements that are associated with this application are processed on the basis of either flat rates and/or meter readings. This extremely flexible system recognizes that individual user requirements vary from jurisdiction to jurisdiction.

**DESCRIPTION**

The System/3 Utility Billing System is a low-cost, automated way to handle utility billing and receivables. A complete set of Card RPG II and System/3 Card Utility routines compute and/or print: Meter Reading Books, Consumption Proofs, Metered Service Charges, Utility Bills, Cash Proofs, Revenue Summaries, Meter Status Reports, Cutoff Listings, Cash Postings and Cycle Balances, Past Due Notices, New Account Listings, and Rate/Revenue Statistics.

Each customer utilizes only that portion of the program code that satisfies individual jurisdictional needs.

Utility services are a significant source of revenue for many municipalities and other local governmental units.

The System/3 Utility Billing System can expedite the receipt of utility revenues. It can reduce manual operations and improve customer service.

The primary potential customer for the System/3 Utility Billing System is the utility that supplies water, electric, and/or gas services to populations of 25,000 to 250,000 inhabitants. Provisions have been incorporated to bill for one or two flat rate services per account; one or two metered services per account; one electric demand metered service account; refuse services.

Although the System/3 Utility Billing System is intended to perform billing at monthly intervals, with fairly minor program modifications it can also accommodate intervals of other lengths. Cycle billing can be accomplished without program modification.

**HIGHLIGHTS**

A modular design permits selected options to be processed without necessitating program modifications. Routines are provided to:

- Print Meter Books.
- Adjust records for replaced meters during the billing period.
- Validate consumption and print Consumption Proof Lists.
- Perform table lookups to compute charges.
- Compute gross and net billings (with automatic late charge or discount disallowed).
- Print billing registers.
- Itemize detailed line items on the bills.
- Prepare optional return stubs or prepunched cash return cards to be sent with the bills.
- Summarize revenue entries for the general ledger system.
- Accumulate rate/revenue statistics.
- Produce daily cash proofs.
- Balance receivables against cycle totals.
- Print past due notices and cutoff lists.
- Record deposit receipts and refunds.
- Maintain inactive accounts.
- Print meter status reports on out-of-service meters.
- Sort and print an alphabetic index of accounts.

Customers may also modify or add routines.

**CUSTOMER RESPONSIBILITIES**

Customers must determine the type of billing service and the associated file requirements (for example, the metered service billing file is not required for flat rate billing). Rate tables must be created for each service to be billed. Codes and related alphabetic descriptions must be established for billing rates, meter locations, meter reading instructions, and cities. Code assignments include:

- Two digit code for each service to be billed.
- One character code for each meter location (optional).
- One character code for meter reading instructions (optional).
- One digit code for each city used in a service address.
- Unique number of up to 7 digits for each account.

The required master files must also be created.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration required is an IBM 5410 Processing Unit mdl A2 (8K) with feature #4100 MFCU attachment and feature #3970 Printer Attachment; an IBM 5424 Multi-Function Card Unit mdl A1; and an IBM 5203 Printer mdl 1.

**SOFTWARE REQUIREMENTS**

The IBM System/3 Utility Billing System is coded in Card RPG II (5701-RG1) with feature #9011. Card System Utilities (5701-UT1) with feature #9011 are also utilized.

**DOCUMENTATION**

(available from Mechanicsburg)

*Promotional Flyer* (G520-2419).

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 ORDER POINT TECHNIQUE for  
INVENTORY MANAGEMENT  
5701-M41****PURPOSE**

This IBM System/3 licensed program consists of a group of programs divided into inventory analysis, stock status transaction processing, and order action. It is especially designed for implementing order point inventory in manufacturing organizations.

Many aspects of these programs are discussed in the *Production Information and Control System Manual* (GE20-0280). This includes the use of the same symbolic labels for fields on the item master card for System/3 that are defined for the item master file in the appendix of the *Production Information and Control System Manual*.

The System/3 Order Point Technique for Inventory Management programs use a card item master file for recording status, averages, and other information required for order point control.

The inventory analysis program is designed to be used periodically to assist in selection of control parameters. The stock status program is normally run on a monthly basis.

Transaction processing and order action programs should be run frequently (for example, daily) to keep the inventory status current and provide order recommendations that are timely.

**DESCRIPTION**

**Inventory Analysis:** Programs that provide for detailed analysis of inventory items on the basis of usage and cost. The output is useful for determining how items are to be controlled.

**Stock Status:** In addition to preparing the stock status report, the program calculates average demand using exponential smoothing, computes the onhand value for each item and for the total inventory, and prepares a new item master card.

**Transaction Processing:** The program processes the day-to-day transactions that affect the inventory status of each item. Onhand, on-order, and exception requirements, as well as current sales and current usage, are updated.

**Order Action:** The current inventory status is checked by this program to determine if order action is recommended. Order point is calculated on the basis of lead time and safety stock stated in weeks, in conjunction with the current average demand calculated in the stock status program.

**HIGHLIGHTS**

- Easily understood techniques for inventory control.
- Analysis program for use in selecting order point and order quantity parameters.
- Calculation of new average demand each time period.
- Exponential smoothing that records average, trend, and forecast separately for ease-of-reference and use.
- Computation of safety stock on the basis of weeks of supply.
- Computation of Mean Absolute Deviation (MAD) for assistance in manually evaluating and setting safety stock level.
- The ability to have order quantity specified by the user automatically or calculated on the basis of weeks of supply.
- Updating of inventory on the basis of transactions.
- Order action notices prepared on the basis of the most recent status information.
- Follow-up notices for items that have an onhand balance below order point.
- Preparation of a periodic stock status report with inventory evaluation.

**CUSTOMER RESPONSIBILITIES**

The user must construct a master inventory file. An item master card must be prepared for each item to be controlled using these programs.

The customer must also determine how transaction processing is accomplished for the overall operation. That is, what source must be used to prepare the transaction cards that update inventory status.

The user must have an understanding of the inventory control concepts embodied in these programs, so the parameters for order quantity and order point and the alpha factor used in exponential smoothing can be selected.

The customer must write routines to perform tasks not covered by these programs. It is also the customer's responsibility to compile the program using the source statements provided.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

An IBM 5410 Processing Unit mdl A2 with appropriate attachments, IBM 5424 Multi-Function Card Unit mdl A1, and IBM 5203 Printer mdl 1, with attachment #5558 (120 print positions).

**SOFTWARE REQUIREMENTS**

The programs are written using Card RPG II, (5701-RG1). Source statements are provided with the licensed program, therefore, Card RPG II is required for compilation. The sort programs utilize Card System Utilities, (5701-UT1). The sort can also be performed offline.

**DOCUMENTATION**

(available from Mechanicsburg)

*Application Description Manual* (GH20-0741) ... *Production Information and Control System* (GE20-0280) ... *Application Description Manual - System/360 Inventory Control* (GH20-0471) ... *Wholesale IMPACT Inventory Management Program and Control Techniques* (GE20-8105).

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SYSTEM/3 CARD BILL-OF-MATERIAL and  
REQUIREMENTS PLANNING  
5701-M42****PURPOSE**

This IBM System/3 licensed program is designed to help manufacturing customers install their requirements planning applications.

**DESCRIPTION**

It consists of the following programs and Sort/Merge functions that use Card System Utilities (5701-UT1) with feature #9011.

**Activity Audit and Bill-of-Material** - These programs assist the customer in creating and maintaining bills-of-material. The activity audit program edits changes, deletions, and additions to the bill-of-material file and provides an audit listing and input to the next program. The bill-of-material program accepts the activity input and the bills-of-material and provides an updated bill-of-material card file and a listing of the bills-of-material.

**Increase Level and Replace Level** - These programs are used to develop the low-level code for all items. The programs are used initially when the product structure bill-of-material file is created and periodically, as required, to insure accuracy of the low-level code. The where-used file is a byproduct of low-level code generation.

**Where-Used** - This program prepares the where-used report. A separate where-used file may be maintained, or the bill-of-material file can be sorted (or reproduced and sorted) to provide input to the program.

**Requirements Generation** - This program accepts requirements for assemblies and bills-of-material and punches component gross requirements. The program is designed so it can be used with a product structure (single level) or product summary (quick deck) bill-of-material file.

**Requirements Planning** - This program combines inventory information with gross requirements to determine what has to be ordered. Orders can be lot sized (EOQ) or planned for net requirements by due date (discrete order planning). Provision is made to automatically include a forecast of spare (service) part usage that is netted with other requirements.

**HIGHLIGHTS**

Programs are used with Sort/Merge utilities to assist the customer in installing the requirements planning application.

Product structure (single level) or product summary (quick deck) bills-of-material.

Level-by-level time series planning or summarized requirements planning.

Net requirements for piece parts can be lot-sized (EOQ) in both techniques.

Many aspects of these programs are discussed in the *Production Information and Control System* (GE20-0280), including the use of the same symbolic labels for fields for the System/3 cards, which are defined for the disk-oriented files in the appendix of this manual.

System/3 Order Point Technique for Inventory Management (5701-M41) can be used to develop the forecast for spare (service) part usage and to update the item master card.

The System/3 Card Bill-of-Material and Requirements Planning programs are designed to create and maintain the bill-of-material files and for order planning.

The activity audit and bill-of-material programs are used, as required, to keep the bills-of-material up-to-date.

The low-level code programs are used initially when the file is created and in the maintenance of low-level codes as a result of changes to the bills-of-material.

The where-used program is run if the customer requires a new listing.

Requirements generation and requirements planning are used periodically (for example, monthly) to develop the overall plan for production.

Low-level code generation and where-used reports.

Automatic consideration of a forecast for spare (service) part usage.

Requirements for raw material developed on the basis of planning piece part orders.

**CUSTOMER RESPONSIBILITIES**

The customer must provide information to create and maintain bills-of-material. The bills-of-material must be accurate and up-to-date for requirements planning.

The customer must provide inventory information on the item master card for all items that are being planned.

The licensed program is designed to assist the user in the development of the overall production plan. Therefore, the user must develop

programs and procedures for the execution of the plan. This includes the release of planned orders, allocation of component inventory for assembly orders, recording issues and receipts for accurate up-to-date status information for subsequent planning runs.

Users must have an understanding of the concepts embodied in these programs to decide which items are to be planned, the type of planning to be used, the length of the planning horizon, and the size of time periods to be used, etc.

The customer must provide the forecast of spare (service) part usage if this option is selected.

The customer must write routines to perform tasks not covered by these programs.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

An IBM 5410 Processing Unit mdl A2 with correct attachments, IBM 5424 Multi-Function Card Unit mdl A1, and IBM 5203 Printer mdl 1 for product structure (single level) bills-of-material, attachment #5558 (120 positions) is required for product summary (quick deck) bills-of-material.

**SOFTWARE REQUIREMENTS**

The licensed program is written using Card RPG II (5701-RG1) with feature #9011. Source statements are provided with the licensed program; therefore, the customer requires RPG II.

The Sort/Merge programs utilize the Card System Utilities (5701-UT1).

**DOCUMENTATION**  
(available from Mechanicsburg)

*Application Description Manual* (GH20-0770) ... *Production Information and Control System* (GE20-0280) ... *System/3 Order Point Technique for Inventory Management* (GH20-0741).

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 CARD RPG II MODEL 10  
5701-RG1**

**PURPOSE**

The IBM System/3 Model 10 program generator system is RPG II, a programming language and a processor program that is used to produce machine language object programs. These object programs are then used in performing a wide range of commercial data processing jobs.

**DESCRIPTION**

The 5424 MFCU is supported as an input/output device. The 5203 and 1403 Printers are supported as output devices. The 1442 mdl 6 (RPQ) is supported as an input/output device. Card RPG II permits punching the System/3 64-character set and packed decimal data on the 1442 (RPQ).

The RPG language has been extended to provide major functional capabilities while maintaining compatibility. These functions make RPG II:

- Easier to use
- More flexible, so the method of coding can be selected to best suit the programmer's needs
- More powerful, so that many programs can be coded using RPG II which in the past were difficult or impossible to code using RPG

The new functional capabilities include:

- Tables/arrays - provide the ability to define, point to (index to) and look up fields within a single dimension array of like fields. An XFOOT operation is provided which sums the elements of an array.  
Tables or arrays can be loaded at compile time, object program load time, or object program execution time. A table or array may contain fewer than the total number of allowable entries; this facility allows for temporary expansion of execution time tables without modification of the source program.
- Closed subroutines - provide for executing closed subroutines within the RPG II program from any number of points within the calculations with an automatic return to the calculation line following the statement which asked for execution of the routine.
- EXCPT operation code - provides the ability to cause output to be written during calculations. After the output is completed, calculations resume where interrupted.
- DEBUG operation code - allows the user to debug programs at the RPG II source level. The DEBUG operation code is used to print the status of the indicators and, optionally, the contents of any field(s). A header card option allows the program to be compiled ignoring the DEBUG operation codes.
- Look Ahead - provides the facility to look ahead at, and to use, the contents of fields in other records awaiting processing.
- FORCE operation code - provides the ability to determine and control which file/record is to be processed during the next RPG II program cycle.
- Read/Demand Files - provide immediate input from a demand file during calculation time. A demand file is a file type that can be processed only by the READ operation code.
- Edit codes - provide the facility to format output fields by specifying a single character code rather than an edit mask. This includes placing slashes in date fields.
- UDATE - provides access to the system date that has been previously loaded during system initialization. This allows the entire date, or any of the three parts of the date, to be referenced by the reserved names UDATE, UMONTH, UDAY, or UYEAR. These fields may be referenced on the calculation specifications or on the output/format specifications.
- 1P Forms Control - allows an option to repetitively print the first output print line conditioned by the

first page (1P) indicator until the operator is satisfied that the forms are aligned.

- Dual I/O areas - provide optional buffered input and/or output performance improvement.
- Fetch overflow - provides the ability to control when overflow processing is to occur.
- File conditioning - provides the ability to use external indicators (U1-U8) to control calculations, input and output files, or specific output records.
- \*PRINT - provides the facility to interpret, while punching, without redefining the output line.
- \*PLACE - provides the facility to print identical information (invoices, labels, etc.) side-by-side (2-up, 3-up, etc.) without respecifying the individual fields on the output specifications.
- 9 match fields - provide flexibility in multi-file processing.
- Line counter specifications - provide a facility to specify page length and overflow line.
- File translation - provides character by character translation for specific files through the use of a translation table.
- Alternate collating sequence - provides the facility for altering the collating sequence if it is not the same as the System/3 collating sequence. This applies to match fields and to the comparison of alphameric fields during calculations.
- SPECIAL exit - provides linkage to assembler language subroutines for nonsupported devices during the RPG II cycle. This enables the user to insert program support for any input or output device capable of attachment to System/3. For example, this exit can be used to support RPQs and OEM devices.

**Use of RPG II**

Five different specification sheets are used to code the user's program requirements. One of these is used only when a table search or forms control is required by the object program. The headings on the specification sheet describe the particular usage of each form.

After the specifications have been written on the appropriate forms, cards are punched with the data from the forms. Each line of the form represents a card in the source deck.

The source deck, along with a control card and the RPG II processor, are read by the 5424 MFCU. On a system equipped with the 1442 mdl 6 (RPQ), the 1442 can be designated to read the source deck. At the end of this processing run, an object program is punched. This program contains all of the computer instructions necessary to run the desired job.

The punched object program deck may be loaded for immediate execution of the desired job. There are no control programs associated with the RPG II generated object program decks or with the RPG II processor program.

**SPECIFIED OPERATING ENVIRONMENT**

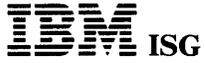
Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/3 card RPG II processor program may be run on a minimum configuration IBM System/3 mdl 10 which includes an IBM 5410 Processing Unit mdl A2 (8K bytes), an IBM 5424 MFCU mdl A1 and an IBM 5203 Printer mdl 1 or an IBM 1403 Printer mdl 2. In addition, an IBM 1442 mdl 6 equipped with RPQ 841205 and an IBM 5410 Processing Unit equipped with Processing Unit Expansion #5732 and RPQ 843175, is required if 80 column cards are utilized as program data or RPG II source statements.

The RPG II generated object programs may take advantage of all capacities of the IBM 5410 Processing Unit up to and including 32,768 bytes of core storage, the IBM 5424 MFCU, and the IBM 5203 and 1403 Printers available on IBM System/3.

There is no restriction as to the number of input, output, or combined files which may be defined within a single RPG II job, other than those imposed by the number of physical devices attached to the system.



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PP 5701-RG1.2

Feb 83

Major Revision

PROGRAM PRODUCTS

**S/3 Card RPG II mdl 10 (cont'd)**

System Control Program (SCP), 5701-SC1, is required to perform the systems initialization.

**SOFTWARE REQUIREMENTS:** None.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Card System RPG II Reference Manual (SC21-7500) ... Functional Description (GC21-5127) ... Additional Topics Programmer's Guide (GC21-7567).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 CARD RPG II TELECOMMUNICATIONS  
FEATURE #6000 (5701-RG1)****PURPOSE**

The Card RPG II Telecommunications feature (#6000) provides the user with the capability of sending or receiving binary synchronous data over voice grade or high-speed communications lines. This support is achieved through the use of a new RPG II Telecommunications Specification Sheet, and the addition of BSCA (Binary Synchronous Communications Adapter) as a device entry on the RPG II File Description Specification. This RPG II support permits System/3 to function in one of the following communication modes:

- Receive only
- Receive with conversational reply
- Transmit only
- Transmit with conversational reply
- Alternate transmit and receive file.

The following RPG II language features are supported for communications:

- Input, Output and Combined Files
- Demand Files for Transmit and Receive
- Blocking and Deblocking of Records
- Dual I/O Area

These BSCA features, options, and capabilities are supported by the feature:

- Manual call
- Manual answer
- Auto-call
- Auto-answer
- Medium speed
- High-speed
- Station selection
- EBCDIC data transparency
- Intermediate block checking
- EBCDIC or ASCII data and data link control characters. File translation of ASCII data can be accomplished by proper use of the file translate extension of RPG II.

System/3 with a BSCA supported by the RPG II Telecommunications feature can communicate with the following systems:

Another System/3 with BSCA, program-supported by RPG II Telecommunications feature.

A System/32 with BSCA, program-supported by RPG II.

A System/34 equipped with a Communications Adapter, program-supported by RPG II and Assembler.

A System/360 Model 20 with BSCA, program-supported by BSCA IOCS.

System/360 mdl 22 or larger, System/370.

This program provides the support to use System/3 in the following telecommunications networks.

Point-to-Point switched or Point-to-Point nonswitched Multipoint (as a tributary station).

System/3 with BSCA is a compatible member of the IBM BSC family of terminals. It can be intermixed with other BSC terminals [System/32, System/34, System/360 mdl 20, 1130, 1800, 2770, 2780, 6670 (as a 2770), 2715 mdl 2 and 3780] on a multipoint line when operating as a tributary station with a central System/360 or System/370 computer\* using DOS or OS BTAM. It can also share the same phone number at the central System/360 or System/370 computer\* with other BSC terminals (System/360 or System/370 computers\*\*, System/32, System/34, System/360 mdl 20, 1130, 1800, 2770, 2780, 2715 mdl 2 and 3780.)

\* System/360 mdls 22, 25 and 30 with DOS/360; mdls 40, 50, 65, 67 (in 65 mode), and 75 with DOS/360 and OS/360 and mdls 85, 91, and 195 with OS/360. System/370 mdls 135, 145 and 155 with DOS and OS; and mdl 165 with OS when operating in Basic Compatibility Mode.

\*\* System/360 mdl 22 with DOS, mdls 25 and 30 with BOS/BPS or DOS/360, mdls 40, 50, 65, 67 (in 65 mode), and 75 with BOS/BPS, DOS or OS/360 mdls 85, 91, and 195 with OS/360. System/370 mdls 135, 145 and 155 with DOS and OS; and mdl 165 with OS when operating in Basic Compatibility Mode.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/3 Card RPG II Telecommunications feature requires as a minimum for source program compilation an IBM System/3 mdl 10 which includes an IBM 5410 Processing unit A2 (8K bytes), an IBM 5424 MFCU mdl A1 and an IBM 5203 Printer mdl 1 or an IBM 1403 Printer mdl 2.

This support requires as a prerequisite the IBM System/3 Card RPG II licensed program (5701-RG1). In addition, an IBM 5410 Processing Unit with a BSCA feature #2074 is required for object program execution.

The Device Counter Logout Program, feature #6002 for System Control Program (5701-SC1) is required for concurrent installation with the BSCA feature #2074, and must be ordered separately.

**SOFTWARE REQUIREMENTS**

Programs 5701-RG1 and 5701-SC1 feature #6002.

**DOCUMENTATION**  
(available from Mechanicsburg)

*RPG II Telecommunications Programming Reference Manual* (SC21-7507).

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**CARD RPG II BRAILLE  
FEATURE #6003 (5701-RG1)**

**PURPOSE**

The IBM System/3 RPG II Card Compiler Braille feature (#6003) provides the user with the capability of having compilation listings and object program printouts in Braille. The user of a Card RPG II Compiler (5701-RG1) equipped with the Braille feature has the option at compile time to select either Braille or printed listings. An object program compiled with the Card RPG II compiler having the Braille feature and specifying Braille output has the option at execution time, to select either Braille or printed output.

The period in the user's printer print arrangement is used to form the Braille characters. A piece of elastic must be stretched in front of the type in order to make the proper impression. Description of the procedure to follow in installing the elastic is contained in the documentation *The Braille Feature for IBM System/3 Card RPG II Compiler* distributed by PID with the feature.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/3 Card RPG II Braille feature requires a card-oriented IBM System/3 mdl 10 which includes an IBM 5410 Processing Unit (8K bytes), an IBM 5424 MFCU (250 cpm read and 60 cpm punch and print), and an IBM 5203 Printer (96 print positions and 100 lpm) or 1403 Printer (132 print positions and 600 lpm).

**SOFTWARE REQUIREMENTS**

This support requires as a prerequisite Card RPG II (5701-RG1).

**DOCUMENTATION**

(available from Mechanicsburg)

All documentation for the Braille feature is distributed with the program from PID; it is not separately orderable.

**TERMS and CONDITIONS:** See PP Index



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PP 5701-RG1.5

Feb 83

Major Revision

PROGRAM PRODUCTS

**SYSTEM/3 CARD RPG II MAGNETIC TAPE  
FEATURE #6004 (5701-RG1)**

**PURPOSE**

The IBM System/3 Card RPG II Magnetic Tape feature (#6004) provides the user with RPG II support to process data files on magnetic tape.

These features are supported:

- Consecutive input or output
- One to four tape units
- Fixed length, blocked or unblocked records
- Record size from 18 to 4,096 bytes
- Maximum block size 4,096 bytes
- Dual I/O areas
- ANSI labels or IBM Standard Labels
- Unlabeled tapes
- 9-track, 800 or 1600 bpi
- Multivolume files (up to 31 volumes)
- ASCII or EBCDIC mode of data or labels
- Program options for rewind or rewind/unload
- Magnetic Tape Error Counters
- Overlay of OPEN routines
- Pre-execution time tables (on tape)

In addition, two programs are provided that permit the Card RPG II compiler to be loaded on tape and executed from tape.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Same as for 5701-RG1, except that an IBM 12K Processing Unit and an IBM 3410/3411 Magnetic Tape Unit are required.

**SOFTWARE REQUIREMENTS**

5701-RG1 V1M8 or later; 5701-SC1, feature #6005.

**DOCUMENTATION**

(available from Mechanicsburg)

*Magnetic Tape Program Planning Manual (GC21-5040).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**CARD-ORIENTED SYSTEM/3 MODEL 10  
5701-SC1****PURPOSE**

These IBM System/3 programs perform the system control functions for the installation. They are supplied by IBM with the system at no additional charge, in two configurations of the IBM System/3 model 10; card and disk-oriented stored programs.

**DESCRIPTION**

**Program Maintenance Program:** Used by the customer to apply programming changes to card programming system decks. The 5424 MFCU is used to collate the changes.

The functions of this program include the inclusion of new cards, removal of deleted cards, and the replacement of cards in the customer's program deck, the automatic verification of sequence, verification of proper currency level, and updating card counts and currency level.

This program must be used to properly maintain the program decks to assure proper function, and to simplify the maintenance procedure.

**System Initialization Program:** Used to initialize the communication area with information obtained from control cards. Normally, the user initializes the communications area at the beginning of the day.

The user date and 'user switches' as well as other system information are stored in the communication area.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The Card System Control Programming operates on a minimum configuration IBM System/3 mdl 10 which includes an IBM 5410 Processing Unit (8K bytes), an IBM 5424 MFCU (250 cpm read and 60 cpm punch and print), an IBM 5203 Printer (96 print positions and 100 lpm) or an IBM 1403 Printer (132 print positions and 600 lpm). The Binary Synchronous Communications Adapter (#2074) with Text Transparency (#7850) is required for execution of the Remote Job Entry Work Station support. The Binary Synchronous Communications Adapter (#2074) is required for execution with the Device Counter Logout Program.

**SOFTWARE REQUIREMENTS:** None

**REMOTE JOB ENTRY WORKSTATION  
FEATURE #6001 (5701-SC1)****PURPOSE**

Permits an IBM System/3 equipped with a Binary Synchronous Communications Adapter with EBCDIC Text Transparency feature to submit OS/360 jobs over communications facilities to a central System/360 (mdl 40 or above with a minimum of 256K of core), or System/370 (minimum of 256K of core) for execution, and to receive output from the central system upon completion of the job. Output may also be received at the workstation on a deferred basis if desired. A user at a workstation other than the sending station may also be designated as an alternate recipient of job output. Optionally, the user may choose to send and receive data in compressed form; the System/3 Workstation program will expand the data on receipt for printing or punching.

The System/3 Remote Job Entry (RJE) Workstation support operates with a central System/360 or System/370 supported by the OS/360 Remote Job Entry Program. Communication is in Binary Synchronous mode on a point-to-point switched, point-to-point nonswitched, or multipoint network.

In an RJE network, a System/3 with BSCA using the RJE program can be intermixed with other CPU workstations (System/360 computers, System/360 mdl 20 and 1130) on a switched network. It can operate as a workstation on a nonswitched multipoint line with System/360 mdl 20 and 1130 workstations.

**Note:** System/360 mdl 25, 30, 40, 50, 65, 67 (in 65 mode), 75, 85 and 195 using the BOS/BPS remote job entry workstation program.

When using the System/3 RJE support, OS object decks can be read or punched if the 1442 is attached; OS object decks cannot be read or punched on 96-column card devices. OS allows 80-position card input records; therefore, only card columns 1 through 80 of the System/3 96-column card are processed by the RJE support. Outputs of 120 or 132 characters from OS RJE are printed as two lines on a System/3 96-print position 5203 printer.

The installation of RJE on the Card-Oriented System/3 requires the concurrent installation of the Device Counter Logout feature for 5701-SC1, feature #6002. This feature must be ordered separately.

**Program Prerequisites:** 5701-SC1, feature #6002. *RJE Work Station Support Reference Manual* (GC21-7531).

**DEVICE COUNTER LOGOUT PROGRAM  
FEATURE #6002 (5701-SC1)****PURPOSE**

This standalone IBM System/3 card program is designed to achieve maximum serviceability and an increased level of availability. It is designed to be executed immediately following the execution of any card system BSC object program which contains the updating of the device counter log. The program recovers the contents of counters accumulated in the preceding BSC execution. The contents of these counters serve as an aid in problem determination.

The program punches the contents of the counters using the MFCU. If selected by the user via the console data switches, the contents of the counters are also printed with appropriate headings.

The installation of the Binary Synchronous Communications Adapter (#2074) requires the concurrent installation of this System Control Program feature, 5701-SC1 (#6002).

**Program Prerequisites:** None.

**MAGNETIC TAPE UTILITY PROGRAMS  
FEATURE #6005 (5701-SC1)****PURPOSE**

This feature contains four standalone, card-resident utility programs:

- **Magnetic Tape Error Logout Program** is executed immediately following the execution of any card system program that updates the magnetic tape error counters. The program punches the contents of counters accumulated during the execution of the preceding object program. The contents of these counters serve as an aid in problem determination.
- **Magnetic Tape Error Summary Program** is used to print a report of the error statistics using as input the cards punched by the Error Logout Program.
- **Tape Initialization Program** is used to create IBM Standard or ANSI tape column labels, to check for unexpired files, and to display existing volume and file labels.
- **Tape Dump Program** is used to list blocks of tape data on the printer in both hexadecimal and character representation until a tape mark is read. This program can also be used to backspace or forward space a tape block, and to rewind a tape to load point.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum system requirement is the same as for 5701-SC1, except that an IBM 12K Processing Unit and an IBM 3410/3411 Magnetic Tape Unit are required. The 7-track feature of the 3410/3411 is not supported by Card System Programming.

**SOFTWARE REQUIREMENTS:** None

**DOCUMENTATION**

(available from Mechanicsburg)

*Card System Operator's Guide* (GC21-7513) ... *RJE Work Station Support Reference Manual* (GC21-7531) ... *Magnetic Tape Program Planning Manual* (GC21-5040)



PROGRAM PRODUCTS

**IBM SYSTEM/3 CARD-RESIDENT  
MAGNETIC TAPE SORT PROGRAM  
5701-SM1**

**PURPOSE**

The IBM System/3 Card Resident Magnetic Tape Sort Program supports: Three or four tape units, fixed length, blocked or unblocked records, record size from 18 to 9,999 bytes, maximum block size 9,999 bytes, labeled or unlabeled tapes, 9-track, 800 or 1600 bpi, multivolume input or output (work files are single volume only), ASCII or EBCDIC mode of data or labels (in one run, the mode cannot be mixed), and read backward.

**DESCRIPTION**

The sort program can select desired records from the input file to be included or excluded from the sort. Recognition of individual records can be based on:

- Record code
- Relation of a field to a constant
- Relation of two fields in a record
- Any relationship in a series (ORing)
- All relationships in a series (ANDing)
- Multiples of the above test in any combinations

Control fields may be in a different location in records within the file.

Output from the sort program is in the following format:

A file or records containing the sort control fields and the data fields the user has specified. The user need select only the data necessary from the input to be included in the output. By specifying the entire input record as a tagalong field, the user can, in effect, accomplish a record sort.

Specification of record selection, sort parameters and tagalong data fields is accomplished by simple, RPG-like coding sheets that are similar to those used by the Disk Sort Program, 5702-SM1. The addroit and summary sort capabilities of the Disk Sort are not supported in the Magnetic Tape Sort Programs.

Sort control card diagnostics and messages are printed on either the 5203 or 1403 Printer.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM System/3 Card Resident Magnetic Tape Program requires as a minimum an IBM System/3 mdl 10 which includes an IBM 5410 Processing Unit mdl A3 (12K bytes), an IBM 5424 MFCU mdl A1, an IBM 5203 Printer mdl 1 or an IBM 1403 Printer and three magnetic tape drives.

**SOFTWARE REQUIREMENTS**

5701-SC1; 5701-SC1 feature #6005 is recommended.

**DOCUMENTATION**

(available from Mechanicsburg)

*Magnetic Tape Program Planning Manual (GC21-5040) ... Tape Sort Reference Manual (SC21-7572) ... Functional Description (GC21-7577).*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**CARD SYSTEM UTILITIES  
5701-UT1**

**PURPOSE**

The Card System Utilities consist of six programs.

- System/3 Reproduce/Interpret Program

The Reproduce/Interpret program has the following options:

Reproduce  
Interpret  
Reproduce and Interpret  
Reproduce with Reformatting  
Reproduce and Interpret with Reformatting

The Data switch on the system console is used to select the desired option. Reformatting control cards follow the program deck in the primary hopper of the MFCU. Blank cards for reproduction are placed in the secondary hopper.

- System/3 96 Column List Program

The 96-Column List Program will list cards without reformatting. User options selected by the Data switch on the system console provide for single, double, or triple spacing. Automatic overflow on standard 11" forms is provided. After listing has been completed, a card count is printed by the program. The user can select an option to bypass the listing and receive only a card count as output.

- System/3 5424 MFCU Sort/Collate Program

This is a general purpose utility program designed to perform a wide variety of sorter and collator functions.

A specification sheet is used to describe the job to be performed. Cards are punched from this sheet. These cards are used by the program to perform the desired functions.

These functions are available:

- Sort
- Merge
- Match
- Select
- Sequence Check

Selection may be accomplished based upon a variety of logical tests including comparison of field contents to a constant or to other field contents. Several tests may be combined in series of *and/or* combinations to allow easy separation of cards meeting certain tests. Tests for zones, digits, or characters may be used during a run to select only those cards to be processed, leaving the remainder of the deck in its original sequence or to direct specific cards to a pocket during a match or select run.

Control fields for the various functions may be ascending or descending sequence and in combinations on numeric fields. Multiple and split control fields may be described provided they do not exceed an accumulated (total) length of 100 characters.

Alternate collating sequence facility is available. This allows the user to substitute a value table which changes the normal sequence values of the sort field contents.

It is also possible in this sort program to assign new values to existing punches in control fields for purposes of sequencing, sorting, and matching. Thus, an 'A' may be recoded to a 'B' so that 'As' and 'Bs' would be considered equal. Similarly, the A and B values could be reversed to provide a new sort pattern. Many variations are possible with this feature.

A control field for sorting or collating need not be in the same location in all cards in the deck. For example, part number might be in two different locations in two different identifiable card types being sorted together.

- System/3 Data Recording Program

This utility program allows a System/3 with an optional 5475 Data Entry Keyboard to be used for online data recording with punched cards created as output.

The 5424 MFCU is used as the punching device; the keyboard for entering the data.

Program control cards, a maximum of two, will be supported for use with this program to allow:

- Field Definition
- Field Skipping
- Field Duplication
- Upper and Lower Shift and Numeric Shift
- Modulus 11 Self-checking Number Verification

The use of a program control card is not mandatory. It is also possible to enter data under manual control.

Various switches and functional keys available of the 5475 Data Entry Keyboard are also supported as follows:

Auto Skip/Dup	Manual Duplication
Auto Record Release	Manual Skip
Program Control ON/OFF	Program Selection
Print ON/OFF	Release Key
Field Erase	Right Field Adjustment
Record Erase	Upper Shift/Lower Shift
Multiple Punch Key	

This program will allow for rekeying (correction) of data for an entire field or an entire record prior to the actual punching of the card by supporting a field erase/record erase facility. A column by column backspace is also supported for correction of data when operating in the manual mode.

- System/3 Data Verifying Program

This utility program allows a System/3 to be used to verify the accuracy of the recorded data. The 5424 MFCU is used to read the card deck which is to be verified and blank cards for immediate correction. The optional 5475 Data Entry Keyboard is required for rekeying source data for verification.

As each character is keyed, a comparison to the corresponding character in memory takes place. If the two are not identical, an error light is turned ON and the operator may re-key. After the third try, the character keyed is assumed correct. When the keying is complete (all data verified) and if there are any errors, a new card will be punched from the corrected information and will replace the original card in error. The incorrect card will be stacker selected. A verify 'OK' notation will be printed on the fourth print line of each correct card.

Two levels of program control will be supported to allow:

- Field Definition
- Field Skipping
- Field Duplication
- Right Field Adjust
- Upper and Lower Shift and Numeric Shift

The use of a program control card is not mandatory. It will also be possible to verify data under manual control.

Various switches and functional keys available on the 5475 Data Entry Keyboard will also be supported as follows:

Auto Skip/Dup	Manual Duplication
Auto Record Release	Manual Skip
Program Control ON/OFF	Program Selection
Print ON/OFF	Release Key
Field Erase	Right Field Adjustment
Record Erase	Upper Shift/Lower Shift
Multiple Punch Key	

This program allows the rekeying and reverification of fields or records by supporting a field/record erase facility.

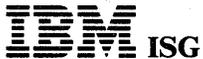
- System/3 80-96 Conversion Program

The 80-96 Conversion program allows a System/3 equipped with a 1442 Card Read Punch and associated RPQ's to read 80-column cards, translate the information and punch out 96-column cards in the 5424 Multifunction Card Unit, with reformatting. Conversion options provided are:

- Standard character for character translation.
- Special translation for specific characters.
- Ability to translate any combination of 80 column card punches. Logical testing for the presence of punches in a column with AND, OR, and NOT conditions enables powerful and flexible translation.
- Ability to handle under punching. There is a translation code that says: accept only the highest value punch, where the ordering of the punches from lowest to highest is 12, 11, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.
- Ability to flag and stacker select invalid or unwanted codes. This code flags and selects all punch combinations that are outside the System/3 64-character set. It also flags and selects all codes which meet a specified logical test for the presence of punches. Logical tests are AND, OR, and NOT.
- Ability to move a high order zone punch to a low order position.

Customers who desire to perform 96 to 80-column card conversion should be advised that a program must be written using RPG II. (Card RPG II permits punching the System/3 64-character set and packed decimal data into 80-column cards; Disk RPG II permits punching 256 characters and packed decimal data into 80-column cards.)

It is anticipated that many customers plan to complete the bulk of their 80-96 column card conversion work during their preinstallation test allowance.



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PP 5701-UT1.2

Feb 83

Major Revision

PROGRAM PRODUCTS

Card System Utilities (cont'd)

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The Card System Utilities require a minimum configuration IBM System/3 mdl 10 which includes an IBM 5410 Processing Unit (8K bytes), an IBM 5424 MFCU (250 cpm read and 60 cpm punch and print) and an IBM 5203 Printer (96 print positions and 100 lpm), or an IBM 1403 Printer (132 print positions and 600 lpm).

SOFTWARE REQUIREMENTS: None

DOCUMENTATION

(available from Mechanicsburg)

*Sort/Collate and Card Utilities Reference Manual (SC21-7529) ... Sort/Collate Programmer's Guide (GC21-7539) ... 80-96 Conversion Program and RPG II Support for the IBM 1442 Card Read Punch Reference Manual (SC21-7518) ... Data Recording and Data Verifying Programs Operator's Guide (SC21-7538) ... Functional Description (GC21-7615).*

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 BASIC ASSEMBLER  
5702-AS1****PURPOSE**

The IBM System/3 Basic Assembler language is a symbolic programming language used to write programs for the IBM System/3 mdl 10. Source programs written in this language are processed by the Basic Assembler Program to produce executable object programs. (This program is applicable to the System/3 mdl 8).

The Basic Assembler can be used to create a standalone program. The object program is punched into cards. Program loading is performed with an initial program loader through the 5424 MFCU. Standalone programs are coded entirely by the user with no dependence on other programming support.

The Basic Assembler may also be used for assembly of relocatable subroutines for use with the Card or Disk System RPG II or with System/3 COBOL or FORTRAN. The subroutines, written in the Basic Assembler language, are coded by the user and separately assembled. The process of program linking is accomplished during compilation of the RPG II source program or by means of the Overlay Linkage Editor in the case of COBOL or FORTRAN.

**DESCRIPTION**

Some of the features provided by the Basic Assembler program and its language are:

- a) Mnemonic Operation Codes
- b) Symbolic Referencing of Storage Addresses
- c) Automatic Storage Assignment
- d) Address Displacement Calculation
- e) Convenient Data Representation
- f) Operand Field Expressions
- g) Source Identification - Sequence Fields
- h) Assembler Instructions
- i) Source Program Listings
- j) Cross Reference Listing
- k) Error Checking and Diagnostic Messages

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

For source program compilation - an IBM System/3 mdl 10 which includes an IBM 5410 Processing Unit mdl A13 (12K bytes), an IBM 5424 MFCU mdl A1 or an IBM 1442 Card Read Punch mdl 6, an IBM 5203 Printer mdl 1 or an IBM 1403 Printer mdl 2 with Universal Character Set feature and a PN (60-character set) interchangeable chain cartridge and an IBM 5444 Disk Storage Drive mdl 1.

**Note:** A 48-character set (for example, HN or LC arrangement) can be used with the Assembler; however, the user must be willing to accept substitute characters.

The Assembler requires 8K of main storage exclusive of control program requirements.

This program will support all increased capacity components of a disk-oriented System/3 mdl 10.

For use on System/3 Model 8 - An IBM 5408 Processing Unit mdl A14 (16K bytes), an IBM 5203 Printer, an IBM 5444 Disk Storage Drive mdl A1, and either an IBM 3741 Data Station directly attached or an IBM 5471 Printer-Keyboards.

**SOFTWARE REQUIREMENTS**

5702-SC1; 5702-SC1 feature #6026/#6027.

**DOCUMENTATION**

(available from Mechanicsburg)

*Basic Assembler Program Reference Manual (SC21-7509) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 SUBSET ANS COBOL  
COMPILER AND LIBRARY  
5702-CB1****PURPOSE**

The IBM System/3 compiler, its library and object programs execute under control of the IBM S/3 model 10 Disk System Control Program (5702-SC1, Version 6 or later). It provides the user with the most widely accepted and used standard high-level procedural language in existence. In addition to the standard language, the following additional features are provided:

Certain language elements which are defined in higher levels of the American National Standard COBOL language.

Certain language elements defined by the CODASYL Programming Languages Committee but not yet incorporated into the COBOL language by the American National Standard Institute.

IBM extensions consistent with those supported by the System/360 OS and DOS ANS compilers and 1130 ANS compiler.

System/3 COBOL supports Grade 1 Braille for both compiler listings and object program printed output. The Braille option requires a 132-position printer (5203 or 1403) with 8 lines per inch spacing. A user-provided elastic strip is attached over the printer hammers to produce the Braille characters.

**DESCRIPTION**

**Considerations:** The American National Standards Institute approved the American National Standards Institute Standard COBOL (ANSI STANDARD X3.23-1968-COBOL) on August 23, 1968. The following functional processing modules of the American National Standards Institute standard are included in the System/3 Compiler:

- 1 Nucleus 1, 2
- 1 Sequential Access 1, 2
- 1 Random Access 0, 2
- 1 Library 0, 2
- 2 Table Handling 1, 3
- 1 Segmentation 0, 2

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level in the American National Standards Institute Standard (0 implies that the module may be completely missing from some standard compilers); the third digit represents the highest level of the American National Standards Institute standard.

IBM implementation of the American National Standard COBOL complies with the first draft International Organization for Standards (ISO) recommendation for COBOL.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

For an IBM System/3 mdl 10 ... IBM 5410 Processing Unit mdl A14 (16K bytes), an IBM 5444 Disk Storage Drive mdl 1, either an IBM 5424 Multi-Function Card Unit or an IBM 1442 Card Read Punch and either an IBM 5203 Printer or 1403 Printer.

For a System/3 mdl 8 ... IBM 5408 Processing Unit mdl A14 (16K bytes), an IBM 5444 Disk Storage Drive mdl A1, an IBM 5203 Printer and either an IBM 3741 Data Station/Programmable Work Station directly attached or an IBM 5471 Printer-Keyboard.

For additional devices supported by the COBOL Object Programs, refer to the *System Generation Reference Manual*, GC21-5126.

**Note:** EC818676 is required for all 5410 Processing Units on which COBOL will be run. The HN print chain/train is recommended.

**SOFTWARE REQUIREMENTS**

5702-SC1; 5702-SC1 feature #6026/#6027. For 5445 support, 5702-SC1 feature #6022/#6023 is required. For 5448 support, 5702-SC1 Feature #6074 is required. For tape support, 5702-SC1 feature #6024/#6025 is required.

**COMPATIBILITY**

System/3 COBOL is upward compatible with the DOS and OS ANS COBOL compilers and is a superset of 1130 ANS COBOL; providing growth from 1130 through System/3 to Systems/360 and 370.

Migration to and from System/3 COBOL requires little source program conversion to effect the transition. Certain 1130 library routines are not included in the System/3 COBOL library, i.e., CALLED subprograms.

**PERFORMANCE**

The System/3 Disk COBOL operates in 12K bytes of main storage, exclusive of control program requirements. Object-time performance is dependent on program type, size, I/O functions performed and other factors pertinent to program execution speed. In the minimum configuration, the supervisor is limited to 4K for compilation. (See "Supervisor Sizes" in the pages for 5702-SC1.)

**DOCUMENTATION**

(available from Mechanicsburg)

*COBOL Reference Manual* (GC28-6452) ... *System/3 Bibliography* (GC20-8080).

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 DISK FORTRAN IV  
5702-FO1****PURPOSE**

IBM System/3 Disk FORTRAN IV processes programs written in the System/3 FORTRAN language, producing output suitable for execution with the System/3 Disk System Control Programming (5702-SC1).

**DESCRIPTION**

The System/3 FORTRAN language contains those features defined in American National Standard Basic FORTRAN, X3.10.1966; language extensions supported by IBM 1130 Basic FORTRAN; and additional features and capabilities previously available only with certain IBM Full FORTRAN compilers. These features include:

- The DEBUG facility, which enables the user to locate errors in a FORTRAN source program. By use of four basic statements, the debug facility provides for tracing flow within a program and between programs, and for checking the validity of subscripts.
- The IMPLICIT statement, which enables the user to specify the type (including length) of all variables, arrays, and user-supplied functions whose name begins with a particular letter.
- Length specification for INTEGER and REAL type statements, which allows the explicit specification of the INTEGER\*2, INTEGER\*4, REAL\*4, and REAL\*8 (double precision) data types.
- The relational IF statement, which is used to direct the transfer of control after the evaluation of relational expressions.
- List-directed input/output, which permits reading and writing of formatted data without a FORMAT statement.
- The GENERIC statement, which enables the user to specify a single name for a FORTRAN built-in or library function having several names. Depending on argument type, the correct function is selected by the compiler with each appearance of the name.
- IBM FORTRAN language extensions INVOKE, PROGRAM and GLOBAL, which allow FORTRAN main programs to be loaded successively into main storage and executed, while permitting these programs to share a common data area. These language extensions provide function equivalent to 1130 FORTRAN CALL LINK.
- Names of up to six characters for variables, arrays, functions, and subroutines.

The System/3 Disk FORTRAN IV library contains mathematical and service subprograms required during execution to perform arithmetic operations, input and output constant conversion and input/output control.

System/3 Disk FORTRAN IV is supplemented by a commercial subroutine package which is equivalent in function to the 1130 Commercial Subroutine Package insofar as is meaningful in terms of System/3 devices and data management.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

For an IBM System/3 mdl 10 ... an IBM 5410 Processing Unit mdl A13 (12K bytes), an IBM 5444 Disk Storage Drive mdl 1, either an IBM 5203 Printer or an IBM 1403 Printer, and an IBM 5424 MFCU or IBM 1442 Card Read Punch.

For an IBM System/3 mdl 8 ... an IBM 5408 Processing Unit mdl A14 (16K bytes), an IBM 5444 Disk Storage Drive mdl A1, an IBM 5203 Printer and either an IBM 3741 Data Station/Programmable Work Station directly attached or an IBM 5471 Printer-KeyBoard.

If running in a DPF environment, or supporting 5445/5448 Disk Storage or 3410/34 11 Magnetic Tape Subsystem, Disk FORTRAN IV requires a mdl 10 with 16K Processing Unit.

Note: EC 818676 is required for all 5410 Processing Units on which System/3 FORTRAN will be run. An HN print chain/train is recommended.

**SOFTWARE REQUIREMENTS**

5702-SC1, 5702-SC1 feature #6026/#6027 (Overlay Linkage Editor). For 5445 support, 5702-SC1 feature #6022/#6023 is required. For 5448 support, 5702-SC1 feature #6074 is required. For tape support, 5702-SC1 feature #6024/#6025 is required.

**PROGRAM COMPATIBILITY**

System/3 Disk FORTRAN IV source programs for the System/3 mdl 10 are compatible with System/3 Disk FORTRAN IV for System/3 mdl 6 except for changes required to accommodate differences in attached I/O. The System/3 Disk FORTRAN IV compiler accepts source programs written in the IBM System/360 Basic FORTRAN IV language, which encompasses American National Standard Basic FORTRAN as defined in X3.10.1966. The compiler also accepts source programs written in the IBM 1130 Basic FORTRAN language with minor modifications.

**PERFORMANCE**

The System/3 Disk FORTRAN will compile and execute in 9K bytes of main storage, exclusive of control program requirements. Object time performance is dependent on program type, size, I/O functions performed and other factors pertinent to program execution speed.

**DOCUMENTATION**

(available from Mechanicsburg)

*Disk FORTRAN IV Reference Manual (SC28-6874) ... Disk FORTRAN IV Commercial Subroutines (SC28-6875) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

SYSTEM/3 BILL-OF-MATERIAL PROCESSOR  
5702-M41

PURPOSE

This IBM System/3 program product is designed to establish, maintain and retrieve information from four basic manufacturing files.

The program product will load and maintain item master, product structure, work center master and standard routing records on disk files ... reorganize the four files ... perform six basic retrievals (single level, indented and summarized parts lists, and single level, indented and summarized where-used parts lists) ... perform two standard routing retrievals (manufacturing routings and work center where-used).

HIGHLIGHTS

Disk file chaining is used to organize product structure data in two sequences:

1. Assembly-component or bill-of-material sequence, thereby linking the components of an assembly in component item sequence. The product structure records are initially loaded and subsequently maintained in this sequence through the use of direct access file chaining techniques.
2. Where-used sequence, thereby associating item usages on higher level assemblies. This eliminates the need for either maintaining a separate file to indicate where each item is used, or periodically sorting the bill-of-material file into where-used sequence. Bi-directional where-used chains are used to facilitate faster processing during maintenance functions. (With bi-directional chaining, where record A points to record B, record B in turn points back to record A).

The same direct access capability makes the standard manufacturing operation records available in two sequences:

1. Routing operation sequence, which specifies the logical sequence of operations during the manufacturing process.
2. Work center (or machine) where-used sequence, which enables the user to retrieve information relative to all work performed by any given work center.

The structure of an assembly is recorded only once regardless of the number of times it is used on higher level assemblies or end products. The structure records are loaded and maintained on direct access files in the form of a series of single-level assemblies in component item sequence.

Users design their own record layouts by incorporating their information plus certain required data into item master, product structure, work center master and standard routine records.

For faster processing, some of the routines access the master files randomly by relative record number.

Raw material can be included in the product structure file to provide complete where-used cross-reference.

Low-level code is automatically maintained when adding records to the product structure file. Low-level code is used by the product structure file load and maintenance routine to verify assembly-to-subassembly continuity and by the product structure file retrieval routines.

All product structure retrieval functions can be performed in the same program run since the data recorded on direct access files is available either in assembly or where-used sequence. The same capability may be applied to routing information.

Product structure file reorganization punches out cards in a series of single-level bills-of-material in low-level code sequence, end items first, allowing the user to reload product structure assemblies in accordance with low-level codes. This speeds up processing in certain retrieval functions and eliminates unnecessary low-level code updating.

A complete assembly can be deleted from the product structure file with one multiple delete transaction card. The same facility is available for the deletion of an entire routing from the standard routing file.

**Use:** File Load and Maintenance - Users prepare their bills-of-material and routing operations in their predefined card formats. The program loads and maintains this information on disk in a logical structure consistent with the relationship of the data.

**Retrieval** - The user prepares an inquiry card to request one of the retrieval reports. The program retrieves the information from the disk files and prints the required document in user-defined format.

**Reorganization** - At the user's discretion, he or she can reorganize all files with the program supplied.

CUSTOMER RESPONSIBILITIES

A thorough knowledge of Bill-of-Material concepts, as explained in the *Application Description Manual*, is necessary. To implement the system, the following steps must be taken ... execute sample problem ... determine the format and content requirements of the records ... define card input format and transaction codes ... design print formats and write RPG II print routines to implement them ... write RPG II quantity extension routine (optional) and routines for changes to user

information ... tailor the RPG II source programs to fit individual requirements.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The minimum configuration for IBM System/3 mdl 10 is an IBM 5410 mdl A14 Processing Unit (16K) with Multi-Function Card Unit Attachment (#4100) and Printer Attachment (#3970) ... IBM 5424 Multi-Function Card Unit mdl A1 ... IBM 5203 Printer mdl 1 ... IBM 5444 Disk Storage Drive mdl 1 (see note).

The minimum configuration for IBM System/3 mdl 15 is an IBM 5415 mdl A17 Processing Unit (48K), (mdl B17 with 3340 data module) with Multi-Function Card Unit Attachment (#4100) and Printer Control Unit 5421 ... IBM 5424 Multi-Function Card Unit mdl A1 ... IBM 1403 Printer ... IBM 5444 disk storage drive mdl A2.

The minimum configuration for IBM System/3 mdl 8 is an IBM 5409 mdl A14 Processing Unit (16K) ... IBM 8220, 3741 Data Station or 3741 programmable work station or IBM 4110, 5471 Printer-KeyBoard ... IBM 5203 Printer ... IBM 5444 disk storage drive ... plus appropriate attachment features for the I/O devices.

The minimum configuration for System/3 mdl 6 is an IBM 5412 mdl B16 Processing Unit (32K) ... IBM 5424 mdl A1 multi-function Card Unit and attachment ... IBM 3340 mdl C2 Disk Storage Drive ... IBM 5203 mdl 1 Printer.

The minimum configuration for IBM System/3 mdl 6 is an IBM 5406 mdl B4 Processing Unit (16K) with Printer Attachment (#3901) ... IBM 5213 Printer mdl 1 (85 CPS) ... IBM 5444 Disk Storage Drive mdl 1 (see note).

**Note:** Sufficient disk capacity is required to contain the system program and user data files. Consult the appropriate System/3 manuals to determine total file requirements.

For a one-drive system, consideration must be given to the fact that master file reorganization requires a new disk area plus an associated temporary disk output file.

SOFTWARE REQUIREMENTS

The IBM System/3 Disk System Control Program is used as the control system for the System/3 Bill-of-Material Processor. The following components are used:

	Model 8 & 10	Model 12	Model 6	Model 15
Disk System Control Program	5702-SC1	5705-SC1	5703-SC1	5704-SC1
Disk RPG II	5702-RG1	5705-RG1	5703-RG1	5704-RG1

The program product provides source code written in Disk RPG II.

The Disk Resident Card Utilities (5702-UT1) may be used for sorting the card input files and in reproducing card decks in the program modification process for Model 10.

DOCUMENTATION  
(available from Mechanicsburg)

*Application Description Manual* (GH20-0965).

**TERMS and CONDITIONS:** See PP Index

## SYSTEM/3 SHOP LOADING AND CONTROL 5702-M51

### PURPOSE

This IBM System/3 program product consists of source programs and supporting documentation for use in the installation of an effective system which determines labor and machine requirements by work center, releases orders, creates and maintains open order files, produces status reports, and creates a work list. This program interfaces with System/3 Inventory and Requirements Planning, 5702-M52. It accepts planned orders generated by 5702-M52 and creates open orders which are used by 5702-M52.

### DESCRIPTION

The program product consists of five phases - infinite loading, order release, open order status and update, open order maintenance, and work list preparation.

The infinite loading phase, using work center capacity information, determines the setup, labor and/or machine hours required for all open and planned orders, based on data extracted from the standard routing file. The setup, labor and/or machine hours are accumulated by time period and work center. The infinite load report is produced from this data to provide a representation of the load hours by time period for each work center.

The order release phase releases planned and unplanned orders to the shop after checking for the availability of all components. A material shortage report lists all planned and unplanned orders lacking sufficient component quantities to complete the order. When sufficient quantities of all components are available, the components are allocated and open order summary and open order detail records are created to maintain the status of each released order. Shop packet information is produced to accompany the order through the shop and provide the documents to update the open order files.

The open order status and update phase updates the files and provides reports on the status of orders in the shop. The open order files are updated by data cards which were provided as part of the shop packet. These data cards are the means of maintaining the current status of the orders in the open order files. The reports include the order status report and item report.

The open order maintenance phase provides for the deletion of cancelled or completed orders and changing current orders. Provision is made for changes to an order date and/or quantity, additions or deletions of open order detail records, and the splitting of open orders.

The work list preparation phase calculates a priority for the remaining operations of open orders, sorts the operations, and produces the work list report which lists the operations in priority sequence by work center. The work list can be used to specify the sequence of performing operations in the work center.

### HIGHLIGHTS

- Calculates setup, labor and/or machine hours for each planned and open order and accumulates these hours by time period for each work center.
- Highlights overloaded and underloaded work centers with an easily read graphical output report.
- Provides for release of planned and unplanned orders.
- Checks component availability of orders prior to release.
- Allocates component requirements for released orders.
- Provides a material shortage report of orders that cannot be released due to insufficient availability of components.
- Creates an open order summary record and open order detail records for each released order.
- Provides detailed reports of released orders from data in the item master, open order summary and open order detail files.
- Prepares a shop packet for each released order.
- Maintains open order files reflecting completion, cancellation or changes to open orders.
- Updates the item master, open order summary and open order detail files with information from the shop floor.
- Provides three order priority calculations for preparation of a work list.
- Prepares a work list report to indicate priority of orders at each work center.

**Use:** System/3 Shop Loading and Control programs are direct access file-oriented and execute in conjunction with an item master file, product structure file, work center master file and standard routing file. These files are created and maintained by the System/3 Bill of Material Processor (5702-M41). The open order summary and open order detailed files are created and maintained by System/3 Shop Loading and Control. These files may be contained on either 5444 or 5445 or 3340 Disk Storage Drives.

Many aspects of this system are discussed in the *Production Information and Control System Manual* (GE20-0280).

System/3 Shop Loading and Control can be used by companies engaged in the fabrication and/or assembly of finished products. Modifications can be made to the programs to satisfy specific user requirements.

System/3 Shop Loading and Control accepts as input planned and/or unplanned order requirements. Planned order requirements must be stored in the item master file in the required format. System/3 Inventory and Requirements Planning (5702-M52) may be used to provide planned orders. Unplanned orders are not stored, but are processed from a card file. Users who do not require a formal system for generating planned orders may use System/3 Shop Loading and Control with only unplanned orders. In this situation, the planned order update program and planned order extract program in the order release phase are not used, and the infinite load report would reflect only open orders. The open order data stored in the item master file is used by System/3 Inventory and Requirements Planning in generating planned orders.

The infinite loading phase which is used for planning purposes is run as frequently as a material planning system, from which new order requirements are generated.

The order release phase is normally run weekly, although planned order changes and unplanned orders may be run on a daily basis, if required.

Feedback transactions are normally processed daily or more frequently if needed. Status reports are produced as frequently as new information is desired.

The open order maintenance phase should be run daily to process open order changes and weekly to process open order completions.

The work list preparation phase produces a work list report of unfinished operations in priority sequence by work center. It is recommended that it should be run daily to reflect the most current open order information.

### CUSTOMER RESPONSIBILITIES

- Make modifications to the source programs to meet installation requirements.
- Create and maintain the item master, product structure, work center master and standard routing files.
- Define content and format of the above files.
- Install System/3 Bill of Material Processor (5702-M41)
- Provide planned order information. System/3 Inventory and Requirements Planning (5702-M52) may be used for the creation of this information.
- Establish procedures for handling the shop packet including the number of data cards to be produced and the collection of the data cards for updating of files.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The minimum configuration for IBM System/3 mdl 10 is an IBM 5410 Processing Unit mdl A14 (16K) ... Multi-Function Card Unit Attachment #4100 ... Printer Attachment #3970 ... IBM 5424 Multi-Function Card Unit mdl A1 ... IBM 5203 Printer mdl 1 ... Printer Attachment #5558 ... IBM 5444 Disk Storage Drive mdl 1.

The minimum configuration for IBM System/3 mdl 6 is an IBM 5406 Processing Unit mdl B4 (16K) ... Printer Attachment #3901 ... Data Recorder Attachment #3210 ... IBM 5213 Printer mdl 1 (85 cps) ... IBM 5444 Disk Storage Drive mdl 1 ... IBM 5496 Data Recorder mdl 1 ... IBM System/3 mdl 6 Attachment #7501.

The minimum configuration for IBM System/3 mdl 12 is an IBM 5412 mdl B16 Processing Unit (32K) ... IBM 5424 mdl A1 Multi-Function Card Unit and attachment ... IBM 3340 mdl C2 Disk Storage Drive ... IBM 5203 mdl 1 Printer.

The minimum configuration for IBM System/3 mdl 15 is an IBM 5415 mdl A17 Processing Unit (48K), (mdl B17 with 3340 data module) with IBM Multi-Function Card Unit mdl A1 ... IBM 1403 Printer ... IBM 5444 disk storage drive mdl A2.

The minimum configuration for IBM System/3 mdl 8 is an IBM 5408 Processing Unit mdl A14 (16K) ... IBM 8220, 3741 Data Station or 3741 programmable work station or IBM 4110, 5471 Printer-Keyboard ... IBM 5203 Printer ... IBM 5444 disk storage drive ... plus appropriate attachment features for the I/O devices.

The program product supports the use of the IBM 5445 Disk Storage Drive. Sufficient disk capacity is required to contain the system program and user data files. Tables 1 through 4 in Appendix A of the *System/3 Shop Loading and Control General Information Manual* (GH20-1240) may be used to estimate disk capacity requirements for data files on the



PROGRAM PRODUCTS

**S/3 Shop Loading and Control (cont'd)**

IBM 5444, 5445 and 3340 Disk Storage Drives. In addition, consult the appropriate System/3 manuals to determine total file requirements.

For the Model 6 and 8, special consideration must be given to the user's input/output volume requirements, with respect to the equipment capabilities. The speed of the I/O devices (for example, the printer, data recorder, and 3741 Data Entry Station) has a significant effect on the overall throughput, and must be thoroughly examined and evaluated relative to the user's overall system requirements.

In addition to the System Control Program, a minimum of 13K bytes is required to compile and execute the programs.

For the Model 8, 10 and 15 user, improved performance will result with additional main storage capacity as the overlay requirements will be reduced or eliminated.

**SOFTWARE REQUIREMENTS**

IBM System/3 programs are required for compilation and execution—

Model 8 & 10	Model 12	Model 6	Model 15
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Disk System Control Program	5702-SC1	5705-SC1	5703-SC1	5704-SC1
Disk RPG II	5702-RG1	5705-RG1	5703-RG1	5704-RG1
Disk Sort	5702-SM1	5705-SM1	5703-SM1	5704-SM1

The program product provides source code written in RPG II. The System/3 Bill of Material Processor (5702-M41) is required for the creation and maintenance of the item master, product structure, standard routing and work center master files.

This program product is released to work with System/3 Disk Release 7 and all subsequent releases, versions, and modifications unless so stated in a future revision of this document.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual (GH20-1240) ... The Production Information and Control System Manual (GE20-0280) ... System/3 Bill of Material Processor - Application Description Manual (GH20-0965) ... System/3 Bill of Material Processor Program Description Manual (SH20-1056) ... System/3 Inventory and Requirements Planning, Application Description Manual (GH20-0971) ... System/3 Inventory and Requirements Planning, Program Description Manual (SH20-1061).*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**SYSTEM/3 INVENTORY AND REQUIREMENTS PLANNING  
5702-M52**

**PURPOSE**

This program product is divided into four phases, inventory planning, projection, requirements planning, and execution. It is specifically designed to implement an inventory management and material planning system for manufacturing organizations.

**Inventory Planning:** Provides for the analysis of inventory items based on usage and cost. The output is useful for determining how the inventory items are to be controlled. Order point, safety stock and order quantity can be calculated using several techniques.

**Projection:** Analyses historical demand data and establishes estimates of demand for future time intervals. New forecasts are periodically projected and the item master records are updated.

**Requirements Planning:** Requirements are determined for component parts, subassemblies and raw materials utilizing forecasts, orders, bills of materials, production lead times and inventory levels. Individual assembly gross requirements may be altered between normal requirements generation runs. An output report provides detailed requirements information and an exception report highlights problem areas.

**Execution:** Input transactions, such as receipts and issues, are processed to update the item master record. Transaction listings highlight exceptions and order recommendations are produced. Inventory status reports are prepared for all or a portion of the item master file.

**HIGHLIGHTS**

- Classification of all inventory items.
- Selection of order point and order quantity calculation can be based on inventory classifications.
- Generation of order recommendation when available inventory is below calculated order point.
- Application of minimum, maximum and multiple values can be made during order quantity calculation.
- Maintenance of item averages, trends and forecasts performed using exponential smoothing.
- Planned orders established on basis of level by level explosion using offsetting of production (or procurement) lead times.
- Requirements exception report produced in sequence specified by user.
- Requirements alteration processing performed at option of user.
- Updating of inventory records based on input transactions.
- Order action or follow up notices produced as a result of transaction processing.
- Preparation of a periodic stock status report for management review.

**Use:** System/3 Inventory and Requirements Planning is direct access file-oriented utilizing data contained in the item master and product structure files. The records within these files may be created and maintained by System/3 Bill-of-Material Processor Program (5702-M41).

**CUSTOMER RESPONSIBILITIES**

A thorough knowledge and understanding of this program product before installation ... a thorough knowledge and understanding of the IBM System/3 Bill-of-Material Processor Program ... define contents and format of the item master and product structure files ... maintain accurate, up-to-date data ... provide open orders to the system ... provide file organization and maintenance of the item master and product structure files [the IBM System/3 Bill-of-Material Processor Program (5702-M41) may be used for this purpose].

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum configuration for IBM System/3 mdl 10 is an IBM 5410 Processing Unit mdl A14 (16K) ... Multi-Function Card Unit Attachment #4100 ... Printer Attachment #3970 ... IBM 5424 Multi-Function Card Unit mdl A1 ... IBM 5203 Printer mdl 1 ... Printer Attachment #5558 ... IBM 5444 Disk Storage Drive mdl 1.

The minimum configuration for IBM System/3 mdl 6 is an IBM 5406 Processing Unit mdl B4 (16K) ... Printer Attachment #3901 ... IBM 5213 Printer mdl 1 (85 cps) ... IBM 5444 Disk Storage Drive mdl 1.

For Card I/O on the IBM System/3 mdl 6, in addition to the minimum system, the IBM 5496 Data Recorder mdl 1 with attachment #7501 is required, and attachment #3210 is required for the IBM 5406 Processing Unit.

The minimum configuration for IBM System/3 mdl 15 is an IBM 5415 mdl A17 Processing Unit (48K), (mdl B17 with 3340 data module) with Multi-Function Card Unit Attachment #4100 and Printer Control Unit 5421 ... IBM 5424 Multi-Function Card Unit mdl A1 ... IBM 1403 Printer ... IBM 5444 disk storage drive mdl A2.

The minimum configuration for System/3 mdl 12 is an IBM 5412 mdl B16 Processing Unit (32K) ... IBM 5424 mdl A1 Multi-function Card

Unit and attachment ... IBM 3340 mdl C2 Disk Storage Drive ... IBM 5203 mdl 1 Printer.

The minimum configuration for IBM System/3 mdl 8 is an IBM 5408 mdl A14 Processing Unit (16K) ... IBM 8220, 3741 Data Station or 3741 programmable work station or IBM 4110, 5471 Printer Keyboard ... IBM 5203 Printer ... IBM 5444 disk storage drive ... plus appropriate attachment features for the I/O devices.

For card I/O on the IBM System/3 mdl 6, in addition to the minimum system, the IBM 5496 Data Recorder mdl 1 with attachment #7501 is required, and attachment #3210 is required for the IBM 5406 Processing Unit.

Sufficient disk capacity is required to contain the system program and user data files. Tables 1 and 2 of the *System/3 Inventory and Requirements Planning Application Description Manual* may be used. In addition, consult the appropriate System/3 manuals to determine total file requirements.

For the mdl 6 and 8, special consideration must be given to the user's input/output volume requirements, with respect to the equipment capabilities. The speed of the I/O devices (for example, the printer, data recorder and 3741 Data Entry Station) has a significant effect on the overall throughput, and must be thoroughly examined and evaluated relative to the user's overall system requirements.

In addition to the System Control Program, a minimum of 13K bytes is required to compile and execute the programs. Some programs use the Overlay Editor of RPG II.

For the mdl 8, 10 and 15 user, improved performance will result with additional core storage capacity as the overlay requirements will be reduced or eliminated.

**SOFTWARE REQUIREMENTS**

The programs required for the compilation and execution of the IBM System/3 Inventory and Requirements Planning are:

	Model 8 & 10	Model 12	Model 6	Model 15
Disk System Control Program	5702-SC1	5705-SC1	5703-SC1	5704-SC1
Disk RPG II	5702-RG1	5705-RG1	5703-RG1	5704-RG1
Disk Sort	5702-SM1	5705-SM1	5703-SM1	5704-SM1
Conversational Utilities*			5703-UT1	

The program product provides source code written in RPG II. The System/3 Bill-of-Material Processor (5702-M41) is required for the creation and maintenance of the item master and product structure files when all phases of the program product are implemented. If the user is only implementing the inventory control capability of the program, the programs of the requirements generation phase are not used and the product structure file is not required. The item master file may then be created and maintained using either the file creation and maintenance capability of System/3 Disk System RPG II or the System/3 Bill-of-Material Processor program product.

\* The System/3 mdl 6 Conversational Utilities Programs are required for data file preparation for mdl 6 systems that do not have the IBM 5496 Data Recorder, mdl 1, with the System/3 mdl 6 online feature.

**DOCUMENTATION**

(available from Mechanicsburg)

*Application Description Manual (GH20-0971) ... Promotional Brochure (G520-2505) ... Production Information and Control System Manual (GE20-0280) ... System/3 Bill-of-Material Processor - Application Description Manual (GH20-0965) ... System/3 Bill-of-Material Processor - Program Description Manual (SH20-1056) ... System/360 Inventory Control Application Description Manual (GH20-0471) ... System/360 Requirements Planning Application Description Manual (GH20-0487).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 HEALTH, WELFARE and PENSION SYSTEM  
5702-N11**

**PURPOSE**

The IBM System/3 Health, Welfare and Pension Fund System meets basic contribution accounting requirements for jointly administered health, welfare and pension funds. In addition, member, contribution, and claims information is maintained for improved management analysis and control.

The Health, Welfare and Pension Fund System program product provides a comprehensive, easily installed package which assumes minimum tailoring and no permanent user programming capability.

**HIGHLIGHTS**

- Contribution accounting including prelisting for both hourly and flat rate contribution funds.
- Notification of employer contribution shortage.
- Member contribution/history file.
- Claim history file.
- Employer contribution/history file including federal (D2) information requirements.
- Computer-prepared claim and pension checks.
- Inquiry facility for all primary files.
- Full maintenance of all system files.
- Data for typical eligibility determination.
- Control of all files, complete audit trail.

**Use:** The health, welfare and pension fund uses this system for contribution accounting, pension and claim check preparation, to provide data for eligibility determination and for analysis and control of its operation.

**CUSTOMER RESPONSIBILITIES**

A thorough knowledge and understanding of both current contribution accounting procedures and controls, and of the program product contribution accounting and controls ... any modification for unique requirements ... generation of system control program and program product ... coding and capture of required files and tables ... assignment of employer account numbers, claim codes, contract codes ... establishing individual audit requirements ... providing for manual supervision of controls and the integration of controls into the reporting framework used by the fund.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum Machine Configuration**

Description	Type	M/SF
Processing Unit (12K)	5410	A13
Multi-Function Card Unit Attachment	5424	A1 4100
Printer	5203	1
Printer Attachment		3970
36 Additional Positions		5560
Additional Positions Attachment		9496
Disk Storage Drive (2.45 M bytes)	5444	1
Printer-Keyboard Attachment	5471	1 4110
Data Recorder	5496	1

The file storage requirements will vary greatly from fund to fund based upon such factors as number of members, collection cycle, and claim rate characteristics. Additional information can be found in the *General Information Manual*.

Reconstruction from machine-readable media will require the purchase of additional 5440 Disk Cartridges.

**SOFTWARE REQUIREMENTS**

The Health, Welfare and Pension Fund System is written in RPG II and operates under the control of the IBM System/3 model 10 Disk System Control Programming (5702-SC1).

All files are indexed disk.

**Required Program Products**

- System/3 Model 10 Disk RPG II (5702-RG1)
- System/3 Model 10 Disk Sort (5702-SM1)

**DOCUMENTATION**

(available from Mechanicsburg)

*Information Manual* (GH20-1189) .

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 DISK RPG II  
5702-RG1****PURPOSE**

IBM System/3 Disk RPG II is a program product that operates under control of the System Control Programming. It is disk resident on the IBM 5444 Disk Storage Drive, and in addition to the functions provided by the Card RPG II, the Disk RPG II facilitates reading and writing disk records and updating existing disk files using card and disk input/output. A directly attached IBM 3741 Data Station is supported for input or output at compile or execution time. Disk RPG II can be used on IBM System/3 mdl 8.

**DESCRIPTION**

The 1442 is supported as an I/O device, and for reading RPG II source statements or data. Disk RPG II permits punching 256 characters (see GX20-1703) and packed decimal on the 1442.

The recording techniques used by all disk file organizations permit multiple records to be read or written with a single I/O instruction. Unlike previous data management techniques, System/3 disk files can be written or read using different blocking factors in different programs. This facility allows the user to process single records when a program uses a large amount of storage or to use as much core as available in processing multiple records to increase throughput.

Any of the disk data files created by System/3 object programs can be processed by any program on the System/3 which uses disk system management to access the files and has compatible disk storage.

The access methods supported are as follows:

1. Sequential
  - a) Consecutive processing - including updating in place.
  - b) Random processing - by relative record number including updating but excluding file loading.
2. Indexed
  - a) Random processing - by key.
  - b) Consecutive processing - by key including file loading.

Unlike previous indexed file organizations, the keys and data may be in a different physical sequence; i.e., the most active records may be placed in the front of the file with the index in sequence by item number.
3. Direct
  - a) Random Processing - by relative record number, including updating and file loading. The open routine on the file load clears the data area on disk.
  - b) Consecutive processing.

Standard System/3 disk labels are mandatory on all disk files. Non-standard labels cannot be used except as data records within the file.

In addition to the extensions to RPG implemented in the System/3 Card RPG II, Disk RPG II has the following language extensions:

- a) Chain Operation Code - User control of direct processing by key or relative record number through the calculation specifications. This facility can be used for chaining from one record to another record in the same file and user generation of the key or relative record number through program logic.
- b) Automatic Overlay - When a program generates too much object code for the stated machine size, the Disk RPG II Compiler will generate overlays to fit. Not all programs - even with overlays - can fit into the stated machine size. In any event, programs cannot be compiled that would exceed 64K without overlays.
- c) AND/OR - Relationships on calculation specifications.
- d) Square root operation code in calculation specifications.
- e) Display Operation Code - The ability to display messages on and accept data from the 5471 Printer-Keyboard.
- f) Spread card processing is provided for within RPG II.
- g) Output from the Disk RPG II Compiler may be loaded into the object program library or punched into cards or written on diskette for subsequent loading.
- h) Support for nonstandard (RPQ and OEM) devices is included. The user must provide a suitable I/O routine (object program) to support the nonstandard device. The remainder of the program written in RPG II will be linked with the user's I/O routine during program compilation.
- i) MOVEA operation code - provides the ability to move a field to an array or an array to a field. The move is left-justified and can begin at any element of the array. This gives the user the ability to access a field on a byte-by-byte basis.
- j) SETLL operation code—allows the user to set limits during calculations for processing indexed files within limits.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirement:** For source program compilation - an IBM System/3 model 10 which includes an IBM 5410 Processing Unit mdl

A13 (12K bytes), an IBM 5424 MFCU mdl A1 or an IBM 1442 Card Read Punch mdl 6, an IBM 5203 Printer mdl 1 or an IBM 1403 Printer mdl 2 and an IBM 5444 Disk Storage Drive mdl 1.

The object program generated by the Disk RPG II Compiler supports, in addition, all capacities of the IBM 5203 and 1403 Printers, IBM 5424 MFCU, 1442 mdl 7, 3741 Data Station/Programmable Workstation directly attached, 5444 Disk Storage Drive, 5445/5448 Disk Storage (see Disk RPG II 5445 Disk Storage Drive feature), 3410/3411 Magnetic Tape Subsystem (see Disk RPG II Magnetic Tape Feature), and 5410 Processing Unit of 12K bytes and above.

For source program compilation on a model 8 - an IBM 5408 Processing Unit mdl A14 (16K bytes), an IBM 5203 Printer, an IBM 5444 Disk Storage Drive mdl A1, and either an IBM 3741 Data Station/Programmable Workstation directly attached or an IBM 5471 Printer-Keyboard.

The object program generated by the Disk RPG II Compiler on the mdl 8 supports, in addition, all the capabilities of the IBM 5203 Printer, 3741 Data Station/Programmable Work Station directly attached, 5444 Disk Storage Drives, 5448 Disk Storage (see "Disk RPG II 5445 Disk Storage Drive Feature"), 3410/3411 Magnetic Tape Subsystems (see "Disk RPG II Magnetic Tape Feature"), and 5408 Processing Unit of 16K bytes and above.

**SOFTWARE REQUIREMENTS**

5702-SC1. For 3741 support, 5702-SC1 feature #6066/#6067 is required.

**DOCUMENTATION**

(available from Mechanicsburg)

*RPG II Reference Manual (SC21-7504) ... RPG II Additional Topics Programmer's Guide (GC21-7567) ... Disk Concepts and Planning Guide (GC21-7571) ... RPG II Disk File Processing Programmer's Guide (GC21-7566) ... Introduction to RPG II (GC21-7514) ... System/3 Bibliography (GC20-8080).*

**DISK RPG II TELECOMMUNICATIONS FEATURE  
FEATURES #6000 and #6002****PURPOSE**

This feature is applicable to IBM System/3 mdl 8. The Disk RPG II Telecommunications feature provides the user with the capability of sending or receiving binary synchronous data over voice grade or high speed\*\*\* communications lines. This support is achieved through the use of an RPG II Telecommunications Specifications Sheet, and the addition of BSCA (Binary Synchronous Communications Adapter) as a device entry on the RPG II File Description Specification. This RPG II support permits System/3 to function in one of the following communication modes:

Receive only ... Receive with conversational reply\*\*\* ... Transmit only ... Transmit with conversational reply\*\*\* ... Alternate transmit and receive file.\*\*\*

**DESCRIPTION**

The following RPG II language features are supported for communications:

Input, Output and Combined Files ... Demand Files for Transmit and Receive ... Blocking and Deblocking of Records ... Dual I/O Areas.

These BSCA features, options, and capabilities are supported by the feature:

Manual call ... Manual answer ... Auto-call ... Auto-answer ... Medium speed ... High speed ... Station selection ... EBCDIC data transparency ... Intermediate block checking ... EBCDIC or ASCII data and data link control characters. File translation of ASCII data can be accomplished by proper use of the file translate extension of RPG II.

System/3 with a BSCA supported by the RPG II Telecommunications feature can communicate with the following systems:

- Another System/3 with BSCA, program supported by RPG II Telecommunications feature.
- A System/32 with BSCA, program-supported by RPG II.
- A System/34 equipped with a Communications Adapter, program-supported by RPG II and Assembler.
- A System/360 mdl 20 with BSCA, program-supported by BSCA IOCS.
- S/360 mdl 22 or larger, S/370
- A 2770 Data Communication System.
- A 2780 Data Transmission Terminal.
- A 3741-2 Data Station/3741-4 Programmable Workstation.
- A 5110 Computer System supported as a 3741 mdl 2 or 4.
- A 5231 mdl 2 with BSCA (#2074). Receive mode only. Supported as a 3741 mdl 2 or 4.
- A 5280 Distributed Data System
- A Series/1 - Refer to Series/1 pages for appropriate features.

**S/3 Disk RPG II (cont'd)**

- A 6670 Information Distributor (as a 2770)
- A System/7 with BSCA (#2074)

This program provides the support to use System/3 in the following telecommunications networks:

Point-to-Point switched ... Point-to-Point nonswitched ...  
Multipoint (as a tributary station).

System/3 with BSCA is a compatible member of the IBM BSC family of terminals. It can be intermixed with other BSC terminals (System/360 mdl 20, 1130, 1800, 5280, System/32, System/34, 2770, 2780, 3741-2, 3741-4, 3780 and 2715 mdl 2) on a multipoint line when operating as a tributary station with a central System/360 or System/370 computer\* using DOS or OS BTAM. It can also share the same phone number at the central System/360 or System/370 computer\* with other BSC terminals (System/360 or System/370 computers\*\*, System/360 mdl 20, 1130, 1800, System/32, System/34, 2780, 2770, 3780, 3741-2, 3741-4 and 6670 (as a 2770), 2715 Model 2).

- \* System/360 mdls 22, 25 and 30 DOS, mdls 40, 50, 65, 67 (in 65 mode), and 75 with DOS and OS, and mdls 85, 91 and 195 with OS; System/370 mdls 135, 145 and 155 using DOS or OS, and mdl 165 using OS when operating in Basic Compatibility Mode.
- \*\* System/360 mdl 22 with DOS, mdls 25 and 30 with BOS/BPS or DOS/360, mdls 40, 50, 65, 67 (in 65 mode), and 75 with BOS/BPS, DOS or OS/360 and mdls 85, 91 and 195 with OS/360, System/370 mdl 135, 145 and 155 with DOS and OS, and mdl 165 with OS when operating in Basic Compatibility Mode.
- \*\*\* Not supported in communication with System/32, System/34, 5280, 2770, 2780, 3741-2 or 3741-4.
- \*\*\*\* Transmit interspersed with Receive is not supported in communication with 2770, 2780, 3741-2 or 3741-4.
- † Operator Identification Card Reader feature (#5450) and the Expanded Communications/Multipoint Data Link Control feature (#1685) on 3741-2, -4 are not supported.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirement:** For source compilation: same as Disk RPG II (5702-RG1).

For object program execution: Mdl 10 - an IBM 5410 Processing Unit with a BSCA (Feature #2074) ... Mdl 8 - an IBM 5408 Processing Unit with either the ICA (feature #4645) or the BSCA (feature #2074).

**SOFTWARE REQUIREMENTS**

5702-SC1; 5702-RG1.

**DOCUMENTATION**

(available from Mechanicsburg)

*RPG II Telecommunications Reference Manual (SC21-7507) ... System/3 Bibliography (GC20-8080).*

**DISK RPG II 5445 DISK STORAGE DRIVE FEATURE  
FEATURE #6012, #6014**

**PURPOSE**

This feature supports the 5448 on both the mdl 8 and mdl 10, but supports the 5445 on the mdl 10 only. The feature allows RPG II users to process data files on the 5445/5448 Disk Storage Drive.

**DESCRIPTION**

The File Description Specifications define the control information and device entry of the 5445/5448 Disk Storage Drive to the RPG II compiler.

This feature supports the 5445/5448 Disk Storage Drive for data files only. The same capability for data file storage and retrieval is provided for the 5445/5448 as is provided for the 5444. The file organizations supported by Disk RPG II are: Sequential, Direct, and Indexed.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirements:** For compilation on the mdl 8, the same requirements as Disk RPG II (5702-RG1). For object program execution, an IBM 5448 Disk Storage Drive is required.

For compilation on the mdl 10, the same requirements as Disk RPG II (5702-RG1). For object program execution, an IBM 5445 or 5448 Disk Storage Drive is required.

**SOFTWARE REQUIREMENTS**

5702-RG1; 5702-SC1; 5702-SC1 feature #6022/#6023 (5445 Support) or 5702-SC1 feature #6074 (5448 Support).

**Note:** For users of 5448 Disk Storage Drive, specify feature #6014 for 200-cylinder 5444 disk cartridge distribution.

**DISK RPG II MAGNETIC TAPE FEATURE  
FEATURE #6016 or #6018**

**PURPOSE**

This feature is applicable to IBM System/3 mdl 8. The Disk RPG II Magnetic Tape Feature provides the user with RPG II support to process data or record address files on magnetic tape. Records may be fixed or variable length and may be either blocked or unblocked. Minimum record or block length is 18 bytes; the maximum is 9,999 bytes.

The File Description Specifications define the control information and device entry of Magnetic Tape to the RPG II compiler.

The feature supports consecutive input and output files. The files may be recorded in either EBCDIC or ASCII code.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirement:** For source compilation: For both the mdl 8 and mdl 10 - the same requirements for compilation as Disk RPG II (5702-RG1). For object program execution: In addition to what is required for compilation, one or more units of the IBM 3410/3411 Magnetic Tape Subsystem are required.

**SOFTWARE REQUIREMENTS**

5702-RG1; 5702-SC1; 5702-SC1 feature #6024/#6025.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/3 Magnetic Tape Planning Manual (GC21-5040) ... System/3 Bibliography (GC20-8080).*

**Note:** For users of 5448 Disk Storage Drive, specify feature #6014 for 200-cylinder 5440 disk cartridge distribution.

**SYSTEM/3 MODEL 10 RPG II AUTO-REPORT FEATURE  
FEATURE #6028, #6029**

**PURPOSE**

This feature is applicable to System/3 mdl 8. The RPG II Auto-Report feature enhances the RPG II language by providing functions which eliminate much of the preparation and coding work normally done by the user when producing an application program in RPG II. It is specifically designed to facilitate report preparation.

**DESCRIPTION**

The Auto-Report program executes as a preprocessor to the RPG II compiler which is a prerequisite for the feature. The input to the program is RPG II source statements and new Auto-Report statements. Auto-Report produces a diagnostic listing, replaces the Auto-Report statements with generated or copied RPG II source statements and calls the RPG II compiler for execution.

**Features:** Coding of applications in RPG II is made easier by the following Auto-Report functions.

- Page Headings - the user need supply only the report title. Auto-Report generates skipping, spacing, horizontal alignment and date and page number constants. Page overflow is considered and the heading conditioned to print on the top of each page.
- Simplified Output Specifications - A single output field specification can result in Auto Report generated statement to:
  - indicate printing with editing,
  - place column heading over the data fields,
  - control spacing,
  - control horizontal alignment of data,
  - define total fields and calculation specifications to accumulate totals by control levels (total rolling)
  - flag total lines with asterisk indication.
- COPY - The COPY statement provides the ability to copy RPG II source statements from a disk library into the RPG II source program. Some values on the copied specifications may be modified for the resulting compilation.
- Source Program - The Auto-Report program passes control directly to the RPG II compiler to cause compilation of the expanded source program. In addition, users may elect to punch the source program so that they can make modifications which tailor the program more closely to their requirements. They can also elect to catalog to the Source Library a copy of the source program for later compilation.

The Auto-Report functions may be specified for one printer file in any RPG II program. Any RPG II specifications not related to the selected printer file and any RPG II statements for the printer file but not



## PROGRAM PRODUCTS

**S/3 Disk RPG II (cont'd)**

requesting Auto-Report functions, are passed to the RPG II compiler as a part of the source program.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirements:** Same as for RPG II.

This feature is applicable for the mdl 8 and has the same requirements as Disk RPG II.

**SOFTWARE REQUIREMENTS**

5702-RG1; 5702-SC1.

**DOCUMENTATION**

(available from Mechanicsburg)

*Disk System RPG II Auto-Report Feature General Information Manual (GC21-7563) ... RPG II Auto-Report Reference Manual (SC21-5057) System/3 Bibliography (GC20-8080).*

**RPG II 3270 DISPLAY CONTROL FEATURE  
FEATURE #6070****PURPOSE**

The RPG II 3270 Display Control feature provides telecommunications services for local or remote 3270 devices. This program is automatically linked into the RPG II application program via the SPECIAL file exit capability on the RPG II File Description Specification Sheet. Neither the Assembler nor the RPG II Telecommunications feature is required.

**DESCRIPTION**

The following services are provided by the 3270 Display Control feature:

- RPG II access to 3270 Display System terminals attached via the Local Communications Adapter (mdl 10), the Local Display Adapter, or Integrated Communications Adapter (mdl 8) or BSCA (mdls 8 and 10).
- Automatic buffering and queuing of terminal data
- A display formatting interface which permits the support of 3270 devices with coding in RPG II.
- Complete line control procedures are provided.
- Up to 18 terminals may be controlled (up to 12 can be attached via the Local Display Adapter on the mdl 8).
- Two subroutines are provided. SUBR13 allows an RPG II program to support the 3270 Information Display System without using CCP. Using SUBR14, an existing program using the 3270 Display Control Feature may be converted to execute under control of CCP by replacing SUBR13 references with SUBR14 references in the RPG II source program. The user must then make any adjustments required by CCP and recompile the program.
- Provides the capability of coding one or more applications within one program. No task switching is provided.

**Terminals Supported:** The following terminals and communications facilities are supported under the RPG II 3270 Display Control feature:

**With the Local Communications Adapter (mdl 10)**

- One 3275 Display Station and Control
- One 3271 Display Control Unit (mdl 1 or 2) with:
  - 3277 Display Station (mdl 1 or 2)
  - 3284 Printer (mdl 1 or 2)
  - 3286 Printer (mdl 1 or 2)
  - 3288 Printer (mdl 2)

**With the Local Display Adapter (mdl 8)**

- 3277 Display Station (mdl 1 or 2)
- 3284 Printer (mdl 1 or 2)
- 3286 Printer (mdl 1 or 2)
- 3288 Printer (mdl 2)

**Note:** A maximum of 12 terminals may be attached via the Local Display Adapter.

**With the Integrated Communications Adapter (mdl 8)**

- One 3275 Display Station and Control, or
- One 3271 Display Control Unit (mdl 1 or 2), with:
  - 3277 Display Station (mdl 1 or 2)
  - 3284 Printer (mdl 1 or 2)
  - 3286 Printer (mdl 1 or 2)
  - 3288 Printer (mdl 2)

**With the Binary Synchronous Communications Adapter (mdls 8 and 10)**

- 3275 Display Station and Control, or
- 3271 Display Control Unit (mdl 1 or 2), with:

- 3277 Display Station (mdl 1 or 2)
- 3284 Printer (mdl 1 or 2)
- 3286 Printer (mdl 1 or 2)
- 3288 Printer (mdl 2)

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS****Minimum System Requirements**

**Model 8...**The RPG II 3270 Display Control feature requires an IBM System/3 mdl 8 which includes an IBM 5408 Processing Unit mdl A16 (32K bytes)...An IBM 5444 A02 Disk Storage Drive...An IBM 5203 Printer...An IBM 5471 Printer-Keyboard or 3741 Data Station directly attached...An Integrated Communications Adapter, Local Display Adapter, or Binary Synchronous Communications Adapter...and one of the devices listed under "Terminals Supported".

**Model 10...**The RPG II 3270 Display Control feature requires an IBM System/3 mdl 10 which includes an IBM 5410 Processing Unit mdl A16 (32K bytes)...An IBM 5444 mdl 2 Disk Storage Drive...An IBM 5203 or 1403 Printer...An IBM 5424 MFCU or 1442 Card Read Punch...A Local Communications Adapter or Binary Synchronous Communications Adapter...and one of the devices listed under "Terminals Supported".

Using SUBR13, approximately 10K-13.5K bytes is added to the size of the object program; using SUBR14, 4.25K-5.25K bytes is added. The actual amount of resident overhead is determined by the user options selected, and that size can be increased to approximately 15K if the trace options are additionally selected when using SUBR13.

**SOFTWARE REQUIREMENTS**

5702-SC1, 5702-SC1 feature #6021, 5702-SC1 feature #6031 and 5702-RG1.

**COMPATIBILITY**

The System/3 mdl 8/10 RPG II 3270 Display Control feature is functionally compatible with the System/3 mdl 12 and System/3 mdl 15 RPG II 3270 Display Control feature.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM RPG II 3270 Display Control Feature Reference and Logic Manual (SC21-5161) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 DISK SORT PROGRAM  
5702-SM1**

**PURPOSE**

The IBM System/3 model 10 Disk Sort Program will sort any disk file organization supported by System/3 in ascending or descending sequence. This includes Indexed, Direct, and Sequential files.

**DESCRIPTION**

The files must be located on a 5444 Disk Storage Drive. The sort program will also accept fixed length records from magnetic tape files created by tape sequential access methods supported by System/3 data management. Output of the sort program may be created on either magnetic tape or disk. The sort program can select desired records from the input file to be included or excluded from the sort. Recognition of individual records can be based on:

- 1) Record code
- 2) Relation of a field to a constant
- 3) Relation of two fields in a record
- 4) Any relationship in a series (ORing)
- 5) All relationships in a series (ANDing)
- 6) Multiples of the above test in any combinations.

Control fields may be in a different location in records within the file.

Output from the sort program will be in three formats:

- 1) Tags - A file of three-byte binary relative record numbers in the sequence specified by the user.
- 2) Tagalong - A file of records containing the sort control fields and/or the data fields the user has specified. By using this option, the user can select only the data he needs from his input file to be included in the output. By specifying the entire input record as a tagalong field, the user can, in effect, accomplish a record sort.
- 3) Summary Tagalong - Records containing identical control fields are combined by summarizing (totaling) specified fields into one record.

Specification of record selection, sort parameters and tagalong data fields is accomplished by simple, RPG-like coding sheets that are similar to those used by the MFCU sort program.

Sort control card diagnostics and messages are printed on either the 5203 or 1403 Printers or the 5471 Printer-Keyboard, depending on which has been assigned to the system's logging function via the operator control language. If the logging function has been 'turned off,' the sort printed output will be suppressed.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirement:** An IBM System/3 model 10 which includes an IBM 5410 Processing Unit model A13 (12K bytes), an IBM 5424 MFCU model A1 or an IBM 1442 Card Read Punch model 6, an IBM 5203 Printer model 1 or an IBM 1403 Printer model 2 and an IBM 5444 Disk Storage Drive model 1.

For use on IBM System/3 model 8 - an IBM 5408 Processing Unit model A14 (16K bytes), an IBM 5203 Printer, an IBM 5444 Disk Storage Drive model A1, and either an IBM 3741 Data Station directly attached or an IBM 5471 Printer-Keyboard.

**SOFTWARE REQUIREMENTS**

5702-SC1; for tape support, 5702-SC1 feature #6024/#6025 is also required.

**DOCUMENTATION**

(available from Mechanicsburg)

*Disk Sort Reference Manual (SC21-7522) ... System/3 Bibliography (GC20-8080).*

**DISK SORT 5445 DISK STORAGE DRIVE FEATURE  
(Feature #6008/#6010)**

**PURPOSE**

This feature enables the user to sort all disk file organizations supported for System/3 in either ascending or descending sequence. This feature supports the 5448 on both the System/3 model 8 and model 10, but supports the 5445 on the model 10 only.

All functions available to the Disk System user through the Disk Sort Program (5702-SM1) are provided.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirement:** For the IBM Model 8 - the same requirements as the Disk Sort Program (5702-SM1) for the model 8, plus the IBM 5448 Disk Storage Drive (the 5448 requires a 5444 model A2 as a prerequisite).

For the IBM Model 10 - the same requirements as the Disk Sort Program (5702-SM1) for the model 10, plus the IBM 5445 or 5448 Disk Storage Drive (the 5448 requires a 5444 model 2 or A2 as a prerequisite).

**SOFTWARE REQUIREMENTS**

5702-SM1; 5702-SC1; 5702-SC1 feature #6022/#6023 (5445 Support) or 5702-SC1 feature #6074 (5448 Support).

Note: For users of 5448 Disk Storage Drive, specify feature #6010 for 200-cylinder 5440 disk cartridge distribution.

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 DISK RESIDENT MAGNETIC TAPE SORT  
5702-SM2****PURPOSE**

The IBM System/3 Disk Resident Magnetic Tape Sort program sorts fixed length, blocked and unblocked files residing on Magnetic Tape. The sort requires a system with a minimum of 12K bytes of core and three magnetic tape drives. Up to four magnetic tape drives may be utilized by the sort program. The file may be recorded in either EBCDIC or ASCII code, and may reside on multiple tape reels. (This feature is applicable to System/3 model 8.)

**DESCRIPTION**

The sort program can select desired records from the input file to be included or excluded from the sort. Recognition of individual records can be based on:

- Record code
- Relation of a field to a constant
- Relation of two fields in a record
- Any relationship in a series (ORing)
- All relationships in a series (ANDing)
- Multiples of the above test in any combinations

Control fields may be in a different location in records within the file.

Output from the sort program is in the following format:

A file of records containing the sort control fields and the data fields the user has specified. The user need select only the data he needs from his input to be included in the output. By specifying the entire input record as a tagalong field, the user can, in effect, accomplish a record sort.

Specification of record selection, sort parameters and tagalong data fields is accomplished by simple, RPG-like coding sheets that are similar to those used by the Disk Sort program, 5702-SM1. The addroot and summary sort capabilities of the Disk Sort are not supported in the Magnetic Tape Sort programs.

Sort control card diagnostics and messages are printed on the system output device.

Checkpoint/Restart is supported but does not require the SCP feature (5702-SC1, feature #6026/#6027). The maximum block or record size for input or output is 9,999 bytes. Input and output files may be multi-volume, but work files for the sort can be single volume files only.

To utilize all of the functions of this program, at least three 9-track work tapes must be available. If one or more of the work tapes is 7-track, then only those sort functions that relate to the standard System/3 64-character set (EBCDIC) are supported. As a result, sorts of packed decimal data, of signed numeric data, or on zones are not allowed in these 7-track configurations.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirements:** In addition to the minimum system requirements for 5702-SM1, an IBM System/3 model 8 or model 10 requires three magnetic tape drives. (When operating using DPF, a minimum program level of 8K is required).

**SOFTWARE REQUIREMENTS**

5702-SC1; 5702-SC1, feature #6024/#6025.

**DOCUMENTATION**

(available from Mechanicsburg)

*Tape Sort Program Reference Manual (SC21-7572). ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 DISK RESIDENT CARD UTILITIES  
5702-UT1**

**PURPOSE**

The following IBM System/3 Card System Utilities may be ordered as disk resident on an IBM 5444 Disk Storage Drive. Their function is the same as their card system equivalents:

MFCU Sort/Collate  
96-Column List  
Reproduce/Interpret  
Data Recording  
Data Verifying  
80-96 Conversion Program.

(This feature not applicable to IBM System/3 model 8.)

**DESCRIPTION**

The Model 10 Gangpunch program is available only for the disk system and provides the following capabilities:

- Interspersed master-card gangpunching: The master and detail cards are intermixed in the primary file.
- Count-controlled gangpunching: A fixed or variable counter may be used to punch a specified number of detail cards. The master card is in the secondary file and the detail cards are in the primary file.
- Match master cards and detail cards on a control field and punch into the detail card if a match occurs: The master card is in the secondary file and the detail card is in the primary file.
- The following functions may be performed with any of the major types of gangpunching described above: Offset gangpunching ... gangpunching consecutive numbers into detail cards ... gangpunching a constant into detail cards ... card interpretation (entire card or only what is punched) ... selection of a single type of master card from many master cards ... selection of a single type of detail card from many detail cards.
- For count-controlled and match fields processing, MFCU2 is used for input and MFCU1 is used for output. For interspersed processing, MFCU1 is used for both input and output.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirement:** An IBM System/3 model 10 which includes an IBM 5410 Processing Unit model A13 (12K bytes), an IBM 5424 MFCU model A1, an IBM 5203 Printer model 1 or 1403 Printer model 2 and an IBM 5444 Disk Storage Drive model 1.

An IBM 5475 Data Entry Keyboard is required if the Data Recording and/or Data Verifying programs are utilized.

An IBM 1442 Card Read Punch model 6 is required, in addition to the IBM 5424 MFCU, if the 80-96 Conversion program is utilized.

**SOFTWARE REQUIREMENTS: 5702-SC1.**

**DOCUMENTATION**

(available from Mechanicsburg)

*Sort Collate and Card Utilities Reference Manual (SC21-7529) ... System/3 80-96 Conversion Program and RPG Support for the 1442 Card Read Punch (SC21-7518) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 UTILITY PROGRAM FOR  
1255 MAGNETIC CHARACTER READER  
5702-UT2****PURPOSE**

This IBM System/3 utility program provides the disk oriented IBM System/3 model 10 user control of document processing on the IBM 1255 Magnetic Character Reader. It provides a means of reading MICR-encoded documents from the 1255, accumulating document totals and amount field totals for each pocket, and placing the data from the documents on output disk and printer files. The program is designed to fulfill the basic requirements of the "ON-US" data capture run required for all Demand Deposit Application programming. (This program is applicable to the IBM System/3 model 8.)

**DESCRIPTION**

The program reads fields from the documents as specified by the user and then, based on decisions indicated by the user, it will stacker select these documents into user-specified pockets. If requested, Modulus 10 and 11 checking will be performed. Then, after each document has been read and stacker selected, the utility will print user-specified fields from that document. Fixed-length records will also be created and placed on disk file (5444 or 5445 or 5448) or a tape file (3410 or 3411, 9-track only).

An additional facility provided by the program is the accumulation of document totals and amount field totals and then printing these at end of job. Subtotals may be printed at any time as indicated by the user during program execution.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Minimum System Configuration: Utility Program for the IBM 1255 Magnetic Character Reader will operate on a minimum configuration IBM System/3 model 10 which includes an IBM 5410 Processing Unit (12K bytes) with a Serial I/O Channel (#7081), an IBM 5424 MFCU (250 cpm read and 60 cpm punch and print), an IBM 5203 Printer (96 print positions and 100 lpm), or an IBM 1403 Printer (132 print positions and 600 lpm), an IBM 5444 Disk Storage Drive (2.45 million bytes) and an IBM 1255 Magnetic Character Reader. The minimum main storage required to support a system including an IBM 5445 or 5448 Disk Storage Drive or IBM 3410/3411 Magnetic Tape Subsystem is 16K bytes.

For use on IBM System/3 model 8 - an IBM 5408 Processing Unit model A14 (16K bytes), an IBM 5203 Printer, an IBM 5444 Disk Storage Drive model A1, and either an IBM 3741 Data Station directly attached or an IBM 5471 Printer-Keyboard. In addition, a Serial I/O Channel and an IBM 1255 Magnetic Character Reader is required.

**SOFTWARE REQUIREMENTS**

5702-SC1. For IBM 5445 support, 5702-SC1 feature #6022/#6023 is also required (model 10 only). For IBM 5448 support, 5702-SC1 feature #6074 (model 10 only - IBM 5448 mutually exclusive with SIOC on model 8). For tape support, 5702-SC1 feature #6024/#6025.

**DOCUMENTATION**

(available from Mechanicsburg)

*Utility Program For IBM 1255 Magnetic Character Reader Reference Manual (SC21-7521) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

JOB ANALYSIS SYSTEM/3 (JAS/3) 5702-XP1

PURPOSE

IBM Job Analysis System/3 (JAS/3) provides a powerful tool to aid management in fulfilling its responsibilities in the planning, supervising, and controlling of project-oriented work by the critical path method. It is designed to be a high performance system with features which make it easily usable by non-technical personnel.

JAS/3 operates under the System/3 Disk System Control Programs 5702-SC1 or 5703-SC1, 5704-SC1, 5704-SC2, or 5705-SC1. Depending on core availability, JAS/3 has a processing capacity of from 180 to 736 activities or work items and relationships per subnet depending on core size.

HIGHLIGHTS

Front-to-back interfacing of up to 10 subnets to form a network with up to 7,000 activities ... multiple networks per master file ... multiple calendars (each subnet in a network can have its own calendar) ... every relationship can have a lag ... multiple starts and ends (explicit or implicit) ... reports easily modifiable via control cards ... progress reporting specifying actual start date and/or remaining duration ... three types of schedule dates ... nine levels of milestones ... Direct Access Master File ... free-form data input.

Use: To use JAS/3, the customer must describe the activities which constitute the project network. This data is punched into cards or diskettes, for entry into the System/3 or can be entered directly from the keyboard. Processing and report requests can also be entered in either fashion.

CUSTOMER RESPONSIBILITIES

All users should be familiar with the various features of this system before attempting to use it for actual project control. Users will need a knowledge of the fundamentals of the critical path technique before they can prepare input.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum Configuration

Table with columns: System, Unit, Storage Size, Reader/Punch, Disk, Printer, Control Unit. Lists configurations for units A17, B17, D19, B16, A13, A14, B3.

Additional Supported Devices:

Table listing additional supported devices for units 5415, 5410, 5408, and 5406, including printer, keyboard, and carriage options.

Note: JAS/3 Does Not Support Spooling.

SOFTWARE REQUIREMENTS

JAS/3 is written in System/3 Basic Assembler language and operates under the IBM System/3 Disk System Control Program. On a system with Dual Programming feature, JAS/3 must run in Program Level 1.

DOCUMENTATION

(available from Mechanicsburg)

General Information Manual (GH20-1085) ... Program Description and Operations Manual (SH20-1176).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 DATA/3**  
**5702-XX1, 5704-XX1, 5704-XX3, and 5705-XX1**

**PURPOSE**

This program product provides users of IBM System/3 models 8, 10 Disk, 12 and 15 with a terminal-oriented data entry, inquiry, and file maintenance system. The specific functions it provides are data entry, data entry with master file input, inquiry, and inquiry with update.

**HIGHLIGHTS**

- Uses a program definition and a data definition form. Both are designed for ease-of-use with forms already familiar to the user.
- Easy to install and use via RPG-like forms and fill-in-the-blanks type prompting.
- DATA/3 generated programs do not require a dedicated system; that is, another program - batch or CCP - can be executed in the other program level or partition.
- DATA/3 generated programs can be executed under control of CCP.
- Places control and responsibility for data integrity at the data source.
- Offers up to four separate program security checks. Two are available in the DATA/3 generated programs; two additional checks are available when running under CCP.
- Requires no knowledge of programming languages by the terminal operator.
- Provides standard checking functions.

**DESCRIPTION**

**Data Entry:** Allows the operator to enter data on either a field or a record basis. It creates a single output file which can contain multiple record types depending on the application. Output files can be sequential, indexed, or direct. During data entry, the operator can page forward or backward through the entry screens. The definition of the output record format controls the program's flow by insuring that the proper input, edit, and output record display format operations are performed. If a field fails to pass a validity check, the field in error is intensified, indicating a correction must be made by the operator.

**Data Entry with Master File Input:** Allows the operator to extract information from up to eight existing master files and combine this information with data entered at the terminal. This combined data is displayed, verified or overridden by the operator, and incorporated into the output data file. Output files can be sequential or indexed, and, as above, the operator can page forward and backward through the entry screens during data entry.

**Inquiry:** This function allows access to records in a disk file by using a record key. When there are several inquiry screen format displays used by the program, the operator can switch from display to display. The program may also specify 'ease-of-reading' editing for numeric fields.

**Inquiry with Update:** This function provides file maintenance capability. When a record is accessed by key and displayed at the terminal, the operator can change the appropriate fields and direct the program to replace the record on disk with the new information. Data integrity is preserved by having user specify at program definition time which fields may be altered (unprotected) and which displayed fields may not be altered (protected). Records may also be added by the operator at the terminal.

**Use:** DATA/3 can be used in a wide variety of applications where a need exists for online data entry, data inquiry and file maintenance.

It is particularly suited for customer service ... order entry ... inventory and production control ... stockholder records ... credit control.

**CUSTOMER RESPONSIBILITIES**

Customizing DATA/3 to their specific needs. This will include the initial specification of the data files that DATA/3 generated programs will interface with. A data definition form is available.

Program definition forms are available for use when a program is to be generated using the DATA/3 facilities. These forms enable users to specify program name, security, data file interfaces, 3270 screen formats and field editing requirements of their various programs.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum configuration for IBM System/3 model 10 Disk System is IBM 5410 Processing Unit - 24K for Non-CCP or 32K for CCP ... IBM 5444 Disk Storage Drive model 2 ... IBM 5424 Multi-function Card Unit or 1442 Card Read Punch ... IBM 5203 Printer or 1403 Printer ... Local Communications Adapter (LCA) or Binary Synchronous Communications Adapter (BSCA) ... IBM 3270 Information Display System (minimum one display station). Programming Requirements include ... model 10 Disk System Control Programming (5702-SC1, Release 12 or later; or Release 13 if the Display Adapter is to be used) ... BSCA Multiline/Multipoint feature (5702-SC1, feature #6030/#6031), ...

Macros feature (5702-SC1, feature #6020/#6021) ... Overlay Linkage Editor and Checkpoint/Restart feature (5702-SC1 feature #6026/#6027) ... RPG II Compiler (5702-RG1).

The minimum configuration for the IBM System/3 model 8 is IBM 5408 Processing Unit model A16 (32K bytes) ... IBM 5444 Disk Storage Drive model A2 ... IBM 5203 Printer ... IBM 5471 Printer-KeyBoard or 3741 Data Station/Programmable Workstation directly attached ... Integrated Communications Adapter (ICA) or Binary Synchronous Communications Adapter (BSCA) or the Local Display Adapter ... IBM 3270 Information Display System (minimum one display station). Programming Requirements same as IBM System/3 model 10.

The minimum configuration for IBM System/3 model 12 is IBM 5412 Processing Unit B16 (32K) ... IBM 5424 MFCU or 1442 Card Read Punch or 3741 Data Station/Programmable Workstation directly attached ... IBM 5203 or 1403 Printer ... IBM 3340 DASF ... Integrated Communications Adapter (ICA) or Binary Synchronous Communications Adapter (BSCA) or Local Display Adapter ... IBM 3270 Information Display System (minimum one display station). Programming requirements include ... IBM model 12 System Control Programming (5705-SC1) ... RPG II Compiler (5705-RG1).

The minimum configuration for IBM System/3 model 15 is the same as for model 15 SCP, but in addition, the following are required: IBM 3270 Information Display System (minimum one display station) ... Local Communications Adapter (LCA) or BSCA or Display Adapter (FC4601); or the model 15D, the BSCC is supported by DATA/3, but only under CCP. Programming requirements for 5704-XX1 include the SCP (5704-SC1 Release 3 or later; or Release 4 if the Display Adapter is to be used) and RPG II Compiler (5704-RG1). Programming requirements for 5704-XX3 include the SCP (5704-SC2) and RPG II Compiler (5704-RG2).

Additional devices supported include additional 5444 or 5445 disks, 5448 disks, 3340 disks, 3344 disks, and multiple terminals (including printers) on the 3270 Information Display System. (Program Function Keys 1-5 are required on the 3270 terminals.) The Data Entry Keyboard is recommended on the 3270 terminals.

**SOFTWARE REQUIREMENTS**

DATA/3 generated programs are compiled and executed like any other RPG II program. The generated programs operate under control of the System/3 System Control Programming (SCP) as follows:

SYSTEM/3	DATA/3	SCP
Models 8 and 10	5702-XX1	5702-SC1
Model 12	5705-XX1	5705-SC1
Model 15	5704-XX1	5704-SC1
Model 15	5704-XX3	5704-SC2

**DOCUMENTATION**

(available from Mechanicsburg)

*DATA/3 Reference Manual (SC21-5102) S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 DISK FORTRAN IV  
5703-FO1**

**PURPOSE**

IBM System/3 Disk FORTRAN IV processes programs written in the IBM System/3 FORTRAN language, producing output suitable for execution with the IBM System/3 model 6 System Control Programming (5703-SC1). (This program is not used with the model 4).

**HIGHLIGHTS**

The System/3 FORTRAN language contains those features defined in American National Standard Basic FORTRAN, X3.10.1966; language extensions supported by IBM 1130 Basic FORTRAN; and additional features and capabilities previously available only with certain IBM Full FORTRAN compilers. These features include:

- The DEBUG facility, which enables the user to locate errors in a FORTRAN source program. By use of four basic statements, the debug facility provides for tracing flow within a program and between programs, and for checking the validity of subscripts.
- The IMPLICIT statement, which enables the user to specify the type (including length) of all variables, arrays, and user-supplied functions whose name begins with a particular letter.
- Length specification for INTEGER and REAL type statements, which allows the explicit specification of the INTEGER\*2, INTEGER\*4, REAL\*4, and REAL\*8 (double precision) data types.
- The relational IF statement, which is used to direct the transfer of control after the evaluation of relational expressions.
- List-directed input/output, which permits reading and writing of formatted data without a FORMAT statement.
- The GENERIC statement, which enables the user to specify a single name for a FORTRAN built-in or library function having several names. Depending on argument type, the correct function is selected by the compiler with each appearance of the name.
- IBM FORTRAN language extensions INVOKE, PROGRAM and GLOBAL, which allow FORTRAN main programs to be loaded successively into main storage and executed, while permitting these programs to share a common data area. These language extensions provide function equivalent to 1130 FORTRAN CALL LINK.
- Names of up to six characters for variables, arrays, functions, and subroutines.

**DESCRIPTION**

The System/3 Disk FORTRAN IV library contains mathematical and service subprograms required during execution to perform arithmetic operations, input and output constant conversion and input/output control.

System/3 Disk FORTRAN IV is supplemented by a Commercial Subroutine Package which is equivalent in function to the 1130 Commercial Subroutine Package with the exception that I/O routines for the model 6 version are not provided. Therefore, FORTRAN I/O must be used for model 6 device support.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Configuration:** For compilation and execution, a System/3 model 6 with a minimum of 12K bytes of main storage is required. Disk FORTRAN IV requires a minimum of 9K bytes of main storage for compilation - exclusive of control program requirements.

- 1 - IBM 5406 Central Processing Unit (model B03)
- 1 - IBM 5444 Disk Drive (model 1)
- 1 - IBM 5213 Printer (model 1) or 2222 Printer (model 1)

**Additional Device Support**

IBM 5406 Central Processing Unit (model B04) ... IBM 5213 Printer models 2 or 3 ... IBM 2222 Printer model 2 ... IBM 5444 Disk models 2 or 3 ... IBM 5496 Online Data Recorder with IBM System/3 model 6 attachment feature ... IBM 129 Online Data Recorder with card I/O attachment feature (supported as IBM 5496). FORTRAN supports the IBM 3741 directly attached as an input or output device for compilation only.

**Prerequisite:** EC 571595 is required for all IBM System/3 model 6 CPUs on which System/3 FORTRAN will be run.

**SOFTWARE REQUIREMENTS**

5703-SC1; 5703-SC1 feature #6010/#6011.

**COMPATIBILITY**

System/3 Disk FORTRAN IV source programs for System/3 model 6 are compatible with the System/3 Disk FORTRAN IV for System/3 model 10 except for changes required to accommodate differences in attached I/O. The System/3 Disk FORTRAN IV compiler accepts source programs written in the IBM System/360 Basic FORTRAN IV language, which encompasses American National Standard Basic FORTRAN as defined in X3.10.1966. The compiler also accepts source programs written in the IBM 1130 Basic FORTRAN language with minor modifications.

**PERFORMANCE**

The System/3 Disk FORTRAN IV will compile and execute approximately 100 source statements on a 12K system with increased capacity on a 16K system.

The System/3 Disk FORTRAN will compile and execute in 9K of main storage, exclusive of control program requirements. Object time performance is dependent on program type, size, I/O functions performed and other factors pertinent to program execution speed.

**DOCUMENTATION**

(available from Mechanicsburg)

*FORTRAN Reference Manual (SC28-6874) ... FORTRAN Commercial Subroutines (SC28-6875). ... S/3 Bibliography (GC20-8080).*

**Multiple Program Requests:** Program Products and System Control Programming type 5703 (System/3 model 4 or 6) which are ordered from PID for shipment at the same time will be shipped to the user stacked on a 5440 disk cartridge (or equivalent)\* under the following conditions:

1. The scheduled ship date, seven-digit customer number and CPU number must be the same for all programs ordered.
2. All of the program feature orders must specify the same cylinder size (100 cyl or 200 cyl). (Note: Model 4 uses only 200-cylinder disks).
3. The total storage requirements of the programs ordered must not exceed the number of available cylinders indicated by the specify number (100 or 200 cylinders).\*
4. The announcement of availability must indicate that the program can be stacked.

\* More than one disk cartridge may be required.

**Action Required:** Sufficient lead time is necessary to facilitate the proper coordination of System Control Programming and program products shipped from PID, and the system installation date. The following procedures must be followed:

- System Control Programming and program products are shipped from PID on 5440 Disk Cartridge. A cartridge may either be supplied by the user or it may be ordered from IBM.
- Orders may be submitted directly to PID for 5440 disk cartridges to be used for program deliveries.
- Orders will be scheduled for shipment from PID the Friday of the second week following AAS order entry, unless a later scheduled ship date is requested. Customer disks must arrive at PID the Tuesday before the Friday scheduled date.
- The branch must verify that System Control Programming and program products are on order and scheduled for shipment from PID to ensure their arrival concurrent with systems delivery.
- When rescheduling a system, the branch must also ensure that associated System Control Programming, program products, and disks are also properly rescheduled.

Failure to adhere to the above procedures can result in late shipment of programs and late installations.

**System/3 Model 4 Program Products Minimum System Requirements**

Program Products	5404	5213	5447	SCP 5703-SC1
RPG II	X	X	X	X
Disk Sort Program	X	X	X	X
CCP/Disk Sort	X	X	X	X
Conversational Utilities	X	X	X	X



PROGRAM PRODUCTS

S/3 Disk FORTRAN IV (cont'd)

System/3 Model 6 Program Products Minimum System Requirements

Program Products	5406				SCP
	8K	12K	5213	5444	5703-SC1
Model 6 RPG II	X		X	X	X
Model 6 Sort	X		X	X	X
Model 6 Conversational Utility Programs					
-Keyboard Data Entry	X		X	X	X
-Keyboard Source Entry	X		X	X	X
-Data Interchange Utility	X		X	X	X
1255 Magnetic Character Reader Utility (plus 1255)		X	X	X	X
System/3 BASIC	X		X	X	
Disk FORTRAN IV		X	X	X	X

Note: To support the 3741 directly attached or 2265, a minimum of 12K 5406 is required.

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 HEALTH, WELFARE AND PENSION FUND  
SYSTEM (5703-N11)**

**PURPOSE**

The IBM System/3 Health, Welfare and Pension Fund System meets basic contribution accounting requirements for jointly administered Health, Welfare and Pension Funds. In addition, member, contribution, and claims information is maintained for improved management analysis and control. The program is designed for the System/3 model 6.

The compact System/3 model 6 offers for the first time all the benefits of a stored program system to a large number of smaller funds, while avoiding significant facility problems. The Health, Welfare and Pension Fund System program product provides a comprehensive, easily installed package which assumes minimum tailoring and no permanent user programming capability.

**HIGHLIGHTS**

- Contribution accounting including prelisting for both hourly and flat rate contribution funds
- Notification of employer contribution shortage
- Member contribution/history file
- Claim history file
- Historic employer contribution file
- Computer prepared claim and pension checks
- Inquiry facility for all primary files
- Full maintenance of all system files
- Data for typical eligibility determination
- Utilization of the low cost System/3 model 6
- Control of all files, complete audit trail

**Use:** The Health, Welfare and Pension Fund will use this system for contribution accounting, pension and claim check preparation, to provide data for eligibility determination and for analysis and control of its operation.

**CUSTOMER RESPONSIBILITIES**

A thorough knowledge and understanding of both current contribution accounting procedures and controls and of the program product contribution accounting and controls ... any modification for unique requirements ... generation of system control program and program product ... coding and capture of required files and tables ... assignment of employer account numbers, claim codes, contract codes ... establishing individual audit requirements ... providing for manual supervision of controls and the integration of controls into the reporting framework used by the fund.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum Machine Configuration**

Description	Type	M/SF
Processing Unit (12K)	5406	B3
Printer Attachment		3902
Printer (132 positions)	5213	2
Disk Storage (2.45 M bytes)	5444	1

The file storage requirements will vary greatly from fund to fund based upon such factors as number of members, collection cycle, and claim rate characteristics. Additional information can be found in the *General Information Manual*. Please contact your Regional Insurance Industry Marketing representative or the Insurance System Center, Princeton, New Jersey, for further assistance.

Reconstruction from machine-readable media will require the purchase of additional 5440 Disk Cartridges.

**SOFTWARE REQUIREMENTS**

The Health, Welfare and Pension Fund system is written in RPG II and operates under the control of the IBM System/3 model 6 System Control Program (5703-SC1).

All files are indexed disk.

**Required Program Products - System/3 Model 6**

- RPG II (5703-RG1)
- Conversational Utilities (5703-UT1)
- Disk Sort (5703-SM1)

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual* (GH20-1189).

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 MODEL 6 RPG II  
5703-RG1**

**PURPOSE**

IBM System/3 model 6 RPG II is a program product that operates under control of the System Control Programming. It is disk resident, and in addition to the functions provided by the S/3 Disk RPG II (5702-RG1), the S/3 model 6 RPG II supports operator keyboard console and other unique devices, as indicated below.

**DESCRIPTION**

The recording techniques used by all disk file organizations permit multiple records to be read or written with a single I/O instruction. Unlike previous data management techniques, System/3 disk files can be written or read using different blocking factors in different programs. This facility allows the user to process single records when a program uses a large amount of storage or to use as much core as available in processing multiple records to increase throughput.

System/3 Model 6 RPG II supports three types of file organization - Sequential, Indexed, and Direct. Direct files are addressed by relative record number; records may be loaded or retrieved by specifying the number of the record in the file.

The access methods supported are as follows:

1. Sequential
  - a) Consecutive processing - including updating in place.
  - b) Random processing - by relative record number including updating but excluding file loading.
2. Indexed
  - a) Random processing - by key.
  - b) Sequential processing - by key including file loading. Unlike previous indexed file organizations, the keys and data may be in a different physical sequence; i.e., the most active records may be placed in the front of the file with the index in sequence by item number.
3. Direct
  - a) Random processing - by relative record number, including updating and file loading. The open routine on the file load clears the data area on disk.
  - b) Consecutive processing.

Standard S/3 disk labels are mandatory on all disk files. Non-standard labels cannot be used except as data records within the file.

When a program generates too much object code for the specified size, the compiler will generate overlays. Not all programs - even with overlays - can fit into the stated machine size. In any event, programs cannot be compiled that would exceed 64K without overlays.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**System Configuration:** An IBM System/3 model 4 workstation system includes: IBM 5404 Processing Unit model A18 (64K bytes) ... IBM 5447 Disk Storage and Control ... IBM 5213 Printer ... IBM 3277 Display Station model 1 ... at least one locally attached terminal. (Note: The 3277 is supported only by CCP; RPG II does not use the 3277.) A minimum IBM System/3 model 6 configuration includes: IBM 5406 Processing Unit model B2 (8K bytes) ... IBM 5444 Disk Storage Drive ... IBM 5213 or 2222 Printer.

**Devices Supported:** The following devices and features are supported by RPG II object programs:

Mdl 4	Mdl 6	Description
	X	129 Card Data Recorder mdl 1, 2 or 3
	X	2222 Printer mdl 1 or 2 (including Ledger Card Device and second tractor)
	X	2265 Display Station mdl 2 (5406-B3 or B4 is required)
	X	3741 Data Station mdl 1 or 2 directly attached
	X	3741 Programmable Workstation mdl 3 or 4 directly attached
	X	5213 Printer mdl 1, 2 or 3
X		5213 Printer mdl 3
X		5404 Processing Unit mdl A18
	X	5406 Processing Unit mdl B2, B3 or B4
	X	5444 Disk Storage Drive mdl 1, 2, 3
X		5447 Disk Storage and Control mdl A1 or A2
	X	5496 Data Recorder mdl 1

**SOFTWARE REQUIREMENTS**

5703-SC1 for IBM 3741 support, 5703-SC1 feature #6026/#6027 is required.

**COMPATIBILITY**

System/3 model 6 RPG II is source language compatible with RPG II for other System/3 models, except for differences due to different hardware.

Disk data files created by disk system management are compatible across System/3 models.

**DOCUMENTATION**  
(available from Mechanicsburg)

*System/3 Models 4 and 6 RPG II Reference Manual (SC21-7517) ... Introduction to RPG II (GC21-7514) ... RPG II Additional Topics Programmer's Guide (GC21-7567) ... RPG II Disk File Processing Programmer's Guide (GC21-7566) ... Disk Concepts and Planning Guide (GC21-7571) ... S/3 Bibliography (GC20-8080).*

**RPG II TELECOMMUNICATIONS FEATURE**  
(Feature #6000 or #6002)

**PURPOSE**

The RPG II Telecommunications feature provides the user with the capability of sending or receiving binary synchronous data over voice grade or high speed communications lines. This support is achieved through the use of an RPG II Telecommunications Specification Sheet, and the addition of BSCA (Binary Synchronous Communications Adapter) as a device entry on the RPG II File Description Specification. This RPG II support permits System/3 to function in one of the following communication modes:

- Receive only
- Receive with conversational reply\*\*\*
- Transmit only
- Transmit with conversational reply\*\*\*
- Alternate transmit and receive file\*\*\*\*

**DESCRIPTION**

The RPG II language features supported for communications are:

Input, Output and Combined Files ... Demand Files for Transmit and Receive ... Blocking and Deblocking of Records ... Dual I/O Areas.

These BSCA features, options, and capabilities are supported by the feature:

Manual call ... Manual answer ... Auto-call ... Auto-answer ... Medium speed ... High speed ... Station selection ... EBCDIC data transparency ... Intermediate block checking ... EBCDIC or ASCII data and data link control characters. File translation of ASCII data can be accomplished by proper use of the file translate extension of RPG II.

System/3 with a BSCA supported by the RPG II Telecommunications feature can communicate with the following systems:

Another System/3 with BSCA, program-supported by RPG II Telecommunications feature.

A System/32 with BSCA (#2074), program-supported by RPG II.

A System/34 equipped with a Communications Adapter, program-supported by RPG II and Assembler.

A System/360 model 20 with BSCA, program-supported by BSCA IOCS.

A System/360 (or System/370 when operating in Basic Compatibility mode) program-supported by DOS BTAM, OS BTAM, or OS TCAM\*.

A 2770 Data Communication System.

A 2780 Data Transmission Terminal.

A 3741-2 Data Station.†

A 3741-4 Programmable Work Station.†

A 5110 Computer System supported as a 3741 model 2 or 4.

A 5230 Data Collection System with BSCA (#2074). Receive mode only. Supported as a 3741 model 2 or 4.

A 5280 Distributed Data System with Communications Adapter (#2500).

A Series/1 - Refer to Series/1 pages for appropriate features.

A 6670 Information Distributor (as a 2770).

A System/7 with (#2074)

This program provides the support to use System/3 in the following telecommunications networks:

Point-to-Point switched ... Point-to-Point nonswitched ... Multipoint (as a tributary station).

System/3 with BSCA is a compatible member of the IBM BSC family of terminals. It can be intermixed with other BSC terminals (System/360 model 20, 5280, System/32, System/34, 1130, 1800, 2770, 2780 and 2715 model 2, 3780, 3741-2) on a multipoint line when operating as a tributary station with a central System/360 or System/370 computer\* using DOS or OS BTAM. It can also share the

**S/3 Mdl 6 RPG II (cont'd)**

same phone number at the central System/360 or System/370 computer\* with other BSC terminals (System/360 or System/370 computers\*\*, System/360 model 20, System/32, System/34, 5280, 1130, 1800, 2780, 2770 and 2715 model 2, 6670 (as a 2770), 3780, 3741-2, -4).

\* System/360 models 22, 25 and 30 with DOS/360, models 40, 50, 65, 67 (in 65 mode), and 75 with DOS/360 and OS/360 and models 85, 91 and 195 with OS/360. System/370 models 135, 145 and 155 with DOS and OS and model 165 with OS when operating in Basic Compatibility mode.

\*\* System/360 models 22, 25 and 30 with BOS/BPS or DOS/360, models 40, 50, 65, 67 (in 65 mode), and 75 with BOS/BPS, DOS or OS/360 and models 85, 91 and 195 with OS/360. System/370 models 135, 145 and 155 with DOS and OS and model 165 with OS when operating in Basic Compatibility mode.

\*\*\* Not supported in communications with System/32, System/34, 2770, 2780 and 3741-2, -4.

\*\*\*\* Transmit interspersed with Receive is not supported in communication with 2770, 2780 or 3741-2, -4.

† Operator Identification Card Reader feature (#5450) and the Expanded Communications/Multipoint Data Link Control feature (#1685) on 3741-2, 4 are not supported.

The functions and specifications for the System/3 model 6 RPG II Telecommunications feature are identical to those of the System/3 model 10 Disk RPG II Telecommunications feature.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This program can be used on the IBM System/3 model 4 or model 6. Minimum requirements are the same as for RPG II (5703-RG1).

For object program execution - the Binary Synchronous Communications Adapter (#2074) is required. For System/3 model 6, an IBM 5406 model B3 or B4 is required to support communications with an IBM 2770 or 2780.

**SOFTWARE REQUIREMENTS**

5703-RG1; 5703-SC1

**DOCUMENTATION**

(available from Mechanicsburg)

*RPG II Telecommunications Programming Reference Manual (GC21-7507). ... System/3 Bibliography (GC20-8080).*

**RPG II AUTO-REPORT FEATURES  
(Features #6008, #6009)****PURPOSE**

The RPG II Auto-Report feature enhances the RPG II language by providing functions which eliminate much of the preparation and coding work normally done by the user when producing an application program in RPG II. It is specifically designed to facilitate report preparation.

The IBM System/3 Auto-Report program executes as a preprocessor to the RPG II compiler which is a prerequisite for this feature. The input to the program is RPG II source statements and Auto-Report statements. Auto-Report produces a diagnostic listing, replaces the Auto-Report statements with generated or copied RPG II source statements and calls the RPG II compiler for execution.

**DESCRIPTION**

Coding of applications in RPG II is made easier by the following Auto-Report functions.

- Page Headings - The user need supply only the report title. Auto-Report generates skipping, spacing, horizontal alignment and date and page number constants. Page overflow is considered and the heading conditioned to print on the top of each page.
- Simplified Output Specifications - A single output field specification can result in Auto-Report generated statements to:
  - Indicate printing with editing
  - Place column heading over the data fields
  - Control spacing
  - Control horizontal alignment of data
  - Define total fields and calculation specifications to accumulate totals by control levels (total rolling),
  - Flag total lines with asterisk indication.
- COPY - The COPY statement provides the ability to copy RPG II source statements from a disk library into the RPG II source program. Some values on the copies specifications may be modified for the resulting compilation.
- Source Program - The Auto Report program passes control directly to the RPG II compiler to cause compilation of the expanded source program. In addition, the user may elect to catalog to disk a copy

of the source program so that he can make modifications which tailor the program more closely to his requirements.

The Auto-Report functions may be specified for one printer file in any RPG II program. Any RPG II specifications not related to the selected printer file and any RPG II statements for the printer file but not requesting Auto-Report functions, are passed to the RPG II compiler as a part of the source program.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**System Configuration:** This program can be used on the IBM System/3 model 4 or model 6. Minimum requirements are the same as for RPG II (5703-RG1).

**SOFTWARE REQUIREMENTS**

5703-RG1; 5703-SC1.

**DOCUMENTATION**

(available from Mechanicsburg)

*RPG II Auto-Report Reference Manual (SC21-5057) ... System/3 Bibliography (GC20-8080)*

**RPG II 3270 DISPLAY CONTROL FEATURE  
(Feature #6030 - Model 4 only)****PURPOSE**

The RPG II 3270 Display Control feature provides telecommunications services on the IBM model 4 for local or remote IBM 3270 devices. This program is automatically linked into the RPG II application program via the SPECIAL file exit capability on the RPG II File Description Specification Sheet. The RPG II Telecommunications feature is not required.

**DESCRIPTION**

The following services are provided by the RPG II 3270 Display Control feature:

- RPG II access to 3270 Display System terminals attached to the CPU or the Binary Synchronous Communications Adapter.
- Automatic buffering and queuing of terminal data.
- A display formatting interface which permits the support of 3270 devices with coding in RPG II.
- Complete line control procedures are provided.
- Up to 18 terminals may be controlled (up to 5 can be attached to the CPU).
- Two subroutines are provided. SUBR13 allows an RPG II program to support the 3270 Information Display System without using CCP. Using SUBR14, an existing program using the 3270 Display Control feature may be converted to execute under control of CCP by replacing SUBR13 references with SUBR14 references in the RPG II source program. The user must only then make any adjustments required by CCP and recompile the program.
- Provides the capability of coding one or more applications within one program. No task switching is provided.

**Terminals Supported:** The following terminals and Communication facilities are supported by the RPG II 3270 Display Control feature:

**With the Binary Synchronous Communications Adapter**

- 3275 Display Station and Control
- 3271 Display Control Unit (models 1 or 2) with:
  - 3277 Display Stations (models 1 or 2)
  - 3284 Printer (models 1 or 2)
  - 3286 Printer (models 1 or 2)
  - 3288 Printer (model 2)

**Directly to CPU**

- 3277 Display Stations (models 1 or 2)
- 3284 Printer (models 1 or 2)
- 3286 Printer (models 1 or 2)
- 3288 Printer (model 2)

**Note:** A maximum of 5 terminals may be attached to the CPU.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS****Minimum System Requirements**

The RPG II IBM 3270 Display Control feature requires an IBM System/3 model 4 which includes an IBM 5404 Processing Unit model A18 (64K bytes)...an IBM 5447 Disk Storage and Control ... an IBM 5213 model 3 Printer...and one of the devices listed under "Terminals Supported".

Using SUBR13, approximately 10.25K-13.75K bytes is added to the size of the object program; using SUBR14, 4.25K-5.25K bytes is



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PP 5703-RG1.3

Mar 83

Major Revision

PROGRAM PRODUCTS

**S/3 Mdl 6 RPG II (cont'd)**

added. The actual amount of resident overhead is determined by the user options selected, and that size can be increased to approximately 15K if the trace options are optionally selected when using SUBR13.

**SOFTWARE REQUIREMENTS**

5703-SC1, 5703-RG1

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM RPG II 3270 Display Control Feature Reference and Logic Manual (SC21-5161) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 MODEL 6 DISK SORT PROGRAM  
5703-SM1****PURPOSE**

This IBM System/3 model 6 disk sort program sorts any disk file organization supported by IBM System/3 disk systems management in ascending or descending sequence. This includes Indexed, Direct, and Sequential files. The sort program can select desired records from the input file to be included or excluded from the sort. Recognition of individual records can be based on:

- 1) Record code
- 2) Relation of a field to a constant
- 3) Relation of two fields in a record
- 4) Any relationship in a series (ORing)
- 5) All relationships in a series (ANDing)
- 6) Multiples of the above tests in any combinations.

**DESCRIPTION**

Control fields can be in a different location in records within the file.

Output from the sort program will be in one of three formats:

- 1) Tags - A file of 3-byte binary relative record numbers in the sequence specified by the user.
- 2) Tagalong - A file of records containing the sort control fields and/or the data fields the user has specified. By using this option, the user can select only the data he needs from his input file to be included in the output. By specifying the entire input record as a tagalong field, the user can, in effect, accomplish a record sort.
- 3) Summary Tagalong - Records containing identical control fields are combined by summarizing (totaling) specified fields into one record.

Specification of record selection, sort parameters and tagalong data fields is accomplished by simple, RPG-like coding sheets.

The functions and syntax of specification statements for the System/3 model 6 Disk Sort program are identical with those of the System/3 model 10 Disk Sort. An output data file created by the System/3 model 6 Disk Sort can be processed by any System/3 program which uses disk system management to access the file.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM System/3 model 4 workstation system includes: IBM 5404 Processing Unit model A18 (64K bytes) ... IBM 5447 Disk Storage and Control ... IBM 5213 Printer ... IBM 3277 Display Station model 1 ... at least one locally attached terminal. (Note: The IBM 3277 is supported only by CCP; the Disk Sort Program does not use the 3277.)

The minimum System/3 model 6 configuration includes: IBM 5406 Processing Unit model B2 (8K bytes) ... IBM 5444 Disk Storage Drive ... IBM 5213 or 2222 Printer.

**Devices Supported**

The following devices are supported by the Disk Sort program:

Model 4	Model 6	Description
	X	129 Card Data Recorder model 1, 2 or 3
	X	2222 Printer model 1 or 2
	X	2265 Display Station model 2 (5406 model B3 or B4 is required)
	X	3741 Data Station model 1 or 2 directly attached
	X	3741 Programmable Workstation model 3 or 4 directly attached
	X	5213 Printer model 1, 2 or 3
X		5213 Printer model 3
X		5404 Processing Unit model A18
	X	5406 Processing Unit model B2, B3 or B4
	X	5444 Disk Storage Drive model 1, 2 or 3
X		5447 Disk Storage and Control model A1 or A2
	X	5496 Data Recorder model 1

For Sort Specification input: IBM 129, 3741, 5444, 5447, 5496, or operator keyboard/console.

For input, work and output files: IBM 5444, 5447

For diagnostics and messages: IBM 2222, 2265, 5213

**SOFTWARE REQUIREMENTS**

5703-SC1. For IBM 3741 support, 5703-SC1 feature #6026/#6027 is required.

**DOCUMENTATION**

(available from Mechanicsburg)

*Disk Sort Reference Manual* (SC21-7522) ... *S/3 Bibliography* (GC20-8080).

**TERMS and CONDITIONS:** See PP Index



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PP 5703-SM2.1

Mar 83

Major Revision

PROGRAM PRODUCTS

**CCP/DISK SORT PROGRAM (Model 4 Only)  
5703-SM2**

**PURPOSE**

This program is functionally compatible with the IBM System/3 model 6 Disk Sort program (5703-SM1). With the CCP/Disk Sort program, however, the user can generate an object module which can be executed as a task under control of the Communications Control program (CCP) (5703-SC1 feature #6033), or as a program in batch (non-CCP) mode.

This program requires 12K bytes of main storage (exclusive of control program requirements) for both generation and execution, and automatic allocation of sort work files is not supported.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

An IBM System/3 model 4 workstation system includes: IBM 5404 Processing Unit model A18 (64K bytes) ... IBM 5447 Disk Storage and Control model A1 or A2 ... IBM 5213 Printer model 3 ... IBM 3277 Display Station model 1 ... at least one locally attached terminal. (Note: The IBM 3277 is supported only by CCP).

**SOFTWARE REQUIREMENTS**

5703-SC1; 5703-SC1 feature #6011. For execution under CCP: 5703-SC1 feature #6033.

**DOCUMENTATION**

(available from Mechanicsburg)

*Disk Sort Reference Manual (GC21-7522) ... S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 MODEL 6 CONVERSATIONAL UTILITY PROGRAMS  
5703-UT1**

**PURPOSE**

There are three IBM System/3 Conversational Utility programs that are disk resident and operate under control of the SCP:

The Keyboard Data Entry program allows the user to key data directly onto the disk. It will format records according to user specifications and output an indexed disk file which can later be processed by a user RPG II program or the Sort program. Additional functions of the program include the ability to correct records and take hash or control totals.

The Keyboard Source Entry program allows the user to key source statements (RPG II) or procedures directly from the keyboard to the source library on disk. The source statements may be in the form of RPG II source programs, format records for the Keyboard Data Entry program, Utility control statements, etc. The disk library is in a format which is acceptable to the system and to the RPG II compiler. Additional features include the ability to correct source statements.

The Data Interchange Utility allows the user to convert disk data files created by disk system management (such as RPG II - produced data files) into BASIC data files, and vice versa. The files are not converted in place; instead, a new file is created. The user must specify the format of his RPG II records and the fields to be converted. The final output will be acceptable to the new system.

(Note: The Data Interchange Utility is not used with the model 4). Data files created by the System/3 model 6 Conversational Utilities can be processed by any System/3 program which uses disk system management to access the files. The exception is that data files that are converted by the Data Interchange Utility (DIU) program to System/3 BASIC format are accessible only by System/3 BASIC and by DIU.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

An IBM System/3 model 4 workstation system includes: IBM 5404 Processing Unit model A18 (64K bytes) ... IBM 5447 Disk Storage and Control ... IBM 5213 Printer ... IBM 3277 Display Station model 1 ... at least one locally attached terminal. (Note: The IBM 3277 is supported only by CCP; the Conversational Utilities do not use the 3277.)

A minimum IBM System/3 model 6 configuration includes: IBM 5406 Processing Unit model B2 (8K bytes) ... IBM 5444 Disk Storage Drive ... IBM 5213 or 2222 Printer.

**SOFTWARE REQUIREMENTS**

5703-SC1.

**DOCUMENTATION**  
(available from Mechanicsburg)

*System/3 Model 4 and 6 Conversational Utilities Reference Manual (SC21-7528) ... S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 UTILITY PROGRAM FOR  
1255 MAGNETIC CHARACTER READER  
5703-UT2**

**PURPOSE**

This utility program allows the IBM System/3 model 6 user to control document processing on the IBM 1255 Magnetic Character Reader. It provides a means of reading MICR-encoded documents from the 1255, accumulating document totals and amount field totals for each stacker, and placing the data from the documents on output disk and printer files. The program is designed to fulfill the basic requirements of the "ON-US" data capture run required for all Demand Deposit Application programming.

The program will read fields from the documents as specified by the user and then, based on decisions indicated by the user, it will stacker select these documents into user-specified stackers. If requested, Modulus 10 or 11 checking will be performed. Then after each document has been read and stacker selected, the utility will print user-specified fields from that document. Fixed-length disk records will also be created and placed on a disk file.

An additional facility provided by the program is the printing of document totals and amount field totals at end of job. Subtotals may be printed during program execution at times selected by the user.

The utility program is functionally compatible with System/3 model 10 Disk System Utility program for 1255 Magnetic Character Reader.

(This program is not used with the model 4.)

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This program requires an IBM 5406 Processing Unit model B3 or B4 with a Serial I/O Channel (#7081) ... IBM 5444 Disk Storage Drive model 1, 2 or 3 ... IBM 5213 Printer model 1, 2 or 3 or IBM 2222 Printer model 1 or 2 ... and IBM 1255 Magnetic Character Reader model 1, 2 or 3.

**SOFTWARE REQUIREMENTS:** 5703-SC1.

**DOCUMENTATION**

(available from Mechanicsburg)

*1255 Utility Reference Manual (SC21-7527) ... S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index

**STAT/BASIC FOR SYSTEM/3 MODEL 6  
5703-XA1****PURPOSE**

STAT/BASIC is an interactive program encompassing the most commonly used statistical techniques for the analysis of numerical data. The program operates on an IBM System/3 model 6.

STAT/BASIC is designed to meet the needs of the statistician, engineer, researcher or business analyst. It helps in using the computer directly for statistical analyses. A statistically-oriented user should have no difficulty in quickly learning the capabilities of the program. The interactive mode of the package allows a non-data processing-oriented user to use the program with ease, with a minimum of training.

Direct use on the System/3 model 6 provides the user with fast results. Because of the interactive nature of STAT/BASIC, the user can sit at the keyboard and see the results of his analyses as they are developed. Delays and some of the sources of error familiar in batch processing are eliminated with STAT/BASIC.

**DESCRIPTION**

STAT/BASIC consists of 40 procedures, written in the BASIC language, providing a wide range of capabilities under the following categories:

Data Generation - Read ... Print Edit ... Transformation.

Elementary Statistics - Cross Tabulation ... Histogram ... Tally ... Moments ... T-test ... Chi-square.

Regression and Correlation Analysis - Correlation ... Simple Regression ... Stepwise Regression ... Multiple Regression ... Polynomial Regression.

Multivariate Analysis - Discriminant Analysis ... Canonical Correlation ... Factor Analysis Part 1 ... Factor Analysis Part 2.

Analysis of Variance - One-way Analysis of Variance ... Factorial Design.

Nonparametric Statistics - Kendall Rank Correlation ... Sign Test ... Wilcoxon's Matched-pairs Signed-ranks Test ... Cochran Q Test ... Friedman Two-way Analysis of Variance ... Mann-Whitney U Test ... Kendall Coefficient of Concordance ... Biserial Correlation ... Point-biserial Correlation ... Tetrachoric Correlation ... Phi Coefficient.

Time Series Analysis - Moving Average ... Seasonal Analysis ... Cyclical Analysis ... Auto-covariance and Auto-correlation ... Cross-covariance and Cross-correlation ... Triple Exponential Smoothing.

Biostatistics - Survival Rate ... Probit Analysis.

On a System/3 model 6, the maximum size of a data matrix that can be processed is 300 rows (observations) by 30 columns (variables).

Exceptions are:

- For the edit and transformation programs, this limitation of 300 rows and 30 columns applies, but the number of rows (N) times the number of columns (M) must not exceed 3500 ( $N \times M \leq 3500$ ).
- For the chi-square and Kendall coefficient of concordance programs, the maximum size of a data matrix is 100 rows by 30 columns.

**HIGHLIGHTS**

- A comprehensive set of statistical procedures.
- A user with a knowledge of statistics can learn the program capabilities with a minimum of effort.
- Interactive mode simplifies usage.
- Calculations performed in short or long precision.
- Extensive error checking with correction facilities.
- Instructional messages clarify procedures or options available.

**Use:** The user may utilize any of the STAT/BASIC programs through the console keyboard with System/3 model 6. The user first types a few systems commands and the name of the desired statistical program. Following a Ready indication, STAT/BASIC guides the user through his problem by typing out procedural instructions. Alternate courses of action or options are usually in the form of questions, which the user answers by typing the appropriate replies.

**CUSTOMER RESPONSIBILITIES**

The STAT/BASIC programs are distributed in machine-readable form for loading into the user system. Once stored, it is available to any member of the organization authorized to use the system.

If confidential information is to be stored in the library, the user must take appropriate steps to safeguard against unauthorized access.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The size of the user area required to run the STAT/BASIC procedures is a function of the number of statements in an individual procedure and the amount of data processed in short and long precision.

All procedures, with the exception of the transformation procedure, can be executed in short precision in a user area of 40,000 bytes with a symbol table size of 9,000 bytes.

All procedures, with the exception of the transformation procedure, can be executed in long precision in a user area of 50,000 bytes with a symbol table size of 16,300 bytes. The transformation procedure cannot be executed in long precision; it can be executed in short precision in a user area of 50,000 bytes with a symbol table size of 10,800 bytes.

IBM System/3 Model 6 ... The minimum system is the same as that required for System/3 BASIC, specifically IBM 5406 Processing Unit model B2 (8K) ... one IBM 5444 Disk Storage Drive model 1 ... one IBM 5213 Printer model 1.

**SOFTWARE REQUIREMENTS**

STAT/BASIC is written in BASIC. To run the program on an IBM System/3 model 6 requires the System/3 BASIC (5703-XM1) program product.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual (GH20-1027)*.

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 BASIC  
5703-XM1****PURPOSE**

IBM System/3 BASIC is a stand-alone, total facility interactive programming system. BASIC enables the user to enter BASIC statements, commands, utilities, BASIC data, and Desk Calculator (DCALC) instructions all in a completely interactive environment.

**DESCRIPTION**

System programs, source programs, and data files are stored on disk for direct accessibility. The system uses a virtual memory concept to allow the user to compile and execute large programs that otherwise would not fit into main storage.

System/3 BASIC, besides having a complete interactive interface to the user through the operator keyboard console, also provides the ability for continuous execution of stacked jobs without operator intervention.

Input to the System/3 BASIC is in the form of commands, data, or BASIC statements from either the keyboard console or from cards. Output is to the printer and/or to the 2265 model 2 Display Station. The disk is an input or output device as well as temporary and permanent storage for all forms of user data or programs.

DCALC (Desk Calculator) is a function of BASIC allowing the user to use the system as a large, highly sophisticated electronic desk calculator. No user knowledge of programming is necessary to put DCALC to its full use.

DCALC will give the user the ability to add, subtract, multiply, divide, and compute powers, roots, trigonometric functions, etc. Special procedures can be defined and stored into DCALC for future use. All of the functional routines (built-in functions) within BASIC are available to the DCALC user, except for the DET function.

The user has full control over his BASIC program with the command language. Commands are analyzed and result in the requested action being performed immediately upon the system. These commands allow the user intervention before, during, and after BASIC program execution.

A set of utilities are included in System/3 BASIC to allow for system generation and disk pack usage. The utilities give disk copy, file allocation, configuration, analysis, initialization, and track assignment capabilities to the user.

**PERFORMANCE**

The BASIC compiler can compile a 500-statement BASIC source program in 30 to 35 seconds. The BASIC program can be listed at a rate of approximately 60 statements-per-minute on the 5213 model 1 Printer (assuming the average statement is 40 characters long).

DCALC will respond to any user input within two seconds.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirements:** The minimum system configuration for System/3 BASIC, DCALC, and the utilities is: An IBM 5406 Processing Unit model B2 (8K bytes), an IBM 5213 Printer model 1 or an IBM 2222 Printer model 1 and an IBM 5444 Disk Storage Drive model 1.

**Additional units and features supported are:** IBM 5406 Processing Unit models B3 (12K bytes) and B4 (16K bytes), IBM 5213 Printer models 2 and 3, IBM 2222 Printer model 2, IBM 5496 Data Recorder with System/3 model 6 Attachment feature, IBM 129 Card Data Recorder with System/3 model 6 Card Input/Output feature, additional capacities of the IBM 5444 Disk Storage Drive, and the IBM 2265 model 2 Display Station. (Support of the 2265 requires a minimum of 12K bytes of main storage and the eight additional command keys.)

**Note:** A co-resident system requires a minimum of 4.90 million bytes of 5444 disk storage for operation.

System/3 BASIC is not supported on the model 4.

**SOFTWARE REQUIREMENTS:** None.

**DOCUMENTATION**

(available from Mechanicsburg)

*BASIC Reference Manual (GC34-0001) ... BASIC Operator's Guide (GC34-0003) ... S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index

**MATH/BASIC for SYSTEM/3 MODEL 6  
5703-XM2****PURPOSE**

IBM System/3 MATH/BASIC is a set of conversational routines for the solution of the most frequently encountered mathematical problems in science and industry. The library operates on an IBM System/3 model 6.

MATH/BASIC is designed to meet the needs of the engineer and scientist. The conversational features of MATH/BASIC allow a non-data processing-oriented user to use the programs with a minimum of training.

**HIGHLIGHTS**

- A comprehensive set of mathematical routines.
- Calculations in short and long precision.
- Control of operation in the case of ill-conditioned problems and error messages.
- Ease-of-use due to conversational mode.

**DESCRIPTION**

MATH/BASIC consists of 44 routines providing computing capabilities in the following areas:

Linear equations, matrix eigenvalue problem.  
Zeros of polynomials, zeros and minima of functions.  
Quadrature/differentiation  
Interpolation, approximation and smoothing.  
Ordinary differential equations.  
Discrete Fourier transform.  
Special functions.  
Linear programming.

**Use:** The user can utilize any of the MATH/BASIC routines through a System/3 model 6 console keyboard.

The user first enters a few systems commands and the name of the desired MATH/BASIC routine. Following a READY indication, MATH/BASIC guides the user through his problem by printing procedural instructions. Alternate courses of action or options are described usually in the form of questions, which the user answers by entering the appropriate replies.

**CUSTOMER RESPONSIBILITIES**

The MATH/BASIC program is distributed in machine-readable form for loading into the user's system. Once stored, it is available to any member of the organization authorized to use the system.

If confidential information is to be stored in the library, the user must take appropriate steps to safeguard against unauthorized access.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum configuration for the IBM System/3 model 6 is the same as that required for System/3 BASIC, that is, one IBM 5406 Processing Unit model B2 (8K) ... one IBM 5444 Disk Storage Drive model 1 ... one IBM 5213 Printer model 1.

**SOFTWARE REQUIREMENTS**

MATH/BASIC is written in the BASIC language. To run the program on an IBM System/3 model 6 requires the System/3 BASIC (5703-XM1).

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual* (GH20-1128) .

**TERMS and CONDITIONS:** See PP Index

**BUSINESS ANALYSIS/BASIC FOR  
SYSTEM/3 MODEL 6  
5703-XM3****PURPOSE**

Business Analysis/BASIC is a comprehensive set of interactive routines for use on the IBM System/3 model 6.

It consists of 30 routines written in the BASIC language, providing the problem-solver professional with procedures for data generation and maintenance, spread sheet analysis, investment analysis, break-even or cost-volume-profit analysis, depreciation analysis, and time series analysis. The program is designed so that a detailed knowledge of programming is not required.

**DESCRIPTION**

Business Analysis/BASIC includes 30 interactive routines for assisting the problem-solver in exercising the following functions:

- Spread Sheet Analysis:
  - Spread Sheet data file creation and update
  - Spread Sheet report formatting
- Investment Analysis:
  - Return-on-Investment computation
  - Discounted Cash Flow analysis
  - Loan analysis (multiple and single)
  - Lease vs Purchase analysis
  - Make vs Buy analysis
- Break-Even Analysis:
  - Break-even with definite assumptions
  - Break-even with probabilistic assumptions
- Depreciation Analysis:
  - Straight line depreciation
  - Sum-of-years digits depreciation
  - Declining balance depreciation
  - Equipment units depreciation
- Time Series Analysis:
  - Compound growth rate projection
  - Moving average
  - Seasonal analysis
  - Cyclical analysis
  - Autocovariance and Autocorrelation
  - Crosscovariance and Crosscorrelation
  - Exponential Smoothing
  - Simple Regression
- Graphic Presentation:
  - Histograms
  - Exponential Smoothing Plots
- Routine and File Indexing:
  - Business Analysis/BASIC routine index
  - User-created data file log
- Data Generation and Maintenance:
  - Create and update data files
  - Select and rearrange records in data files and spread sheet data files
  - Resequence records in data files and spread sheet data files
  - Print data files

**HIGHLIGHTS**

- Comprehensive set of analytical routines to assist the user in examining investment alternatives and in preparing financial plans.
- Spread sheet analysis capability for report creation and update.
- Interactive features include instructional messages, flexible control of calculations, extensive error checking, and data editing.

**Use:** The professional analyst can utilize any of the Business Analysis/BASIC routines through the System/3 model 6 console keyboard.

The user first enters a few systems commands (LOGON, EDIT, etc.) and the name of the desired Business Analysis/BASIC routine. Following a READY indication, the Business Analysis/BASIC routine guides the user through his problem by typing out procedural instructions. Alternative courses of action or options are presented in the form of questions, which the user answers by entering the appropriate replies.

**CUSTOMER RESPONSIBILITIES**

The user must have the necessary computer configuration as described below. The user will also need the associated program product for his system as mentioned under "Programming Systems".

Business Analysis/BASIC program is distributed in machine-readable form for loading into the user's system. Once stored, it is available to any member of the organization authorized to use the system.

If the user has confidential information to be stored in disk files, it will be his responsibility to take appropriate steps to safeguard against unauthorized access.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum configuration for the System/3 model 6 is the same as that required for IBM System/3 BASIC, that is, one IBM 5406 Processing Unit model B2 (8K), one IBM 5444 Storage Drive model 1, and one IBM 5213 Printer model 1.

**SOFTWARE REQUIREMENTS**

Business Analysis/BASIC is written in the BASIC language. To run the program on an IBM System/3 model 6 requires System/3 BASIC (5703-XM1).

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual* (GH20-1175) ... *Promotional Flyer* (G520-2527).

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

SYSTEM/3 MODEL 15 BASIC ASSEMBLER  
5704-AS1; 5704-AS2

PURPOSE

The IBM System/3 model 15 Basic Assembler program is a program product that processes source programs written in the Basic Assembler language, and produces executable object programs. The program is disk resident on an IBM 5444 Disk Storage Drive or 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-AS2 only). 5704-AS1 is used with SCP 5704-SC1, and 5704-AS2 is used with SCP 5704-SC2.

DESCRIPTION

The Basic Assembler language is a symbolic programming language used to write programs. Some of the features provided by the program and its language are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Convenient Data Representation
- Operand Field Expressions
- Source Identification - Sequence Fields
- Assembler Instructions
- Source Program Listing
- Cross-Reference Listing
- Error Checking and Diagnostic Messages

The Basic Assembler may be used for assembly of relocatable subroutines for use with model 15 RPG II, COBOL, or FORTRAN. The subroutines, written in the Basic Assembler language, are coded by the user and separately assembled. The process of program linking is accomplished during compilation of the RPG II, COBOL, or FORTRAN source programs by means of the Overlay Linkage Editor.

Source input to the Assembler can be from the system input device (card reader, 3741 directly attached, or 3277 keyboard), from a source library, or from a source file generated by the macro processor. Work files for the Assembler can be on either a 5444 or 5445 Disk Storage Drive, or a 3340 Direct Access Storage Facility or 3344 Direct Access Storage. The Overlay Linkage Editor may be used to generate executable object programs.

Model 15 Basic Assembler Device Support

	Source Assembly	Object Execution
5444 Disk Storage Drive (5704-AS1 only) model A2 or A3	Yes	Yes
5445 Disk Storage (5704-AS1 only) model 1, 2 or 3	Yes	Yes
3340 Direct Access Storage Facility model A2, B1 or B2	Yes	Yes
3344 Direct Access Storage (5704-AS2 only) model B2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2, or 3	No	Yes
1403 Printer model 2, 5, or N1	Yes	Yes
3277 Display Station model 1	Yes**	Yes
5424 MFCU model A1 or A2	Yes	Yes
2560 MFCM model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
2501 Card Reader model A1 or A2	Yes	Yes
3284 Printer model 1	Yes	Yes
1255 MCR model 1, 2 or 3	No	Yes
3881 OMR model 1	No	Yes
3741 (directly attached) model 1, 2, 3 or 4	Yes	Yes
BSCA, 1 or 2 lines, LCA, or DA	No	Yes
Main Storage Requirements		
5704-AS1	10-48K	up to 48K
5704-AS2	10-48K	up to 56K*

\* Object program size can be up to 56K, depending on the CCP, spool and configuration options selected during system generation.

\*\* Assembler and system halts are logged on the 3277. Source statements may be entered from the keyboard.

Stand-Alone Programs: The Basic Assembler can be used to create a stand-alone program. The object program is punched into cards. Program loading is performed with an initial program loader through the alternate IPL device (MFCU, MFCM, or 1442). Stand-alone programs are coded entirely by the user with no dependence on other programming support.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: The same as for SCP\* (5704-SC1 for 5704-AS1; 5704-SC2 for 5704-AS2).

\* Note: The IBM 1403 printer should be equipped with the Universal Character Set feature and a PN (60-character set) interchangeable train cartridge. A 48-character set (for example, HN or AN arrangement) can be used with the Assembler; however, the user must be willing to accept substitute characters.

SOFTWARE REQUIREMENTS

5704-SC1 for 5704-AS1; 5704-SC2 for 5704-AS2.

COMPATIBILITY

System/3 model 15 Basic Assembler is functionally equivalent to the Basic Assembler programs on other System/3 models. Four mnemonics are unique to model 15: Load CPU (LCP), Store CPU (SCP), Command CPU (CCP), and Supervisor Call (SVC). When converting from another System/3 model, there may be changes required in macro statements.

DOCUMENTATION

(available from Mechanicsburg)

Assembler Reference Manual (SC21-7509) ... Components Reference Manual (GA21-9236) ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 15  
SUBSET ANS COBOL COMPILER AND LIBRARY  
5704-CB1; 5704-CB2**

**PURPOSE**

Model 15 COBOL is a program product that operates under control of the IBM System/3 model 15 System Control Programming. 5704-CB1 is used with SCP 5704-SC1, and 5704-CB2 is used with SCP 5704-SC2. The compiler and library are disk resident on the IBM 5444 Disk Storage Drive or 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-CB2 only). The compiler requires as input a COBOL source language program and produces as output, by means of the system's Overlay Linkage Editor, a System/3 machine language object program, either cataloged in an object library, punched into 80- or 96-column cards, or written onto a diskette.

System/3 COBOL supports Grade 1 Braille for both compiler listings and object program printed output. Minimum requirements include a 132-print position printer with 8 lines/inch spacing (1403 Printer); the compiler requires a 14K partition in order to produce Braille listings. A user-provided elastic strip is attached over the printer hammers to produce the Braille characters.

Source input to the compiler can be from the system input device (card reader, 3741 directly attached, or 3277 keyboard) or from a source library. Work files for the compiler can be on any 5444 or 5445 Disk Storage Drive or on a 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-CB2 only). The Overlay Linkage Editor is used to generate object programs.

**American National Standard COBOL Considerations**

The U.S. Industry standard for COBOL is American National Standard (ANS) COBOL. ANS COBOL, X3.23-1968, was approved by the American National Standards Institute (ANSI) on August 23, 1968. The following functional processing modules of the ANSI standard are included in the System/3 model 15 Compiler.

1 Nucleus	1, 2
1 Sequential Access	1, 2
1 Random Access	0, 2
1 Library	0, 2
2 Table Handling	1, 3
1 Segmentation	0, 2

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level in the American National Standards Institute Standard (0 implies that the module may be completely missing from the standard compilers). The third digit represents the highest level in the ANSI standard.

The international standard for COBOL is ISO Recommendation Number 1989, which was approved by ISO (International Organization for Standardization) in 1972. System/3 model 15 COBOL bears the same relation to the ISO standard as to the ANSI standard, inasmuch as the two standards are identical in technical content.

**Additional:** In addition to the standard language, the following additional features are provided:

- Extensions to the modules of American National Standard COBOL listed above, comprising:
  - Certain language elements which are defined in higher levels of the American National Standard COBOL than those listed.
  - Certain language elements defined by the CODASYL Programming Language Committee but not yet included by ANSI in American National Standard COBOL.
  - IBM-developed extensions consistent with those supported by the System/360 and 370 OS and DOS ANS COBOL compilers and 1130 ANS COBOL compiler.
- ROLLOUT/ROLLIN support allows a COBOL object program to be interrupted during execution. This is provided by invocation of a supplied program via a CALL statement (CALL "CBROLL"). ROLLOUT/ROLLIN is not supported in 5704-CB2.
- The interval timer is supported for time-of-day functions. This is provided by invocation of a supplied (SCP) subroutine via a CALL 'CFTOD' statement.

**Support of 3277 Display Station:** A model 15 COBOL object program supports the 3277 as a destination device for the DISPLAY and ACCEPT commands. Record lengths of 1 to 120 characters may be processed by ACCEPT, and records of 1 to 107 characters may be processed by DISPLAY. The 78-key Operator Console Keyboard is used for data input.

**Disk File Support:** The access methods supported for 5444, 5445, 3340 and 3344 are the same as those supported by other System/3 COBOL compilers, and are as follows:

**Sequential Organization**

- Consecutive Processing - including updating in place.
- Random Processing - by relative record number including updating but excluding file loading.

**Indexed Organization**

- Random Processing - by key.
- Sequential Processing - by key including file loading.

**Direct Organization**

- Random Processing - by relative recording number, including updating and file loading.
- Consecutive Processing.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except for data records within the file.

Record size can range from 1 byte to 32K bytes, and records may be processed as blocked or unblocked. Logical records may span physical disk sectors, tracks or cylinders.

Multi-volume indexed files are supported.

**Tape File Support:** The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by other System/3 COBOL compilers. COBOL object programs can process data on magnetic tape; highlights include:

- Consecutive input or output files
- 1 - 4 tape drives
- Fixed length records, blocked or unblocked
- Variable length records, blocked or unblocked
- Record size from 18 to 32,768 bytes
- Block size from 18 to 32,768 bytes
- IBM Standard Labels, ANSI labels, no labels
- Option for two I/O areas
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multi-volume files
- Single file or multi-file volumes
- Recording format: EBCDIC (7- or 9-track) or ASCII (9-track only)

**Printer Support:** COBOL supports the 1403 as follows: Space 0, 1, 2, or 3 before or after printing a line; skip to line number before or after printing a line; overflow detection.

COBOL supports the 3284 Printer the same way it does the 1403, except that space 0 after print is not allowed.

**Card I/O Support:** Model 15 COBOL supports the MFCU, MFCM, 1442, and 2501 as follows:

	MFCU	MFCM*	1442	2501
Read	Yes	Yes	Yes	Yes
Punch	Yes	Yes	Yes	No
Card Print	Yes	Yes	No	No
Stacker Select (punch only)	Yes	Yes	Yes	No
Associated file	Yes	Yes	No	No
Character set (EBCDIC)	64	256	256	256

\* MFCM support is similar to MFCU support; six lines of card printing is possible on the MFCM (optional feature on model A1 only).

**Diskette Support:** Data can be read from a diskette using ACCEPT verb. In addition, for 5704-CB2 only, a directly-attached 3741 can be specified as an input or output device in the ASSIGN clause of the SELECT statement.



## PROGRAM PRODUCTS

## Subset ANS COBOL Compiler and Library (cont'd)

## Model 15 COBOL Device Support

	Compilation	Execution
5444 Disk Storage Drive (5704-CB1 only) model A2 or A3	Yes	Yes
5445 Disk Storage (5704-CB1 only) model 1, 2 or 3	Yes	Yes
3340 Direct Access Storage Facility model A2, B1, or B2	Yes	Yes
3344 Direct Access Storage (5704-CB2 only) model B2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2, or 3	No	Yes
1403 Printer model 2, 5, or N1	Yes	Yes
3277 Display Station model 1	Yes*	Yes
5424 MFCU model A1 or A2	Yes	Yes
2560 MFCM model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
2501 Card Reader model A1 or A2	Yes	Yes
3284 Printer model 1	Yes	Yes
1255 MCR model 1, 2 or 3	No	No
3881 OMR model 1	No	No
3741 (directly attached) model 1, 2, 3 or 4	Yes	Yes**
BSCA, 1 or 2 lines, LCA, or DA	No	No
Main Storage Requirements		
5704-CB1	12-48K	8-48K
5704-CB2	12-48K	8-56K***

\* COBOL and system halts are logged on the 3277. Source statements may be entered from the keyboard.

\*\* 5704-CB2 only. See "Diskette Support".

\*\*\* Object program size can be up to 56K, depending on the CCP, spool and configuration options selected during system generation.

## SPECIFIED OPERATING ENVIRONMENT

## HARDWARE REQUIREMENTS

Minimum System Requirements: Same as for SCP (5704-SC1 for 5704-CB1; 5704-SC2 for 5704-CB2). For the IBM 1403 Printer, the HN print arrangement is recommended.

## SOFTWARE REQUIREMENTS

5704-SC1 for 5704-CB1; 5704-SC2 for 5704-CB2.

## COMPATIBILITY

- System/3 COBOL is upward compatible with the DOS and OS ANS COBOL compilers and is a superset of 1130 ANS COBOL providing growth from 1130 through System/3 to System/360 and 370. ROLLOUT support is unique to model 15 COBOL.
- Migration to and from System/3 COBOL requires little source program conversion to effect the transition. Certain 1130 library routines are not included in the System/3 COBOL library, i.e., CALLED subprograms.
- System/3 model 15 COBOL is source language compatible with COBOL on other System/3 models, except for differences due to different hardware. A COBOL source program can be recompiled by a model 15 COBOL compiler without changes to the source program (assuming the same I/O). The resulting object program can be executed under control of the appropriate model 15 SCP and will produce output identical to that on the previous system (assuming equivalent I/O devices and data).
- Any of the disk data files created by any System/3 program using disk system management (e.g., RPG II, Sort and COBOL) can be processed by any System/3 program which uses disk system management to access the file. Scratch files (RETAIN-S) created on other System/3 models are not accessible on the model 15. Files on magnetic tape are similarly compatible between the System/3 models, except only the model 15 supports multi-file tape volumes.

The directly-attached 3741 Data Station or Programmable Workstation is supported only in 5704-CB2.

## DOCUMENTATION

(available from Mechanicsburg)

COBOL Reference Manual (GC28-6452) ... Disk Concepts and Planning Guide (GC21-7571). ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 15 DISK FORTRAN IV  
5704-FO1; 5704-FO2**

**PURPOSE**

Model 15 FORTRAN IV is a program product that operates under control of the IBM System/3 model 15 SCP. 5704-FO1 is used with SCP 5704-SC1; 5704-FO2 is used with SCP 5704-SC2. The compiler and library are disk resident on the IBM 5444 Disk Storage Drive or the IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage (5704-FO2 only). The compiler requires as input a FORTRAN source language program and produces as output, by means of the system's Overlay Linkage Editor, a System/3 machine language object program, either cataloged in an object library or punched into 80- or 96-column cards or written onto a diskette. A source program listing, diagnostic messages and main storage map can be requested.

**DESCRIPTION**

Source input to the compiler can be from the system input device (card reader, 3741 directly attached, or 3277 keyboard) or from the source library. Work files for the compiler can be on any 5444 or 5445 Disk Storage Drive or on 3340 Direct Access Storage Facility or on the 3344 Direct Access Storage. The Overlay Linkage Editor is used to generate object programs.

The model 15 FORTRAN IV language is identical to the FORTRAN IV language for other System/3 models. It contains those features defined in American National Standard Basic FORTRAN, X3.10-1966 and additional language features and capabilities previously available only with certain IBM Full FORTRAN IV Compilers.

The model 15 FORTRAN IV Library contains mathematical and service subroutines required during execution to perform arithmetic operations, input and output conversion, and input and output control.

The model 15 FORTRAN IV Library also includes a Commercial Subroutine Package which is equivalent in function to the 1130 Commercial Subroutine Package insofar as is meaningful in terms of System/3 model 15 devices and data management.

The interval timer is supported for time-of-day functions. This is provided by a supplied SCP subroutine, CFTOD.

**Support of 3277 Display Station:** A model 15 FORTRAN object program can support the 3277 in either a split-screen or full-screen mode. Using a split-screen, an input file (up to 125 bytes) and/or an output file (up to 125 bytes) can be specified. In full-screen mode, 279 bytes can be read or written. The Operator Console Keyboard is used for data input.

**Disk File Support:** The access methods supported for 5444, 5445, 3340 and 3344 are the same as those supported by FORTRAN on other System/3 models, and are as follows:

**Sequential I/O**

Consecutive processing of formatted or unformatted records is supported. Record size of formatted records can range from 1 to 256 bytes. Record size of unformatted records can range from 1 to 32,767 bytes.

**Direct Access I/O**

Random processing is by relative record number; consecutive processing can also be performed. Record size can range from 1 to 32,767 bytes, formatted or unformatted.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except as data records within the file.

Indexed files are not supported.

**Tape File Support:** The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by FORTRAN for other System/3 models. FORTRAN object programs can process data on magnetic tape; highlights include:

- Consecutive input or output files
- 1 - 4 tape drives
- Formatted or unformatted records
- Record size from 18 to 32,767 bytes
- Block size from 18 to 32,767 bytes
- IBM Standard Labels, ANSI Labels, no labels
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multi-volume files
- Single file or multi-file volumes
- Recording format: EBCDIC (7- or 9-track) or ASCII (9-track only)

**Printer Support:** The FORTRAN language supports the 1403 as follows: Space 0, 1, or 2 before or after printing a line ... skip to line 1 before or after printing a line ... overflow detection. Commercial Subroutines support the 1403 as follows: Space immediately 0, 1, 2, or 3 lines ... skip immediately to a specified line number.

FORTRAN supports the 3284 Printer the same way it does the 1403, except that space 0 after print is not allowed.

**Card I/O Support:** The model 15 FORTRAN supports the MFCU, MFCM, 1442, and 2501 as follows:

	MFCU	MFCM*	1442	2501
Read	Yes	Yes	Yes	Yes
Punch	Yes	Yes	Yes	No
Card Print	Yes	Yes	No	No
Stacker Select**	No	No	No	No
Combined File***	No	No	No	No
Character set (EBCDIC)	64	256	256	256

\* MFCM support is similar to MFCU support; six lines of card printing is possible on the MFCM (optional feature on model A1 only).

\*\* Commercial Subroutines support stacker selection of cards from the secondary hopper of the MFCU or MFCM.

\*\*\* When using the Commercial Subroutines, the MFCU2, MFCM2, or 1442 may be defined as both input and output.

**Diskette Support:** 5704-FO1 supports the 3741 directly attached as an input or output device for compilation only. 5704-FO2, in addition to compilation, supports the 3741 as an input/output device during object program execution.

**Model 15 FORTRAN Device Support**

	Compilation	Execution
5444 Disk Storage Drive (5704-FO1 only) model A2 or A3	Yes	Yes
5445 Disk Storage (5704-FO1 only) model 1, 2 or 3	Yes	Yes
3340 Direct Access Storage Facility model A2, B1, or B2	Yes	Yes
3344 Direct Access Storage (5704-FO2 only) model B2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2, or 3	No	Yes
1403 Printer model 2, 5, or N1	Yes	Yes
3277 Display Station model 1	Yes*	Yes
5424 MFCU model A1 or A2	Yes	Yes
2560 MFCM model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
2501 Card Reader model A1 or A2	Yes	Yes
3284 Printer model 1	Yes	Yes
1255 MCR model 1, 2 or 3	No	No
3881 OMR model 1	No	No
3741 (directly attached) model 1, 2, 3, or 4	Yes	Yes***
BSCA, 1 or 2 lines, LCA or DA	No	No
Main Storage Requirements 5704-FO1	10-48K	8-48K
5704-FO2	10-48K	8-56K**

\* FORTRAN and system halts are logged on the 3277. Source statements may be entered from the keyboard.

\*\* Object program size can be up to 56K, depending on the CCP, spool and configuration options selected during system generation.

\*\*\* 5704-FO2 only; see "Diskette Support".

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirements:** Same as for SCP (5704-SC1 for 5704-FO1; 5704-SC2 for 5704-FO2).

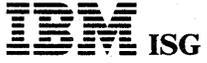
**SOFTWARE REQUIREMENTS**

5704-SC1 for 5704-FO1; 5704-SC2 for 5704-FO2.

**COMPATIBILITY**

System/3 Model 15 FORTRAN IV is source language compatible with FORTRAN IV on other System/3 models. A FORTRAN IV source program can be recompiled by a model 15 FORTRAN IV compiler without changes to the source program (assuming the same I/O). The resulting object program can be executed under control of the appropriate model 15 SCP and will produce output identical to that on the previous system (assuming equivalent I/O devices and data).

The FORTRAN IV compiler accepts source programs written in the IBM System/360 Basic FORTRAN IV language, which encompasses American National Standard Basic FORTRAN as defined in X3.10-1966. The compiler also accepts source programs written in the IBM 1130 Basic FORTRAN IV language with minor modifications.



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PP 5704-FO1.2

Mar 83

Major Revision

PROGRAM PRODUCTS

**System/3 Mdl 15 Disk FORTRAN IV (cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*FORTRAN IV Reference Manual (SC28-6874) ... FORTRAN IV  
Commercial Subroutines (SC28-6875) ... Disk Concepts and Planning  
Guide (GC21-7571) ... S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 MODEL 15 RPG II  
5704-RG1; 5704-RG2**

**PURPOSE**

Model 15 RPG II is a program product that operates under control of the System/3 model 15 System Control Programming. 5704-RG1 is used with SCP 5704-SC1, and 5704-RG2 is used with SCP 5704-SC2. RPG II is disk resident on the 5444 Disk Storage Drive or 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-RG2 only). It requires as input an RPG II source language program and produces as output a System/3 model 15 machine language object program, either cataloged in an object library or punched into 80- or 96-column cards, or written onto a diskette. A source program listing, diagnostic messages, and a main storage map can be requested.

**DESCRIPTION**

To use the RPG II compiler, the user supplies information about the job to be processed. The job can be described on specification sheets prior to entering the source statements into the system. The specification sheets are: Auto-Report, Control Card and File Description, Extension and Line Counter, Telecommunications, Input, Calculation and Output-Format.

Source Input to the compiler can be from the system input device (card reader, 3741 directly attached, or 3277 keyboard) or from a source library. Work files for the compiler can be on either a 5444 or 5445 Disk Storage Drive, or on a 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-RG2 only). The Overlay Linkage Editor, invoked by the compiler, is used to generate overlays, executable object programs, etc. (On other System/3 models, RPG II uses its own linkage editor rather than the system's Overlay Linkage Editor.) The user can request non-link-edited output from the model 15 RPG II compiler, allowing modification of the control statements prior to the execution of the Overlay Linkage Editor.

In addition to the functions provided by S/3 model 10 Disk RPG II, model 15 RPG II provides the following capabilities:

- Model 15 RPG II includes the following support that is available as separate features in some of the other System/3 models: Telecommunications, Auto-Report, 5445 and Tape support.
- Support of 3340 Direct Access Storage Facility, 2560 MFCM, 2501 Card Reader, 3284 Printer, 1255 Magnetic Character Reader, and 3277 Display Station (with operator console keyboard).
- Support of 3344 Direct Access Storage (5704-RG2 only).
- Support of interval timer for time-of-day function.
- Device Independent Data Management - a sequential file is defined whose assignment to a device can be specified by an OCL FILE statement when the object program is executed. The sequential file can be input (2501, 1442, MFCU, MFCM, 3741 directly attached, 5444, 5445, 3340, 3344 or 3410/3411) or output (1403, 3284, 1442, MFCU, 3741 directly attached, MFCM, 5444, 5445, 3340, 3344 or 3410/3411) but not update, add or combined. Specifications unique to a particular device, such as space, skip, and stacker select are not allowed for this kind of file.
- Additional index space - for 5444, 5445, 3340 or 3344 indexed files, an optional File Description Specification entry, INDEX, permits additional main storage to be used to accommodate more sectors of file index. This is advantageous when sequentially processing indexed files.

**Note:** 5704-RG2 supports an 'external buffers' option and does not support B-type inquiry programs.

**Auto-Report:** RPG II Auto-Report enhances the RPG II language by providing functions which eliminate much of the preparation and coding work normally done by the user. It is specifically designed to facilitate report preparation.

Auto-Report executes as a preprocessor to the RPG II Compiler. The input is RPG II source statements and Auto-Report statements. Auto-Report produces a diagnostic listing, replaces the Auto-Report statements with generated or copied RPG II source statements and calls the RPG II compiler for execution.

**Support of 3277 Display Station:** The 3277 is an integral part of the system and is used as the system console. A model 15 RPG II object program can access the 3277 as an input file (up to 120 bytes), as an output file (up to 120 bytes), as an update file (up to 279 bytes), or as a display file (up to 35 bytes). The 78-key Operator Console Keyboard is used for data input. The program function keys 1-9 can be tested by means of a supplied subroutine, SUBR89.

**Disk File Support:** The access methods supported for 5444, 5445, 3340 and 3344 are the same as those supported by other System/3 RPG II compilers, and are as follows:

**Sequential Organization**

- Consecutive Processing - including updating in place.
- Random Processing - by relative record number including updating

but excluding file loading.

**Indexed Organization**

- Random processing - by key.
- Sequential processing - by key including file loading.

**Direct Organization**

- Random Processing - by relative record number, including updating and file loading.
- Consecutive Processing

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except as data records within the file.

Record size can range from 1 to 9,999 bytes, and records can be processed as blocked or unblocked. Logical records may span physical disk sectors, tracks or cylinders.

**Tape File Support:** The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by other System/3 RPG II compilers. RPG II object programs can process data or record address files on magnetic tape. Highlights of tape support include:

- Consecutive input or output files
- 1 - 4 tape drives
- Fixed length records, blocked or unblocked
- Variable length records, blocked or unblocked
- Record size from 18 to 9,999 bytes
- Block size from 18 to 9,999 bytes
- IBM Standard Labels, ANSI Labels, no labels
- Option for two I/O areas
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multi-volume files
- Single file or multi-file volumes
- Recording format: EBCDIC or ASCII
- Program options to Rewind or Rewind/Unload at end of job.

**Printer Support:** RPG II supports the 1403 Printer as follows: Space 0, 1, 2, or 3 before or after printing a line; skip to line number before or after printing a line; overflow detection; first page forms alignment.

RPG II supports the 3284 Printer the same way it does the 1403, except that space 0 after print is not allowed.

**Card I/O Support:** RPG II supports the MFCU, MFCM, 1442, and 2501 as follows:

	MFCU	MFCM	1442	2501
Read	Yes	Yes	Yes	Yes
Punch	Yes	Yes	Yes	No
Card Print	Yes	Yes	No	No
Stacker Select	Yes	Yes	Yes	No
Combined File	Yes	Yes	Yes	No
Character set (EBCDIC)	64	256	256	256

RPG II support of the MFCM is identical to the System/360 model 20 RPG support, except for certain situations involving stacker selection and combined files.

Card input or output files for which stacker selection is not specified may be double buffered.

**Diskette Support:** RPG II supports the 3741 directly attached as an input or output device through device independent data management or standard data management.

**Telecommunications Support:** The first and/or second Binary Synchronous Communications Adapter (BSCA) and the Local Communications Adapter are supported through the use of the RPG II Telecommunications Specifications and the addition of BSCA as a device entry on the RPG II File Description Specification. (The Display Adapter and the BSCC are not supported by the RPG II Telecommunications support.) The support is identical to that provided by other System/3 Telecommunications features, and it includes:

**Modes:** Receive only ... Receive with conversational reply\*\*\* ... Transmit only ... Transmit with conversational reply\*\*\* ... Alternate transmit and receive file.\*\*\*

\*\*\* Not supported in communication with 2770 and 2780, 6670 (as a 2770).

**RPG II language features supported:** Input, Output and Combined files ... demand files for Transmit and Receive ... Blocking and deblocking of records ... Dual I/O areas.

**BSCA features, options, and capabilities supported:** Manual call ... manual answer ... Auto-call ... Auto-answer ... Medium Speed ... High Speed ... Station Selection ... EBCDIC data transparency ... intermediate block checking ... EBCDIC or ASCII data and data link control characters. File translation of ASCII data can be accomplished by proper use of the file translation facility of RPG II.

**System/3 Model 15 RPG II (cont'd)**

For additional information, see the description of the model 10 Disk RPG II Telecommunications feature (5702-RG1, feature #6000/#6002).

Communication with the 5231 model 2 is in Receive mode only. The 5231 model 2 is supported as a 3741 model 2 or 4.

**System/3 Model 15 RPG II Device Support**

	Compilation	Execution
5444 Disk Storage Drive (5704-RG1 only) model A2 or A3	Yes	Yes
5445 Disk Storage (5704-RG1 only) model 1, 2 or 3	Yes	Yes
3340 Direct Access Storage Facility model A2,B1, or B2	Yes	Yes
3344 Direct Access Storage (5704-RG2 only) model B2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2, or 3	No	Yes
1403 Printer model 2, 5, or N1	Yes	Yes
3277 Display Station model 1	Yes*	Yes
5424 MFCU model A1 or A2	Yes	Yes
2560 MFCM model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
2501 Card Reader model A1 or A2	Yes	Yes
3284 Printer model 1	Yes	Yes
1255 MCR model 1, 2 or 3	No	Yes****
3881 OMR model 1	No	Yes****
3741 (directly attached) model 1, 2, 3 or 4	Yes	Yes
BSCA, 1 or 2 lines, LCA, or DA	No	Yes**
Main Storage Requirements 5704-RG1	10-48K	8-48K***
5704-RG2	10-48K	8-56K*****

\* RPG II and system halts are logged on the 3277. Source statements may be entered from the keyboard.

\*\* For a list of terminals supported, see the model 5 SCP pages.

\*\*\* When a program generates object code that exceeds the partition size as specified, overlays will be generated to fit. Not all programs - even with overlays - can fit into the stated partition size.

\*\*\*\* Requires SCP subroutine; RPG II SPECIAL exit is used.

\*\*\*\*\* The discussion of overlays above (\*\*\*) also applies to 5704-RG2. In addition, object program size can be up to 56K, depending on the CCP, spool and configuration options selected during system generation.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirements:** Same as for model 15 SCP (5704-SC1 for 5704-RG1; 5704-SC2 for 5704-RG2).

**SOFTWARE REQUIREMENTS**

5704-SC1 for 5704-RG1; 5704-SC2 for 5704-RG2.

**COMPATIBILITY**

**Programs:** System/3 model 15 RPG II is source language compatible with RPG II on other System/3 models, except for differences due to different hardware. An RPG II source program can be recompiled by a model 15 RPG II compiler, without changes to the source program (assuming the same I/O). The resulting object program can be executed under control of the appropriate model 15 SCP and will produce output identical to that on the previous system (assuming equivalent I/O devices and data). The System/3 inline inquiry subroutine (SUBR95) is not supported by model 15 RPG II, but the program function keys 1-9 can be tested by using a different subroutine, SUBR89.

**Data:** Any of the disk data files created by any System/3 program using disk system management (e.g., RPG II, Sort, and COBOL) can be processed by any System/3 program which uses disk system management to access the file. Scratch files (RETAIN-S) created on other System/3 models are not accessible on the model 15. Files on magnetic tape are similarly compatible between System 3 models, except only the model 15 supports multifile tape volumes.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Introduction to RPG II (GC21-7514) ... RPG II Reference Manual (SC21-7504) ... RPG II Additional Topics Programmer's Guide (GC21-7567) ... RPG II Disk File Processing Programmer's Guide (GC21-7566) ... RPG II Auto-Report General Information (GC21-7563) ... Auto-Report Reference Manual (SC21-5057) ... RPG II Telecommunications Programming Reference Manual (SC21-7507) ... Disk Concepts and Planning Guide (GC21-7571). ... S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index

**RPG II 3270 DISPLAY CONTROL FEATURE**

**Feature #6005/#6006**

**PURPOSE**

The RPG II 3270 Display Control feature provides telecommunications services for local or remote 3270 devices. The program can be automatically linked into the RPG II application program via the SPECIAL file exit capability on the RPG II File Description Specification Sheet. Neither the Assembler nor the RPG II Telecommunications feature is required.

**DESCRIPTION**

The following services are provided by the 3270 Display Control Feature:

- RPG II access to 3270 Display System Terminals attached via the Display Adapter (DA), the Local Communications Adapter (LCA), or the Binary Synchronous Communications Adapter (BSCA).
- Automatic buffering and queuing of terminal data
- A display formatting interface which permits the support of 3270 devices with coding in RPG II
- Complete line control procedures are provided
- Up to 18 terminals may be supported
- Provides the capability of coding one or more applications within one program. No task switching is provided.
- Two subroutines are provided. SUBR13 allows an RPG II program to support 3270s without using CCP. SUBR14 provides upward compatibility with CCP, requiring only program recompilation, assuming the RPG II program meets the CCP requirements.

**Terminals Supported**

The following terminals and communications facilities are supported under the RPG II 3270 Display Control Feature:

**With the Display Adapter**

- 3277 Display Station (model 1 or 2)
- 3284 Printer (model 1 or 2)
- 3286 Printer (model 1 or 2)
- 3288 Line Printer (model 2)

**With the Local Communications Adapter (LCA) or Binary Synchronous Communications Adapter (BSCA)**

- 3275 Display Station and Control, or
- 3271 Display Control Unit (model 1 or 2), with:

- 3277 Display Station (model 1 or 2)
- 3284 Printer (model 1 or 2)
- 3286 Printer (model 1 or 2)
- 3288 Line Printer (model 2)

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Note:** The RPG II 3270 Display Control feature is not supported under SCP 5704-SC2 (model 15D).

**Minimum System Requirements:** In addition to the minimum system requirements of the SCP (5704-SC1), the RPG II 3270 Display Control feature requires one of the following: Display Adapter (DA), the Local Communications Adapter (LCA), or the Binary Synchronous Communications Adapter (BSCA), plus one of the devices listed under "Terminals Supported".

Using SUBR13, approximately 10K-12K bytes are added to the size of the object program. Using SUBR14, approximately 4.3K bytes are added to the size of the object program.

**SOFTWARE REQUIREMENTS**

5704-SC1; 5704-RG1



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PP 5704-RG1.3

Mar 83

Major Revision

PROGRAM PRODUCTS

**System/3 Model 15 RPG II (cont'd)**

**COMPATIBILITY**

The RPG II 3270 Display Control Feature is functionally compatible with the System/3 model 8/10 and System/3 model 12 RPG II 3270 Display Control feature.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/3 RPG II 3270 Display Control Feature Reference and Logic Manual (SC21-5161) ... System/3 Bibliography (GC20-8080).*



## PROGRAM PRODUCTS

**SYSTEM/3 MODEL 15 DISK SORT  
5704-SM1; 5704-SM9****PURPOSE**

The IBM System/3 model 15 Disk Sort program is a program product that sorts a file into ascending or descending sequence. It is resident on an IBM 5444 Disk Storage Drive or an IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage (5704-SM9 only). 5704-SM1 is used with SCP 5704-SC1, and 5704-SM9 is used with SCP 5704-SC2.

**DESCRIPTION**

**Input file:** From 1 to 8 files may be input to the Disk Sort Program. These files may be on 5444 or 5445 Disk Storage drives, 3340 Direct Access Storage Facility, 3344 Direct Access Storage, 3410/3411 Magnetic Tape Subsystem, card reader, or 3741 directly attached. A disk input file can have sequential, indexed or direct organization. For a disk file, the input record size can be from 1 to 9,999 bytes. A tape input file can have fixed length records, either blocked or unblocked; variable length tape records are not supported. The maximum input tape record or block size is 9,999 bytes, and the minimum is 18 bytes. Input tape files can be 9-track 800/1600 bpi or 7-track 200/556/800 bpi. The tape file can be recorded in either EBCDIC or ASCII code. Input can be either a single volume file or a multi-volume file. For a diskette input file, the record size can be only 96 bytes.

**Work file:** A work file can be resident on a 5444 or 5445 Disk Storage Drive, or on a 3340 Direct Access Storage Facility or 3344 Direct Access Storage. Work space can be specified by the user or can be automatically allocated by the program. Directed auto-allocate references to units D3 or D4 on the 3344 Direct Access Storage is interpreted to mean any of the four logical volumes on the drive.

**Output file:** The output file can be resident on a 5444 or 5445 Disk Storage Drive, or on a 3340 Direct Access Storage Facility or on 3344 Direct Access Storage, or on a unit of the 3410/3411 Magnetic Tape Subsystem. A disk output file can have sequential organization only. Characteristics of tape output files are the same as for tape input files, described above. The maximum output record size for disk or tape is 4,096 bytes. Output of the program will be in one of three formats: Tag (ADDROUT), tag-along, or summary tag-along.

**Features**

- Records can be selected or omitted, and reformatted.
- Specified records may be forced ahead of others.
- An alternate collating sequence can be specified.
- Control fields can be in different locations in the records.
- The total length of the control fields can be from 1 to 256 bytes; there is no other limit on the number of control fields.
- Control fields can be sorted in ascending or descending sequence, or mixed (some ascending and some descending).
- Control fields can be sorted using only the digit or zone portion of the character. The fields can be packed or unpacked decimal, or character formats.
- Records containing identical control fields can be combined by summarizing specified fields into one record.

**Use:** Specifications are described on a simple, RPG-like coding sheet. These specifications are entered into the system using the system input device (card reader, 3741 directly attached, or 3277 keyboard), or they can be stored in the source library on disk. Sort control card diagnostics and messages may be displayed on the system logging device (CRT, 1403 or 3284). The program can be executed in a multi-programming environment and requires from 8K to 48K bytes of main storage, exclusive of SCP requirements.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirements:** Same as for SCP (5704-SC1 for 5704-SM1; 5704-SC2 for 5704-SM9).

**SOFTWARE REQUIREMENTS**

5704-SC1 for 5704-SM1; 5704-SC2 for 5704-SM9.

**COMPATIBILITY**

The System/3 model 15 Disk Sort program is compatible with the Disk Sort programs used on other System/3 models.

**DOCUMENTATION**

(available from Mechanicsburg)

*Disk Sort Reference Manual* (SC21-7522). ... *System/3 Bibliography* (GC20-8080).

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 MODEL 15 MAGNETIC TAPE SORT  
5704-SM2; 5704-SM8****PURPOSE**

The IBM System/3 model 15 Magnetic Tape Sort Program is a program product that sorts a tape file into ascending or descending sequence. It is resident on an IBM 5444 Disk Storage Drive or an IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage (5704-SM8 only). 5704-SM2 is used with SCP 5704-SC1, and 5704-SM8 is used with SCP 5704-SC2. A configuration that includes three or four tape units is required.

**Input file:** The input file resides on any unit of the 3410/3411 Magnetic Tape Subsystem. The input file can have fixed length records, either blocked or unblocked. (Variable length records are not supported). The maximum input record or block size is 9,999 bytes. The minimum input record or block size is 18 bytes. Input tape files can be 9-track 800/1600 bpi or 7-track 200/556/800 bpi. The file can be recorded in either EBCDIC (7- or 9-track) or ASCII (9-track only) code. Input can be either a single volume file or a multi-volume file.

**Work files:** Three work tapes are required: A fourth can be utilized, if available. Work tapes can be either 7- or 9-track (see restrictions below). Work tapes must be single volume only (not multi-volume).

**Output file:** The output file resides on any unit of the 3410/3411 Magnetic Tape Subsystem. Characteristics of tape output files are the same as for tape input files, described above. Output is a file of records containing the sort control fields and/or the data fields the user has specified. (The tag (ADDRROUT) and summary tag-along sort capabilities of the Disk Sort are not supported in the Tape Sort.)

**Restrictions:** To utilize all of the functions of this program, at least three 9-track work tapes must be available. If one or more of the work tapes is 7-track, then only those sort functions that relate to the standard System/3 64-character set (EBCDIC) are supported. As a result, sorts of binary data, packed or unpacked decimal data or sorts on zones are not allowed in these 7-track configurations.

**Features**

- Records can be selected or omitted, and reformatted.
- Specified records may be forced ahead of others.
- An alternate collating sequence can be specified.
- A checkpoint/restart facility is supported.
- Control fields can be in different locations in the records.
- The total length of the control fields can be from 1 to 256 bytes; there is no other limit on the number of control fields.
- Control fields can be sorted using only the digit or zone portion of the character. The fields can be packed or unpacked decimal, or character formats.
- Control fields can be sorted in ascending or descending sequence, or mixed (some ascending and some descending).

**Use:** Specifications are described on a simple, RPG-like coding sheet. These specifications are entered into the system using the system input device (card reader, 3741 directly attached, or 3277 keyboard), or they can be stored in the source library on disk. Sort control card diagnostics and messages may be displayed on the system logging device (CRT, 1403 or 3284). The program can be executed in a multiprogramming environment and requires 8K to 48K bytes of main storage, exclusive of SCP requirements.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirements:** Same as for SCP (5704-SC1 for 5704-SM2; 5704-SC2 for 5704-SM8). In addition, at least three tape drives of the 3410/3411 Magnetic Tape Subsystem are required.

**SOFTWARE REQUIREMENTS**

5704-SC1 for 5704-SM2; 5704-SC2 for 5704-SM8.

**COMPATIBILITY**

The model 15 Magnetic Tape Sort Program is functionally compatible with the Disk Resident Magnetic Sort Programs for other System/3 models.

**DOCUMENTATION**

(available from Mechanicsburg)

*Tape Sort Reference Manual (SC21-7572). ... S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 MODEL 15 CCP/DISK SORT  
5704-SM7**

**PURPOSE**

The IBM System/3 model 15 CCP/Disk Sort program is a program product that is used to sort a file into ascending or descending sequence. It is resident on an IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage. 5704-SM7 is used with SCP 5704-SC2.

With the CCP/Disk Sort program, the user can generate an object module which can be executed as a task under control of the Communications Control Program (CCP) (5704-SC2, feature #6011/#6012), or as a program under control of the SCP in a non-CCP partition.

All Disk Sort functions are available in the CCP/Disk Sort program, including tag, tag-along and summary tag-along sorts, with the following exceptions or requirements:

- For generation, only 12K bytes of main storage is used.
- For the size of the generated program, 12K to 48K can be However, CCP does not allow a program greater than 32K.
- Only disk input files can be specified. (From 1 to 8 input files may be used.)
- Deferred mount of the output file is not supported, and the output file cannot be written over the input file.
- Automatic work file allocation is not supported.
- Work record lengths cannot be less than 3 bytes.

Use: To use this program, two steps are necessary:

- Generation: Using information from OCL FILE statements (for input, work and output files) and sort specifications, this program generates an object module which is cataloged into the object library. Generation is done in a non-CCP partition.
- Execution: The CCP system or terminal operator calls the generated object program by entering the name of the program, similar to calling any other program under CCP control. A generated program can be loaded in a batch partition by the system operator.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Minimum System Requirements: Same as for SCP (5704-SC2).

**SOFTWARE REQUIREMENTS**

5704-SC2.

**DOCUMENTATION**

(available from Mechanicsburg)

*Disk Sort Reference Manual (SC21-7522) ... S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 MODEL 15  
DISK RESIDENT CARD UTILITIES  
5704-UT1; 5704-UT3****PURPOSE**

This IBM System/3 program product is resident on an IBM 5444 Disk Storage Drive or an IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage (5704-UT3 only). 5704-UT1 is used with SCP 5704-SC1 and 5704-UT3 is used with SCP 5704-SC2. It provides the following programs that support 80- or 96-column card files: Sort/Collate, List, Reproduce/Interpret, and Gangpunch. (The following programs are not provided in 5704-UT1 or 5704-UT3 but are available in the model 10 Utilities, 5701-UT1 and 5702-UT1: Data Recording, Data Verifying and 80-96 Conversion Program.)

**DESCRIPTION**

**Sort/Collate Program** - Functionally identical to the model 10 Sort/Collate Program (see 5701-UT1), the model 15 program also supports the 2560 MFCM.

**List Program** - Functionally identical to the model 10 96-column List Program (see 5701-UT1), the model 15 program supports input from 5424 MFCU, 2560 MFCM, 1442 Card Read Punch, or 2501 Card Reader. Printed output is directed to the 1403 or 3284 Printer.

**Reproduce/Interpret Program** - Functionally identical to the model 10 Reproduce/Interpret Program (see 5701-UT1), the model 15 program supports:

- MFCU-1 input and MFCU-2 output, or
- MFCM-1 input and MFCM-2 output, or
- 2501 input and 1442 output.

**Gangpunch Program** - The model 15 Gangpunch Program provides the following capabilities:

- Interspersed master-card gangpunching: The master and detail cards are intermixed in the primary file.
- Count-controlled gangpunching: A fixed or variable counter may be used to punch a specified number of detail cards. The master card is in the secondary file and the detail cards are in the primary file.
- Match master cards and detail cards on a control field and punch into the detail card if a match occurs: The master card is in the secondary file and the detail card is in the primary file.
- The following functions may be performed with any of the major types of gangpunching described above: Offset gangpunching ... gangpunching consecutive numbers into detail cards ... gangpunching a constant into detail cards ... card interpretation (entire card or only what is punched) ... selection of a single type of master card from many master cards ... selection of a single type of detail card from many detail cards.

The Gangpunch Program supports the following devices:

- For count-controlled and match fields processing
  - MFCU2 input and MFCU1 output, or
  - MFCM2 input and MFCM1 output, or
  - 2501 input and 1442 output.
- For interspersed processing
  - MFCU1 input and output, or
  - MFCM1 input and output, or
  - 1442 input and output.

**Use:** The programs described above can be executed in a multiprogramming environment and require main storage, exclusive of SCP requirements, as follows: (Note: The minimum partition size is 8K.)

Sort/Collate	8K*
List Program	3K
Reproduce/Interpret	6K
Gangpunch	6K

\* Additional main storage is used, if available.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirements:** Same as for SCP (5704-SC1 for 5704-UT1; 5704-SC2 for 5704-UT3). The devices required for the particular program (described above) must be available.

**SOFTWARE REQUIREMENTS**

5704-SC1 for 5704-UT1; 5704-SC2 for 5704-UT3.

**COMPATIBILITY**

The model 15 Disk Resident Card Utilities that have model 10 equivalents are functionally compatible to the model 10 versions. Operation of the programs is different due to the model 15 system/operator interface.

**DOCUMENTATION**

(available from Mechanicsburg)

*Sort/Collate and Card Utilities Reference Manual (SC21-7529) ... S/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

SYSTEM/3 MODEL 12 BASIC ASSEMBLER  
5705-AS1

PURPOSE

The IBM System/3 model 12 Basic Assembler program is a program product that processes source programs written in the Basic Assembler language and produces executable object programs. The program is disk resident in a simulation area on the 3340 Direct Access Storage Facility (DASF) and operates under control of the model 12 SCP.

The Basic Assembler language is a symbolic programming language used to write programs. Some of the features provided by the program and its language are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Convenient Data Representation
- Operand Field Expressions
- Source Identification--Sequence Fields
- Assembler Instructions
- Source Program Listing
- Cross-Reference Listing
- Error Checking and Diagnostic Messages

The Basic Assembler can be used to create a stand-alone program. The object program is punched into cards. Program loading is performed with an initial program loader through the 5424 MFCU or the 1442 Card Read Punch. Stand-alone programs are coded entirely by the user with no dependence on other programming support.

The Basic Assembler may also be used for assembly of relocatable subroutines for use with model 12 RPG II, COBOL, or FORTRAN. The subroutines, written in the Basic Assembler language, are coded by the user and separately assembled. The process of program linking is accomplished during compilation of the RPG II source program or by means of the Overlay Linkage Editor, in the case of COBOL or FORTRAN.

Source input into the Assembler can be from the system input device (card reader, 3741 directly attached, or 5471 keyboard), from a source library, or from a source file generated by the Macro Processor. Work files for the Assembler are on the simulation area of a 3340. The Overlay Linkage Editor is used to generate executable object programs.

Model 12 Basic Assembler Device Support

	Source Assembly	Object Execution
3340 Direct Access Storage Facility model C2	Yes	Yes
3410/3411 Magnetic Tape Unit, model 1, 2 or 3	No	Yes
5203 Printer, model 1, 2 or 3	Yes	Yes
1403 Printer, model 2, 5 or N1	Yes	Yes
5424 MFCU, model A1 or A2	Yes	Yes
1442 Card Read Punch, model 6 or 7	Yes	Yes
5471 Printer-Keyboard, model 1	Yes	Yes
1255 MCR, model 1, 2 or 3	No	Yes
3881 OMR, model 1	No	Yes
3741 Data Station/Programmable Workstation, model 1, 2, 3 or 4 (directly attached)	Yes	Yes
BSCA, 1 or 2 lines, ICA, or Local Display Adapter	No	Yes
Main Storage Requirements (Program Level Size)	10-56K*	Up to 64K*

\* The maximum program level is 64K less supervisor requirements.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) ... and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or an IBM directly-attached 3741 Data Station/Programmable Workstation ... and an IBM 5203 or 1403 Printer\* ... and an IBM 3340 DASF.

\* Note: The 5203 or 1403 printer should be equipped with the Universal Character Set feature and a PN (60-character set) print chain/train arrangement. A 48-character set (for example, HN or LC arrangement) can be used with the Assembler; however, the user must be willing to accept substitute characters.

SOFTWARE REQUIREMENTS

5705-SC1.

COMPATIBILITY

The model 12 Basic Assembler program is source language compatible with the model 10 Basic Assembler program. Macro instructions used in model 10 programs (model 10 Macros feature of the SCP) may have to be changed before re-assembling with the model 12 Assembler.

DOCUMENTATION

(available from Mechanicsburg)

System/3 Basic Assembler Reference Manual (SC21-7509) ...  
System/3 Basic Assembler Program Product Specifications (GC21-5079) ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 12 SUBSET  
ANS COBOL COMPILER AND LIBRARY  
5705-CB1)**

**PURPOSE**

IBM System/3 model 12 COBOL is a program product that operates under control of the System/3 model 12 System Control Programming. The compiler and library are disk resident in a simulation area on the 3340 Direct Access Storage Facility (DASF). The compiler requires as input a COBOL source language program and produces as output, by means of the System/3 Overlay Linkage Editor, a System/3 machine language object program, either cataloged in an object library, punched into 80- or 96-column cards, or written onto a diskette. A source program listing, diagnostic messages and a main storage map can be requested.

**DESCRIPTION**

System/3 COBOL supports Grade 1 Braille for both compiler listings and object program printed output. Minimum requirements include a 132-position printer (5203 or 1403) with 8 lines/inch spacing. A user-provided elastic strip is attached over the printer hammers to produce the Braille characters. The compiler requires a 14K program level in order to produce Braille listings.

Source input to the compiler can be from the system input device (card reader, 3741 directly attached, or 5471 keyboard) or from a source library. Work files for the compiler are in a simulation area of a 3340 Direct Access Storage Facility. The Overlay Linkage Editor is used to generate object programs.

**American National Standard COBOL Considerations:** The U.S. Industry standard for COBOL is American National Standard COBOL, X3.23-1968, which was approved by the American National Standards Institute (ANSI) on August 23, 1968. The following functional processing modules of the ANSI standard are included in the System/3 model 12 compiler.

1 Nucleus	1, 2
1 Sequential Access	1, 2
1 Random Access	0, 2
1 Library	0, 2
2 Table Handling	1, 3
1 Segmentation	0, 2

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level in the American National Standards Institute Standard (0 implies that the module may be completely missing from the standard compilers).

The third digit represents the highest level in the ANSI standard.

The international standard for COBOL is ISO Recommendation Number 1989, which was approved by ISO (International Organization for Standardization) in 1972. System/3 model 12 COBOL bears the same relation to the ISO standard as to the ANSI standard, inasmuch as the two standards are identical in technical content.

**Additions:** In addition to the standard language, the following additional features are provided:

- Extensions to the modules of American National Standard COBOL listed above, comprising
  - Certain language elements which are defined in higher levels of the American National Standard COBOL than those listed.
  - Certain language elements defined by the CODASYL Programming Language Committee but not yet included by ANSI in American National Standard COBOL.
  - IBM-developed extensions consistent with those supported by the System/360 and 370 OS and DOS ANS COBOL compilers and 1130 ANS COBOL compiler.

**Disk File Support:** The access methods supported for the 3340 are the same as those supported by System/3 model 10 COBOL and are as follows:

**Sequential**

- Consecutive Processing - including updating in place.
- Random Processing - by relative record number including updating but excluding file loading.

**Indexed (main data area only)**

- Random Processing - by key.
- Sequential Processing - by key including file loading.

**Direct**

- Random Processing—by relative record number, including updating and file loading.
- Consecutive Processing.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except for data records within the file.

Record size can range from 1 to 32K bytes, and records may be processed as blocked or unblocked. Logical records may span physical disk sectors, tracks or cylinders.

Multi-volume sequential files are supported on the 3340 main data area. Offline multi-volume files are only supported on Drive 2 of the 3340. Neither multi-volume nor indexed files are supported on the simulation areas of the 3340.

**Tape File Support:** The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by System/3 model 10 COBOL. COBOL object programs can process data on magnetic tape; highlights include:

- Consecutive input or output files
- 1-4 tape drives
- Fixed length records, blocked or unblocked
- Variable length records, blocked or unblocked
- Record size from 18 to 32,768 bytes
- Block size from 18 to 32,768 bytes
- IBM Standard Labels, ANSI labels, no labels
- Option for two I/O areas
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multivolume files
- Recording format: EBCDIC (7- or 9-track) or ASCII (9-track only)

**Printer Support:** COBOL supports the 5203 and 1403 as follows: Space 0, 1, 2, or 3 before or after printing a line; skip to line number before or after printing a line; overflow detection.

**Card I/O Support:** Model 12 COBOL supports the MFCU and 1442 as follows:

	MFCU	1442
Read	Yes	Yes
Punch	Yes	Yes
Card Print	Yes	No
Stacker Select (punch only)	Yes	Yes
Associated File	Yes	No
Character Set (EBCDIC)	64	256

**Diskette Support:** COBOL supports the 3741 directly attached as an input or output device for compilation. For object programs, the 3741 is supported only by using the ACCEPT statement.

**Model 12 COBOL Device Support**

	Compilation	Execution
3340 Direct Access Storage Facility model C2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2 or 3	No	Yes
5203 Printer, model 1, 2 or 3	Yes	Yes
1403 Printer, model 2, 5 or N1	Yes	Yes
5424 MFCU, model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
5471 Printer-Keyboard, model 1	Yes	Yes*
1255 MCR, model 1, 2 or 3	No	No
3881 OMR, model 1	No	No
3741 Data Station/Programmable Workstation model 1, 2, 3 or 4 (directly attached)	Yes	Yes*
BSCA, 1 or 2 lines, ICA, or Local Display Adapter	No	No
Main Storage Requirements (Program Level Size)	12-56K	8-56K

\* This device is supported only by using the DISPLAY or ACCEPT statement.

\*\* The maximum program level is 64K less supervisor requirements.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirements:** For source compilation - An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) ... and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation ... and an IBM 5203 or 1403 Printer (the HN print arrangement is recommended) ... and a 3340 DASF.

**SOFTWARE REQUIREMENTS**

5705-SC1.



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Mar 83

Major Revision

PROGRAM PRODUCTS

**System/3 Mdl 12 Subset ANS COBOL  
Compiler and Library (cont'd)**

**COMPATIBILITY**

- System/3 COBOL is upward compatible with the DOS and OS ANS COBOL compilers and is a superset of 1130 ANS COBOL providing growth from 1130 through System/3 to System/360 and 370.
- Migration to and from System/3 COBOL requires little source program conversion to effect the transition. Certain 1130 library routines are not included in the System/3 COBOL library, e.g., CALLED subprograms.
- System/3 model 12 COBOL is source language compatible with System/3 model 10 COBOL, with language differences due to differences in I/O. A System/3 model 10 COBOL source program can be re-compiled on System/3 model 12, without changes to the source, and be executed under control of System/3 model 12 SCP - assuming the same I/O. (Note: A 5444 is equivalent to a simulation area on the 3340; indexed and multi-volume files are supported in the main data areas only; split cylinder files are not supported.)

**DOCUMENTATION**

(available from Mechanicsburg)

*System/3 Subset ANS COBOL Reference Manual (GC28-6452) ...  
System/3 Subset ANS COBOL Program Product Specification  
(GC28-6462) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 MODEL 12 DISK FORTRAN IV  
5705-FO1**

**PURPOSE**

System/3 model 12 FORTRAN IV is a program product that operates under control of the System/3 model 12 SCP. The compiler and library are disk resident in a simulation area on the 3340 Direct Access Storage Facility (DASF). The compiler requires as input a FORTRAN source language program and produces as output, by means of the system's Overlay Linkage Editor, a System/3 machine language object program, either cataloged in an object library, punched into 80- or 96-column cards, or written onto a diskette. A source program listing, diagnostic messages and a main storage map may be requested.

**DESCRIPTION**

Source input to the compiler can be from the system input device (card reader, 3741 directly attached, or 5471 keyboard) or from a source library. Work files for the compiler are in a simulation area of the 3340 Direct Access Storage Facility. The Overlay Linkage Editor is used to generate object programs.

The model 12 FORTRAN IV language is identical to the System/3 model 6 or 10 FORTRAN IV language. It contains those features defined in American National Standard Basic FORTRAN, X3.10-1966 and additional language features and capabilities previously available only with certain Full FORTRAN IV Compilers.

The model 12 FORTRAN IV Library contains mathematical and service subroutines required during execution to perform arithmetic operations, input and output conversion, and input and output control.

The model 12 FORTRAN IV Library also includes a Commercial Subroutine Package which is equivalent in function to the 1130 Commercial Subroutine Package insofar as is meaningful in terms of System/3 model 12 devices and data management.

**Disk File Support:** The access methods supported for the 3340 are the same as those supported by System/3 model 10 FORTRAN, and are as follows:

**Sequential I/O**

Consecutive processing of formatted or unformatted records is supported. Record size of formatted records can range from 1 to 256 bytes.

Record size of unformatted records can range from 1 to 32,767 bytes.

**Direct Access I/O**

Random processing is by relative record number; consecutive processing can also be performed. Record size can range from 1 to 32,767 bytes, formatted or unformatted.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except as data records within the file.

Indexed files are not supported.

**Tape File Support:** The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by System/3 model 10 FORTRAN. FORTRAN object programs can process data on magnetic tape; highlights of tape support include:

- Consecutive input or output files
- 1-4 tape drives
- Formatted or unformatted records
- Record size from 18 to 32,767 bytes
- Block size from 18 to 32,767 bytes
- IBM Standard Labels, ANSI Labels, no labels
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume files
- Multivolume files
- Recording format: EBCDIC (7- or 9-track) or ASCII (9-track only)

**Printer Support:** The FORTRAN language supports the 5203 and 1403 as follows: Space 0, 1, or 2 before or after printing a line ... skip to line 1 before or after printing a line ... overflow detection. Commercial Subroutines support the 5203 and 1403 as follows: Space immediately 0, 1, 2 or 3 lines ... skip immediately to a specified line number.

**Card I/O Support:** The Model 12 FORTRAN supports the MFCU and 1442 as follows:

	MFCU	1442
Read	Yes	Yes
Punch	Yes	Yes
Card Print	Yes	No
Stacker Select*	No	No
Combined File**	No	No
Character set (EBCDIC)	64	256

\* Commercial Subroutines support stacker selection of cards from the 1442 and from the secondary hopper of the MFCU.

\*\* Through use of the Commercial Subroutines, the MFCU or 1442 can support a combined file.

**Diskette Support:** FORTRAN supports the 3741 directly attached as an input or output device for compilation only.

**Model 12 FORTRAN Device Support**

	Compilation	Execution
3340 Direct Access Storage Facility model C2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2 or 3	No	Yes
5203 Printer, model 1, 2 or 3	Yes	Yes
1403 Printer, model 2, 5 or N1	Yes	Yes
5424 MFCU, model A1 or A2	Yes	Yes
1442 Card Read Punch, model 6 or 7	Yes	Yes
5471 Printer-Keyboard, model 1	Yes	Yes
1255 MCR, model 1, 2 or 3	No	No
3881 OMR, model 1	No	No
3741 Data Station/Programmable Workstation model 1, 2, 3 or 4 (directly attached)	Yes	No
BSCA, 1 or 2 lines, ICA, or Local Display Adapter	No	No
Main Storage Requirements Program Level Size)	9-56K*	8-56K*

\* The maximum program level is 64K less supervisor requirements

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirements:** For source compilation - A System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) ... and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation ... and an IBM 5203 or 1403 Printer ... and an IBM 3340 DASF.

**SOFTWARE REQUIREMENTS**

5705-SC1.

**COMPATIBILITY**

System/3 model 12 Disk FORTRAN IV source programs are compatible with System/3 Disk FORTRAN IV for System 3 model 6, 8 or 10 except for changes required to accommodate differences in attached I/O. The model 12 FORTRAN compiler accepts source programs written in the IBM System/360 Basic FORTRAN IV language, which encompasses American National Standard Basic FORTRAN as defined in X3.10-1966. The compiler also accepts source programs written in the IBM 1130 Basic FORTRAN IV language with minor modifications.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/3 FORTRAN IV Reference Manual (SC28-6874) ... System/3 FORTRAN IV Commercial Subroutines (SC28-6875) ... System/3 FORTRAN IV Program Product Specifications (GC28-6880) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index

**DATA COLLECTION SYSTEM SUPPORT FOR SYSTEM/3  
5705-M31**

**PURPOSE**

The IBM 5230 Data Collection System Support for System/3 program product provides the manufacturer with a convenient, practical means of preparing shop floor data for processing by a user-provided management accounting system. Data collected by the IBM 5230 Data Collection System is edited, consolidated, and formatted on the System/3 for such applications as payroll accounting, inventory management, and production control. By the customer making simple changes in the output formats of both program products, IBM 5230 Data Collections System Support for System/3 can provide input to and use turnaround documents from the System/3 Shop Loading and Control program product (5702-M51).

**DESCRIPTION**

The 5230 Data Collection System Support for System/3 program product provides two phases of operations: A 5230 personalization phase and a data conversion phase.

The 5230 personalization phase provides a menu of actions from which the user selects those that best fit the operation. Using the menu selections and loop definitions for up to three 5231 controllers with up to four loop each, this phase creates the personalization records required to personalize the 5230 Data Collection System.

The data conversion phase prepares the data received from the 5230 Data Collection System for processing by the user-provided applications. The data can be accepted through the data communications facilities, the 96-column cards, the 80-column cards, or the diskette offered as output options by the 5230 Data Collection System. (Input from 80-column cards or diskette requires minor changes to source).

Both material transactions and labor transactions are prepared by the program product. The material transactions are edited, listed, formatted and stored for later processing by the user-provided inventory management and production control applications. Labor transactions are expanded, edited, checked for accuracy and adjusted for break and lunch times and lunch and shift start-stop time variances. Time and attendance totals are checked against job time totals with warning messages printed for differences that exceed user-prescribed limits. The elapsed time for time and attendance and job time is calculated. Job time applied to overlapping jobs is apportioned to the jobs. A correction procedure is included to allow for changing incorrect labor records. The results of the labor transaction processing are stored for later processing by the user-provided payroll and production control applications.

Reports are printed, at the user's option, for material transactions and for labor transactions. The material transactions report is a single listing. Labor transactions reports provide labor-related information suitable for management review and checking by foremen for correctness.

A *Program Reference Manual* provides installation and planning information such as input and output formats, a description of the processing, control and audit information, and a discussion of the sample problem.

An *Operations Guide* specifies the procedures that must be followed to make any necessary modifications, to compile and include the program in the system library, and to prepare data for the program. A discussion of operating procedures and messages is also included.

**HIGHLIGHTS**

- Provides needed input to user-provided applications
  - Elapsed time calculation for payroll
  - Material receipt and issue data for inventory management
  - Job elapsed time and location data for production control
- Management reports generated as a byproduct of data entry
  - Jobs started checked against time and attendance record
  - Transaction records checked for complete and accurate entry
- Provides for automatic generation of machine-readable data
  - Uses punched-card turnaround documents from user-supplied applications
  - Reduces transcription errors
  - Eliminates timekeeper calculation of elapsed time

**CUSTOMER RESPONSIBILITIES**

IBM will provide assistance in many areas pertaining to the installation of IBM program products. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day to day operation lies solely with the customer. Activities, within these areas of customer responsibility, are defined to include, but not be limited to, the following:

Personnel selection and training ... the customer is responsible for selecting at least one person who will be responsible for supervising the installation and at least one person to assume the duties of an operator.

The customer is also responsible for the coordination and education of the various user departments affected by the installation.

Installation ... the customer is responsible for installation of the product. Installation activities include:

- Establishing an installation plan and schedule consistent with the requirements and availability of customer personnel
- Entering control data and compiling the program
- Copying the delivered disk cartridges for backup purposes
- Creation of the badge file and verification of the data
- Modification of existing programs to interface to the program product

Day-to-day system operation ... the customer is responsible for the day to day operation of the system and the results derived from its operation. The customer is also responsible for maintaining controls and audit trails consistent with good business practices and for the security and safekeeping of all machine-readable material and documents which are related to, and/or resulting from, the operation of the system.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 5230 Data Collection System Support will execute on any model of the System/3 meeting the following minimum configuration:

**System/3 Model 8**

- IBM 5408 with 16K of primary storage
- IBM 3741 Data Station directly attached
- IBM 5444 model A1 Disk Storage Drive
- IBM 5203 Printer with 132 print positions and PN or GN print character arrangement

**System/3 Model 10**

- IBM 5410 with 16K of primary storage
- IBM 5444 model 1 or A1 Disk Storage Drive
- IBM 5424 Multifunction Card Unit
- IBM 5203 Printer with 132 print positions and PN or GN print character arrangement

**System/3 Model 12**

- IBM 5412 with 32K of primary storage
- IBM 3340 model C2 Direct Access Storage Facility
- IBM 5424 Multifunction Card Unit or IBM 3741 Data Station directly attached
- IBM 5203 Printer with 132 print positions and PN or GN print character arrangement

**System/3 Model 15**

- IBM 5415 with 48K of primary storage
- IBM 5444 model A2 Disk Storage drive
- IBM 5424 Multifunction Card Unit or IBM 3741 Data Station directly attached
- IBM 3277 Systems Console
- IBM 5421 Printer Control Unit
- IBM 1403 Printer with 132 print positions and PN or GN print character arrangement

If the data communications features of 5230 Data Collection System Support for the System/3 are to be used, the Binary Synchronous Communications Adapter, the Local Communications Adapter, or the Integrated Communications Adapter must be added to the minimum configuration. The processing unit must contain the appropriate expansion and attachments features if required.

**SOFTWARE REQUIREMENTS**

The IBM 5230 System Support for System/3 is written in RPG II programming language and executes under control of the System/3 System Control Program. The System/3 Disk Sort program is also required for execution of the program. The System/3 RPG II compiler is required for tailoring and compiling the Data Collection System Support for System/3. The program numbers applicable to the different system models are given below.

For System/3 Models 8 and 10	
System Control Program	5702-SC1
Disk Sort Program	5702-SM1
RPG II Compiler	5702-RG1

If data communications is used, the RPG II Compiler must have either feature #6000 or feature #6002 installed.

For System/3 Model 12	
System Control Program	5705-SC1
Disk Sort Program	5705-SM1
RPG II Compiler	5705-RG1



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Major Revision

PROGRAM PRODUCTS

**Data Collection System Support for System/3 (cont'd)**

For System/3 Model 15	
System Control Program	5704-SC1
Disk Sort Program	5704-SM1
RPG II Compiler	5704-RG1

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5230 Data Collection System Support for System/3 General Information Manual (GH30-0204) ... Facts Flyer (G580-0073) ... Data Collection Application Workbook (GH20-0203) ... Executive Guide (G580-0072) ... IBM 5230 Data Collection User's Guide (GA34-0040).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/3 MODEL 12 RPG II  
5705-RG1**

**PURPOSE**

IBM System/3 model 12 RPG II is a program product that operates under control of the System/3 model 12 System Control Programming. RPG II is disk resident in a simulation area on the 3340 Direct Access Storage Facility (DASF). It requires as input an RPG II source language program and produces as output a System/3 model 12 machine language object program, either cataloged in an object library or punched into 80- or 96-column cards, or written onto a diskette. A source program listing, diagnostic messages, and a main storage map can be requested.

To use the RPG II compiler, the user supplies information about the job to be processed. The job can be described on specification sheets prior to entering the source statements into the system. The specification sheets are: Auto Report, Control Card and File Description, Extension and Line Counter, Telecommunications, Input, Calculation and Output-Format.

Source Input to the compiler can be from the system input device (card reader, 3741 directly attached, or 5471 keyboard) or from a source library. Work files for the compiler are on a simulation area of a 3340 data module.

In addition to the functions provided by System/3 model 10 Disk RPG II, model 12 RPG II provides the following capabilities:

- Support of 3340 Direct Access Storage Facility.
- Included as standard functions of the model 12 RPG II, the following support that is available as separately priced features in model 6 and/or 10 RPG II: Telecommunications, Auto Report, and Magnetic Tape support.

**Disk File Support:** The access methods supported for the 3340 are the same as those supported by System/3 model 10 Disk RPG II and are as follows:

**Sequential**

- Consecutive Processing - including updating in place.
- Random Processing - by relative record number including updating but excluding file loading.

**Indexed (main data area only)**

- Random processing - by key.
- Sequential processing - by key including file loading.

**Direct**

- Random Processing - by relative record number, including updating and file loading.
- Consecutive Processing.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used (except as data records within the file).

Record size can range from 1 to 9,999 bytes, and records can be processed as blocked or unblocked. Logical records may span physical disk sectors, tracks or cylinders.

**Tape File Support:** The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by System/3 model 10 Disk RPG II. RPG II object programs can process data or record address files on magnetic tape. Highlights of tape support include:

- Consecutive input or output files
- 1-4 tape drives
- Fixed length records, blocked or unblocked
- Variable length records, blocked or unblocked
- Record size from 18 to 9,999 bytes
- Block size from 18 to 9,999 bytes
- IBM Standard Labels, ANSI Labels, no labels
- Option for two I/O areas
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multi-volume files
- Recording format: EBCDIC (7-or 9-track) or ASCII (9-track only)
- Program options to Rewind or Rewind/Unload at end of job

**Printer Support:** RPG II supports the 5203 and 1403 Printer as follows: Space 0, 1, 2 or 3 before or after printing a line; skip to line number before or after printing a line; overflow detection; first page forms alignment. The 5203 dual feed carriage is supported.

**Card I/O Support:** RPG II supports the MFCU and 1442 as follows:

	MFCU	1442
Read	Yes	Yes
Punch	Yes	Yes
Card Print	Yes	No
Stacker Select	Yes	Yes
Combined File	Yes	Yes
Character set (EBCDIC)	64	256

**Diskette Support:** A directly-attached 3741 is supported as a unit record input/output device for RPG II object programs.

**Model 12 RPG II Device Support**

	Compilation	Execution
3340 Direct Access Storage Facility, model C2	Yes	Yes
3410/3411 Magnetic Tape Unit, models 1, 2 or 3	No	Yes
5203 Printer, model 1, 2 or 3	Yes	Yes
1403 Printer, model 2, 5, or N1	Yes	Yes
5424 MFCU, model A1 or A2	Yes	Yes
1442 Card Read Punch, model 6 or 7	Yes	Yes
5471 Printer-Keyboard, model 1	Yes	Yes
1255 MCR, model 1, 2 or 3	No	Yes**
3881 OMR, model 1	No	Yes**
3741 Data Station/Programmable Workstation model 1, 2, 3 or 4 (directly attached)	Yes	Yes
BSCA, 1 or 2 lines, ICA, or Local Display Adapter	No	Yes
Main Storage Requirements (Program Level Size)	8-56K*	8-56K*

- \* The maximum program level is 64K less supervisor requirements.
- \*\* Requires SCP subroutine; RPG II SPECIAL exit is used.

**Auto Report:** Model 12 RPG II Auto Report is functionally identical to the S/3 model 10 Disk RPG II Auto Report feature. Auto Report enhances the RPG II language by providing functions which eliminate much of the preparation and coding work normally done by the user. It is specifically designed to facilitate report preparation.

Auto Report executes as a preprocessor to the RPG II Compiler. The input is RPG II source statements and Auto Report statements. Auto Report produces a diagnostic listing, replaces the Auto Report statements with generated or copied RPG II source statements and calls the RPG II Compiler for execution.

**Telecommunications Support:** Support of the Binary Synchronous Communications Adapter (BSCA), and the Integrated Communications Adapter (ICA) is achieved through use of the RPG II Telecommunications Specifications Sheet and the addition of BSCA as a device entry on the RPG II File Description Specification. The support is identical to that provided by System/3 model 6 and 10 RPG II Telecommunications features, and includes:

**Communication modes:** Receive only ... Receive with conversational reply\* ... Transmit only ... Transmit with conversational reply\* ... Alternate transmit and receive file. (\*Not supported in communication with System 32, System/34, 2770, 2780, 3741-2, and 3741-4 or a 5110 Computer System supported as a 3741 model 2 or 4.)

Communication with the 5231 model 2 is in Receive mode only. The 5231 model 2 is supported as a 3741 model 2 or 4.

**RPG II language features supported:** Input, Output, and Combined files ... Demand files for Transmit and Receive ... Blocking and deblocking of records ... Dual I/O areas.

**BSCA and ICA features, options and capabilities supported:** Manual Call ... Manual answer ... Auto-call (BSCA only) ... Auto-Answer ... Medium speed ... High speed (BSCA only) ... Station selection ... EBCDIC data transparency ... intermediate block checking ... EBCDIC or ASCII data and data link control characters. File translation of ASCII data can be accomplished by proper use of the file translation facility of RPG II.

For additional information, see the description of the model 10 Disk RPG II Telecommunications feature (5702-RG1, feature #6000/#6002).

**COMPATIBILITY**

System/3 model 12 RPG II is source language compatible with the System/3 model 10 Disk RPG II (5702-RG1) and System/3 model 6 RPG II (5703-RG1) except for differences due to different hardware. A System/3 model 6 or 10 Disk RPG II source program can be re-compiled on System/3 model 12, without changes to the source, and be executed under control of System/3 model 12 SCP - assuming the same I/O. (Note: 5444 is equivalent to a 5444 simulation area on the 3340; indexed and multi-volume files are supported in the main data areas only; split cylinder files are not supported; shared I/O areas are not supported.)



## PROGRAM PRODUCTS

## System/3 Model 12 RPG II (cont'd)

## SPECIFIED OPERATING ENVIRONMENT

## HARDWARE REQUIREMENTS

**Minimum System Requirements:** For source program compilation - An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) ... and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or directly-attached IBM 3741 Data Station/Programmable Workstation ... and an IBM 5203 or 1403 Printer ... and an IBM 3340 DASF.

## SOFTWARE REQUIREMENTS

5705-SC1.

## DOCUMENTATION

(available from Mechanicsburg)

*Introduction to RPG II (GC21-7514) ... System/3 RPG Reference Manual (SC21-7504) ... System/3 RPG II Auto Report General Information (GC21-7563) ... System/3 PRG II Auto Report Reference Manual (SC21-5057) ... System/3 RPG II Telecommunications Reference Manual (SC21-7507) ... System/3 RPG II Program Product Specifications (GC21-5081) ... System/3 RPG II Additional Topics Programmer's Guide (GC21-7577) ... System/3 RPG II Disk File Processing Programmer's Guide (GC21-7566) ... System/3 Bibliography (GC20-8080).*

**RPG II 3270 DISPLAY CONTROL FEATURE**  
Feature #6003/#6004

## PURPOSE

The RPG II 3270 Display Control feature provides telecommunications services for local or remote 3270 devices. The program is automatically linked into the RPG II application program via the SPECIAL file exit capability on the RPG II File Description Specification Sheet. Neither the Assembler nor the RPG II Telecommunications feature is required.

## DESCRIPTION

The following services are provided by the Display Control feature:

- RPG II access to 3270 Display System Terminals attached via the Local Display Adapter, the Integrated Communications Adapter (ICA), or the Binary Synchronous Communications Adapter (BSCA).
- Automatic buffering and queuing of terminal data
- A display formatting interface which permits the support of 3270 devices with coding in RPG II
- Complete line control procedures are provided
- Up to 18 terminals may be controlled (up to 12 can be attached via the Local Display Adapter)
- Provides the capability of coding one or more applications within one program. No task switching is provided.
- Two subroutines are provided. SUBR13 allows an RPG II program to support 3270s without using CCP. SUBR14 provides upward compatibility with CCP, requiring only program recompilation, assuming the RPG II program meets the CCP requirements.

**Terminals Supported:** The following terminals and communications facilities are supported under the RPG II 3270 Display Control feature:

With the Local Display Adapter

- 3277 Display Station (model 1 or 2)
- 3284 Printer (model 1 or 2)
- 3286 Printer (model 1 or 2)
- 3288 Printer (model 2)

**Note:** A maximum of 12 terminals may be attached via the Local Display Adapter.

With the Integrated Communications Adapter (ICA) or the Binary Synchronous Communications Adapter (BSCA).

- 3275 Display Station and Control, or
- 3271 Display Control Unit (model 1 or 2), with:
  - 3277 Display Station (model 1 or 2)
  - 3284 Printer (model 1 or 2)
  - 3286 Printer (model 1 or 2)
  - 3288 Printer (model 2)

## SPECIFIED OPERATING ENVIRONMENT

## HARDWARE REQUIREMENTS

**Minimum System Requirements:** The RPG II 3270 Display Control feature requires an IBM System/3 model 12 which includes, as a minimum, an IBM 5412 Processing Unit model B16 (32K bytes) ... an IBM 3340 model C2 DASF ... an IBM 5203 or 1403 Printer ... an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached 3741 Data Station/Programmable Workstation ... a Local Display Adapter or an Integrated Communications Adapter or a Binary Synchronous Communications Adapter and one of the devices listed under "Terminals Supported".

Using SUBR13, approximately 10K-12K bytes are added to the size of the object program. Using SUB14, approximately 4.3K bytes are added to the size of the object program.

## SOFTWARE REQUIREMENTS

5705-SC1, 5705-RG1.

## COMPATIBILITY

The System/3 model 12 RPG II 3270 Display Control feature is functionally compatible with the System/3 model 8/10 and System/3 model 15 RPG II 3270 Display Control feature.

## DOCUMENTATION

(available from Mechanicsburg)

*IBM RPG II 3270 Display Control Feature Reference and Logic Manual (SC21-5161) ... System/3 Bibliography (GC20-8080).*

**Programming Service Classification:** A.

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 MODEL 12 DISK SORT  
5705-SM1****PURPOSE**

The IBM System/3 model 12 Disk Sort program is a program product that sorts a file into ascending or descending sequence. The program is resident in a simulation area on the 3340 Direct Access Storage Facility (DASF) and operates under control of the model 12 SCP.

**DESCRIPTION**

**Input files** - Multiple input files are supported - up to eight input files from disk and/or tape. An input file can be resident on a 3340 DASF or on a unit of the 3410/3411 Magnetic Tape subsystem. A disk file can have sequential, indexed or direct organization. For a disk file, the input record size can be from 1 to 9,999 bytes. A tape input file can have fixed length records, either blocked or unblocked; variable length tape records are not supported. The maximum input tape record or block size is 9,999 bytes, and the minimum is 18 bytes. Input tape files can be 9-track 800/1600 bpi or 7-track 200/556/800 bpi. The tape file can be recorded in either EBCDIC or ASCII code. Input can be either a single volume file or a multi-volume file.

**Work file** - A work file can be resident on a simulation area or main data area of a 3340 DASF. Work space can be specified by the user or can be automatically allocated by the program.

**Output file** - The output file can be resident on a 3340 DASF or on a unit of the 3410/3411 Magnetic Tape Subsystem. A disk output file can have sequential organization only. Characteristics of tape output files are the same as for tape input files, described above. The maximum output record size for disk or tape is 4,096 bytes. Output of the program will be one of three formats: Tag (ADDROUT), tag-along, or summary tag-along.

**Features**

- Records can be selected or omitted, and reformatted.
- Specified records may be forced ahead of others.
- An alternate collating sequence can be specified.
- Control fields can be in different locations in the records.
- The total length of the control fields can be from 1 to 256 bytes; there is no other limit on the number of control fields.
- Control fields can be sorted in ascending or descending sequence, or mixed (some ascending and some descending).
- Control fields can be sorted using only the digit or zone portion of the character. The fields can be packed or unpacked decimal, or character formats.
- Records containing identical control fields can be combined by summarizing specified fields into one record.

**Use:** Specifications are described on a simple, RPG-like coding sheet. These specifications are entered into the system using the system input device, or they can be stored in the source library on disk. Sort control statement diagnostics and messages may be displayed on the system logging device.

The program can be executed in a dual programming environment and uses from 8K to 56K bytes of main storage, exclusive of SCP requirements.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirements:** An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K), and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation, and an IBM 5203 or 1403 Printer and an IBM 3340 DASF.

**SOFTWARE REQUIREMENTS**

5705-SC1. (See SCP pages.)

**COMPATIBILITY**

The model 12 Disk Sort program is source language compatible with the Disk Sort programs for the System/3 models 6, 8 and 10.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/3 Disk Sort Reference Manual (SC21-7522) ... System/3 Disk Sort Program Product Specifications (GC21-5083) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/3 MODEL 12 MAGNETIC TAPE SORT  
5705-SM2****PURPOSE**

The IBM System/3 model 12 Magnetic Tape Sort program is a program product that sorts a tape file into ascending or descending sequence. It is resident in a simulation area on the 3340 Direct Access Storage Facility (DASF) and operates under control of the model 12 SCP. A configuration that includes three or four tape units is required. The program is functionally identical to the System/3 model 10 Disk Resident Magnetic Tape Sort program (5702-SM2).

**Input files** - The input file resides on any unit of the 3410/3411 Magnetic Tape Subsystem. The input file can have fixed length records, either blocked or unblocked. (Variable length records are not supported.) The maximum input record or block size is 9,999 bytes. The minimum input record or block size is 18 bytes. Input tape files can be 9-track 800/1600 bpi or 7-track 200/556/800 bpi. The file can be recorded in either EBCDIC (7- or 9-track) or ASCII (9-track only) code. Input can be either a single volume file or a multivolume file.

**Work files** - Three work tapes are required; a fourth can be utilized, if available. Work tapes can be either 7- or 9-track (see restrictions below). Work tapes must be single volume only (not multivolume).

**Output file** - The output file resides on any unit of the 3410/3411 Magnetic Tape Subsystem. Characteristics of tape output files are the same as for tape input files, described above. Output is a file of records containing the sort control fields and/or the data fields the user has specified. (The tag [ADDROUT] and summary tag-along sort capabilities of the Disk Sort are not supported in the Tape Sort.)

**Restrictions:** To utilize all of the functions of this program, at least three 9-track work tapes must be available. If one or more of the work tapes is 7-track, then only those sort functions that relate to the standard System/3 64-character set (EBCDIC) are supported. As a result, sorts of binary data, packed or unpacked decimal data or sorts on zones are not allowed in these 7-track configurations.

**Features**

- Records can be selected or omitted, and reformatted.
- Specified records may be forced ahead of others
- An alternate collating sequence can be specified.
- A checkpoint/restart facility is supported.
- Control fields can be in different locations in the records.
- The total length of the control fields can be from 1 to 256 bytes; there is no other limit on the number of control fields.
- Control fields can be sorted using only the digit or zone portion of the character. The fields can be packed or unpacked decimal, or character formats.
- Control fields can be sorted in ascending or descending sequence or mixed (some ascending and some descending).

**Use:** Specifications are described on a simple, RPG-like coding sheet. These specifications are entered into the system using the system input device, or they can be stored in the source library on disk. Sort control statement diagnostics and messages may be displayed on the system logging device. The program can be executed in a dual programming environment and requires 8K to 55K bytes of main storage, exclusive of SCP requirements.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirements:** An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K), and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation, and an IBM 5203 or 1403 Printer, and an IBM 3340 DASF. At least three tape drives of the IBM 3410/3411 Magnetic Tape Subsystem are required.

**SOFTWARE REQUIREMENTS**

5705-SC1. (See SCP pages.)

**COMPATIBILITY**

The model 12 Magnetic Tape Sort program is functionally compatible with the Disk Resident Magnetic Tape Sort program for System/3 model 8 and System/3 model 10.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/3 Tape Sort Reference Manual (SC21-7572) ... System/3 Magnetic Tape Program Planning Manual (GC21-5040) ... System/3 Tape Sort Program Products Specifications (GC21-5138) ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 MODEL 12 DISK RESIDENT CARD UTILITIES  
5705-UT1**

**PURPOSE**

This IBM System/3 program product is resident in a simulation area on the 3340 Direct Access Storage Facility (DASF) and operates under control of the model 12 SCP. The following programs are provided: Sort/Collate, List, Reproduce/Interpret, and Gangpunch. (The following programs, included in the model 10 Utilities, 5701-UT1 and 5702-UT1, are not available for the model 12: Data Recording, Data Verifying, and 80-96 Conversion program.)

**DESCRIPTION**

**Sort/Collate Program** - Functionally compatible with the model 10 Sort/Collate program (see 5701-UT1). The model 12 program supports the 5424 MFCU only.

**List Program** - Functionally compatible with the model 10 96-column List program (see 5701-UT1). The model 12 program supports input from 5424 MFCU, 1442 Card Read Punch, or the directly-attached 3741.

**Reproduce/Interpret Program** - Functionally compatible with the model 10 Reproduce/Interpret program (see 5701-UT1). The model 12 program supports the 5424 MFCU only.

**Gangpunch Program** - Functionally compatible with the model 10 Gangpunch program (see 5702-UT1). The model 12 program supports the 5424 MFCU.

**Use:** Each program described above can be executed in an 8K program level in a dual program environment.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum System Requirements:** An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K), and an IBM 5203 or 1403 Printer, and an IBM 3340 DASF, and the device required for the particular program described above (IBM 5424 MFCU, 1442 Card Read Punch, or a directly-attached IBM 3741 Data Station/Programmable Workstation).

**SOFTWARE REQUIREMENTS**

5705-SC1. (See SCP pages.)

**COMPATIBILITY**

The model 12 Disk Resident Card Utilities that have model 10 equivalents are functionally compatible to the model 10 versions.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/3 Sort/Collate and Card Utilities Reference Manual SC21-7529* ... *System/3 Disk Resident Card Utilities Program Product Specifications (GC21-7535)* ... *System/3 Bibliography (GC20-8080)*.

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SYSTEM/3 UTILITY PROGRAM FOR  
1255 MAGNETIC CHARACTER READER  
5705-UT2****PURPOSE**

This utility program provides the System/3 model 12 user control of document processing on the IBM 1255 Magnetic Character Reader. It provides a means of reading MICR encoded documents from the 1255, accumulating document totals and amount field totals for each pocket, and placing the data from the documents on output disk or tape and printer files. The program is designed to fulfill the basic requirements of the "ON-US" data capture run required for all Demand Deposit Application Programming.

**DESCRIPTION**

The program reads fields from the documents as specified by the user and then, based on decisions indicated by the user, it will stacker select these documents into user-specified pockets. If requested, Modulus 10 or 11 checking will be performed. Then after each document has been read and stacker selected, the utility will print user-specified fields from that document. Fixed-length disk records will also be created and placed on a disk file or a tape file (3410 or 3411 9-track only).

An additional facility provided by the program is the accumulation of document totals and amount field totals and then printing these at end of job. Subtotals may be printed at any time as indicated by the user during program execution.

**Use:** The utility requires at least 10K bytes of main storage when disk output is requested and 12K bytes of main storage when tape output is requested (exclusive of SCP requirements). The program will operate in a dual program environment.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Requirements:** An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) with a Serial I/O Channel (#7081), and an IBM 5424 MFCU or a directly-attached IBM 3741 Data Station/Programmable Workstation, and an IBM 5203 or 1403 Printer, and an IBM 3340 DASD, and an IBM 1255 Magnetic Character Reader, model 1, 2 or 3.

**SOFTWARE REQUIREMENTS**

5705-SC1. (See SCP pages.)

**COMPATIBILITY**

The model 12 Utility Program for the 1255 MCR is functionally compatible to the model 10 version.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/3 Models 10 and 12 Utility Programs for the 1255 MCR Reference Manual (SC21-7521) ... System/3 1255 Utility Program Product Specifications (GC21-5030). ... System/3 Bibliography (GC20-8080).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/7 FORTRAN IV  
STAND-ALONE COMPILER and LIBRARY  
5707-FO1****PURPOSE**

Provides high-level FORTRAN language support for the System/7 user by offering the ease and speed of coding in the FORTRAN language. The Compiler and Library program product is installed on the System/7 and executes as a component under the System/7 Program Preparation Facilities, thereby significantly enhancing stand-alone program preparation capability on the System/7.

The System/7 FORTRAN IV program product is designed to provide users with convenient access to a powerful, easy-to-use higher-level language with which they may write scientific, sensor-based and other applications.

**DESCRIPTION**

Users will compile their programs with the System/7 FORTRAN IV compiler. The System/7 Linkage Editor under the S/7 Program Preparation Facilities will combine these programs with the FORTRAN library routines, sensor-based routines, and/or other MSP/7 routines to form an executable real-time application program. The FORTRAN programs which are connected to an interrupt on a priority level via MSP/7 facilities gain control whenever the appropriate device or software interrupt occurs.

The user also may utilize the batch DSS/7 nucleus provided as part of the System/7 Program Preparation Facilities. Thus, users need not build their own MSP/7 nucleus, thereby enhancing the installability and usability of FORTRAN. In this environment the user is offered batch compile-and-go facilities and sequential DP I/O device support for the 5028 Operator Station, 5022 Disk Storage Module, 129 Data Recorder and the 7431 Serial Printer.

Some of the features that FORTRAN offers include:

- ANS Basic FORTRAN with major extension
- Syntax checking mode, at substantial compile time savings
- Optimization during compilation for time, space and execution performance
- Sequential Access Method support of the 5028 Operator Station, 5022 Disk Storage Module, 129 Data Recorder, 7431 Serial Printer
- Direct support of the Binary Synchronous Communications Adapter through the Communications Access Method
- Extensive library containing mathematical subprograms, implicitly-called subprograms, service subprograms, and sensor-based subroutines. New sensor-based subroutines have been included conforming to the Instrument Society of America Standard S61.1 providing such functions as:
  - initiation, suspension and termination of user programs based upon time parameters
  - reading analog input points in random or sequential order
  - setting and resetting digital output at specified times
  - reading and writing input and output registers
  - bit manipulation through logical shift complement and inclusive and exclusive OR, AND functions.
- Compatibility with host FORTRAN IV Library and host FORTRAN IV source and object code.
- MSP/7 functions including sensor I/O available through CALL statements

**CUSTOMER RESPONSIBILITIES**

- Understand the application they wish to perform and provide the appropriate hardware and software design
- Install the System/7 Program Preparation Facilities
- Utilize the batch DSS/7 (8-12K) nucleus or generate the supporting system nucleus for servicing sensor-based devices
- Provide the required user-written programs and link-edit these programs with the MSP/7 nucleus
- Test the resulting object programs

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS****Minimum Hardware for Compilation:**

- IBM System/7 (5010 mdl A, B, or E) with at least 12K words of main storage
- IBM 5022 Disk Storage Module (mdl 1 or 2), with or without cycle steal feature
- IBM 5028 Operator Station

**Minimum Hardware for Execution:** For stand-alone execution, the minimum requirements are:

- An IBM System/7 (5010 mdl A, B, or E) with at least 6K words of main storage
- IBM 5028 Operator Station

**Minimum Hardware for execution under control of the 8-12K version of DSS/7:**

- IBM System/7 (5010 mdl A, B, or E) with at least 12K words of main storage
- IBM 5022 Disk Storage Module (mdl 1 or 2), with or without cycle steal feature
- IBM 5028 Operator Station

With this configuration, only the 5028 can be used for I/O.

Service programs for 5707-AA1 are provided on a separate 8-channel paper tape when #9056 is ordered.

**SOFTWARE REQUIREMENTS**

IBM System/7 FORTRAN IV runs under the control of the IBM System/7 Program Preparation Facilities. The object modules produced by FORTRAN must be link-edited and formatted prior to execution in the IBM System/7. Both the stand-alone Macro Assembler and the Macro Library/Relocatable are required for preparing the real-time nucleus (in lieu of using DSS/7 for non-real time applications) for those user applications utilizing sensor-based subprograms.

**COMPATIBILITY**

The compiler accepts source programs written in System/7 FORTRAN, which is an extension of ANS Basic FORTRAN, X3.10-1966 and produces object modules that are acceptable to LINK/7 for link-editing. The System/7 FORTRAN IV compiler will also accept source programs written in ANS Basic FORTRAN. The language level is similar with the host FORTRAN program product.

**DOCUMENTATION**

(available from Mechanicsburg)

*Program Product Specifications: IBM System/7 FORTRAN IV (System/7 Compiler and Library) (GC34-0034) ... An Introduction to System/7 FORTRAN IV (GC28-6869).*

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**TREND ANALYSIS/370 - (5740-F12)  
Color Graphics Support Feature (5707-F12)**

**DESCRIPTION**

Trend Analysis/370 is an easy-to-use, interactive, IMS/VS-based computer application designed to allow presentation of time series data in tabular report form on a 3270 Information Display System. Using the System/7 Color Graphics Support Feature, presentation can be done graphically on a color television monitor. Time series numerical data, either from an organization's internal systems or from the external environment, can be formatted and stored for use by the system.

Information stored for use by Trend Analysis/370 is logically organized by time period (daily, weekly, monthly, quarterly, semi-annually and annually), by organization (such as companies, divisions, departments, subsidiaries, competitors or part numbers) and by data element (such as assets, expenses, net/gross sales or unit price). It is the customer's responsibility to provide the source information, either by writing a simple format conversion program for machine-readable information, or by entering it manually through online data entry terminal facilities provided by Trend Analysis/370.

The Trend Analysis/370 program provides a framework within which time series information can be stored, retrieved, manipulated and presented as required during the process of executive or management decision-making. Users may customize their use of the system by stipulating, interactively, the information content and format of the reports they are creating, or by pre-defining the reports.

In either case, they interact with the system through the use of 'menus'. These are simply terminal displays (3277) of a list of options for users to select from in creating their reports. For a pre-defined report, a single menu suffices (i.e., 'give me standard report number 6') while for an interactively-created report, a series of menus would be required (i.e., to select from lists of available data, manipulation facilities, report formats, time periods of interest, etc.). Data selection menus are created by users themselves; report option menus are provided along with the program.

Trend Analysis/370 also provides for the presentation of decision-supporting information in whatever format the user decides is best suited to the information to be displayed. For example, a report of 'today's closing balances' could be shown in tabular form on a terminal display screen (and a printed copy may be requested). On the other hand, using the System/7 Color Graphics Support Feature, an analysis of the expenses incurred by six departments by month over the past 24 months could be displayed on a standard color television monitor as six lines, each line in a different color against a black background, with white axes and scales. In tabular form, this report might have required several pages from which trends or patterns would be more difficult to discover.

Trend Analysis/370, then, is a major support tool for executive management, providing for the storage, retrieval, manipulation and presentation of time series information to assist and augment the decision-making process.

**HIGHLIGHTS**

- Trend Analysis/370 provides time series data in tabular report form for comparison of multiple organizations and data elements at a point in time, for comparing the performance of multiple organizations over time and for analysis of the performance of a single organization over time.
- The Color Graphics Support Feature enables the compression of a large tabular report (hundreds of numbers over several pages) into a single color graphical display on a standard television monitor. Time series data is particularly suited to analysis when viewed in graphical form.
- An easy-to-use 'menu' approach permits users, with minimal training, to customize the information content and format of a desired report.

**CUSTOMER RESPONSIBILITIES**

For Trend Analysis/370 they include:

- Identify the source of required information.
- Assign unique numbers to each organization and data element.
- Assign up to eight-character acronyms and up to twenty-character descriptors to each data element and organization.
- Load the unique numbers, acronyms and descriptors into the description data base using a batch program supplied by Trend Analysis/370.
- Assign a general password, data access password and a data modification password to limit access to this sequence of menus, to limit the information that may be seen by personnel holding the general password, and to limit data modification capability to only authorized people.
- Write conversion programs to reformat existing machine-readable data to meet format requirements of the Trend Analysis/370 interface program for the time series data base. The online data

entry facility can be used to enter non-machine readable data values and subsequently modify them.

- Design menus to reflect the most logical sequencing of the source data and the Trend Analysis/370 facilities that will be used.

For the Color Graphics Support Feature they include:

- The customer must purchase, install and maintain all data interfaces, cabling and equipment not specifically provided and maintained by IBM, in accordance with published System/7 Physical Planning Specifications (see "System Requirements").
- The customer must write the System/7 code to interface with the video display generator or submit a PRPQ to IBM for System/7 interface code for the selected device.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Trend Analysis/370 operates under IMS/VS Version 1 Release 1.0 or later versions, using any version of OS/VS1 or OS/VS2 which supports IMS/VS. This requirement means that the minimum IBM S/370 which can be used, (and also process other transactions) is a mdl 145 with 1,024K bytes of main storage. The product uses 173K in main storage (real or virtual depending upon the customer's installation requirements) and requires a 260K Message Processing Region (real or virtual). Each of the two batch support programs requires 256K in main storage (real or virtual).

The IBM 3270 Information Display System is used to communicate with Trend Analysis/370 and can be attached locally or remotely.

The system and terminal requirements are the IMS/VS requirements (please refer to the IMS/VS pages). However, Trend Analysis/370 requires the large (1,920 characters) Display Station such as the IBM 3277 mdl 2. A Printer such as the IBM 3286 mdl 2 is optional.

The Color Graphics Support Feature operates under the Disk Support System/7 on an IBM System/7. It can operate in a local or a remote environment. In a remote environment, the required IBM System/7 components are:

Type	Feature Code	RPQ Reference Number	Quantity per Machine	Description
5010				Processor Module mdl E28 Minimum
	#1610		1	Asynchronous Communication Control
	#2165		1	Common Carrier Adapter
		D08001	1	Communication Asynchronous 1200 Adapter
5013				Digital I/O Module
	#3284		1	Digital Input Control
	#3289		2	Digital Input Group
	#3296		1	Digital Output Control
	#3422		2	Digital Output Medium Power Group
	#5710		1	Process Interrupt
		D08147	1	Common Attachment 129/5496/7431
		D08150	1	Data Recorder 129 Attachment
5022				Disk Storage Module
5026				Enclosure - 3 Position Minimum
5028				Operator Station
5029				Feature Attachment to System/7
	#3283		2	Digital Input Voltage Sense
	#3410		3	Digital Output Connector



PROGRAM PRODUCTS

Trend Analysis/370 (cont'd)

129			Card Data Recorder
	#3610	1	Expansion Feature
	8T0065	1	I/O Attachment for System/7

For all machine types other than the IBM 5010, the model for that machine type may be any that the customer desires. In a remote environment, an IBM 2701 Data Adapter Unit, 2702 Transmission Control, a 2703 Transmission Control, 3704 Communications Controller in 2701/2702/2703 Emulation Mode, or 3705 Communications Controller in 2701/2702/2703 Emulation Mode is required. Appropriate modems, such as the IBM 3872 Modem, are also required.

For a local attachment to a channel, the specifications for the IBM 5013, 5022, 5026, 5028, 5029 and 129 remain the same as that for a remote environment. The specifications for the IBM 5010 and a 2701 Data Adapter Unit are:

Type	Feature Code	RPQ Reference Number	Quantity per Machine	Description
5010				Processor Module mdl E28 Minimum
	#1610		1	Asynchronous Communication Control
		D08000		Communication Asynchronous 50KB Adapter
2701				Data Adapter Unit
		858450		Asynchronous Communication Adapter

The following are not required but recommended to increase the performance of the respective machine types:

Type	Feature Code	RPQ Reference Number	Quantity per Machine	Description
5010	#2662		1	Cycle Steal Basic
5022	#2664		1	Disk Cycle Steal
129		Z04771	1	Skip/Read Double SPD

Additionally, two Original Equipment Manufacturer (OEM) devices are required:

- Video Display Generator.
- Red/Green/Blue (RGB) Television Monitor.

The video display generator is a device whose function is to provide a 30-times-per-second refresh (signal regeneration) to an RGB television monitor or any other device which requires a similar signal regeneration. The OEM RGB television monitor, to meet United States standards, should have 525 scan lines of two interlaced fields, with a 30-times-per-second refresh rate. Of the 525 scan lines on the TV monitor, 480 are usable for display. With a display aperture ratio of four horizontal to three vertical, 640 bits of information can be displayed on each of the 480 lines. The Color Graphics Support Feature is based upon this coordinate display of 480 vertical elements by 640 horizontal elements.

The Color Graphics Support Feature has been tested with one of the commercially available video display generators and two of the commercially available television monitors.

SOFTWARE REQUIREMENTS

The IBM Trend Analysis/370 program product is written in Programming Language/1 (PL/1) and operates under the control of the Information Management System/Virtual Storage (IMS/VS) Version 1 Release 0 or later versions. The prerequisite program products are:

Information Management System/VS	5740-XX2
IMS/VS Data Communication Feature	5740-XX2
PL/1 OS Resident Library	5734-LM4
PL/1 OS Transient Library	5734-LM5

If user exit code is written, then the PL/1 OS Optimizing Compiler (5734-PL1) is required.

The Color Graphics Support Feature is written in MSP/7 and operates under the control of the Disk Support System/7 (5707-AG1) and should only be used in conjunction with the Trend Analysis/370

program product (5740-F12). The program logic manual for the feature contains the interface specifications and guidelines necessary to program the System/7 to utilize a video display generator. It is recommended that the System/7 Host Preparation Program Facility for OS/VS (5744-AF1) be used on the S/370 to compile the code. Alternatively, the S/7 Program Preparation Facilities (5707-AA1) can be used to do the compilations on the System/7.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Design Objectives ... Promotional Brochure* (G520-3064) ... Slide Set (GV20-0610) ... *General Information Manual*

**RPQs ACCEPTED:** Yes

**TERMS and CONDITIONS:** See PP Index

**MANUFACTURING MONITORING SYSTEM VERSION 2  
5707-M33 (OS/VS)  
5707-M34 (DOS/VS)****PURPOSE**

The IBM Manufacturing Monitoring System (abbreviated to MMS) is a program product designed for realtime monitoring of plant floor activities and resources.

**DESCRIPTION**

MMS consists of a base program, the Basic System/7 Code, which resides in a System/7, and a feature, the S/370 Data Feature, which resides in a S/370 and is required for MMS data set generation and teleprocessing capabilities. The System/7 communicates with the plant floor via 2790 terminals operated by plant personnel. User-provided sensors, attached to System/7 digital input and output points, sense status and production count of machines (optional).

MMS accepts, edits, and processes transactions entered by workers, foremen, dispatchers, stock-keepers, and other personnel who report via terminal on setup, operation start and completion, interruptions, delivery to stock, and so on.

Signals received from machine sensors - indicating machine status, failure conditions, and quantities produced - are used to calculate utilization data, report failure conditions, monitor idle times, and check consistency of machine status against job status reported via terminal.

Based on this data, MMS monitors the execution of shop orders, their correct sequence, and timely completion, and the utilization of machines. It also calls for immediate action whenever exceptional conditions are detected. The data collected on System/7 disk files can be transmitted periodically, for additional evaluation, to a S/370 via binary synchronous or asynchronous communication linkages, using the MMS S/370 Data Feature, or to an IBM System/3 via physical disk transfer. When using the binary synchronous communication linkage (BSC), MMS data logging and sensor input processing can be performed in parallel with the transmission of System/7 disk file data to a S/370 host. This function is important for plants with 3-shift operations.

**HIGHLIGHTS**

MMS assists the user in the following functions:

- Collection of plant activity data, such as reporting on job status and machine status changes, work and operator assignments, maintenance.
- Machine monitoring, by sensing machine status, failure conditions, and quantities produced.
- Realtime information, on workstations, job queues, shop orders, and machine operators.
- Plant communication, with message generation and distribution according to order progress and exceptional conditions detected.
- Feedback for planning and accounting, e.g., for scheduling systems, cost and payroll accounting, quality assurance, material planning.

**CUSTOMER RESPONSIBILITIES**

To tailor MMS according to the user's environment, the customer must provide specifications and parameters that describe the plant environment and select the MMS functions required.

If users install sensor hardware for machine monitoring and piece counting, a user-written System/7 interface program is required to connect the particular hardware equipment to MMS. An MMS sample problem will be provided as a guide for the user programming effort.

Prerequisite to successful implementation of MMS is an intensive education of the plant personnel operating terminals and using MMS functions.

**SOFTWARE REQUIREMENTS**

MMS Basic System/7 Code is written in IBM System/7 Assembler language.

The IBM System/7 MSP/7 Host Program Preparation Facilities II, Release (ASM/7, LINK/7, FORMAT/7, MACLIB/R: Group Order Number 5744-AF1 for OS/VS, 5747-AF1 for DOS/VS) are required to generate the MMS System/7.

System generation must be performed on an IBM S/370 processor operating under control of the IBM Operating System (OS/VS or OS/VS2) or the IBM Disk Operating System (DOS/VS).

The MMS System/7 batch programs use the direct-access method of MSP/7 Symbolic File Support for access to disk data sets. The MMS System/7 realtime programs use the Basic Access Support for disk file access.

For initialization of System/7 disks, for definition and deletion of data sets, and for program loading onto System/7 disk, the MSP/7 Disk Support System (5707-SC2 or 5707-AG1) is required.

MMS S/370 Data Feature is written in IBM OS/VS and DOS/VS Assembler language and operates on a host IBM S/370 Virtual Storage system under control of the IBM Operating System (OS/VS1 or OS/VS2) or the IBM Disk Operating System (DOS/VS). For data access and data management it uses QSAM, BSAM, BDAM, and BTAM (under OS/VS) or SAM, DAM, and BTAM (under DOS/VS).

Generation of the Basic System/7 code and compilation and execution of the S/370 Data Feature can also be performed on a S/370 operating under OS/VS1, OS/VS2 or DOS/VS running under the control of VM/370.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

For execution of the MMS Basic System/7 Code, the minimum machine requirements are as follows:

IBM System/7 with:

- 1 IBM 5010 A14 Processor Module with 14,336 words of storage (for MMS without machine monitoring function and without Binary Synchronous Communications Control - BSCA) or
- 1 IBM 5010 A16 or E16 Processor Module with 16,384 words of storage (for MMS with machine monitoring function but without BSCA) or
- 1 IBM 5010 E20 Processor Module with 20,480 words of storage (for MMS without machine monitoring function but with BSCA) or
- 1 IBM 5010 E20 Processor Module with 20,480 words of storage (for MMS with machine monitoring function and BSCA).

Users of the MMS Version 1 who change to Version 2 will experience a storage increase of approximately 1K words due to increased storage requirements of MSP/7 Release 7 even if no functional extensions are installed.

Data transmission between IBM System/7 and an IBM S/370 host can be performed either by the

- Binary Synchronous Communications Control (#2074) with 1,200 to 40,800 bps.

or the

- Asynchronous Communications Control (#1610) with 600 bits/sec.

- 1 IBM 5012 A01 Multifunction Module, or

- 1 IBM 5013 A01 Digital I/O Module

One or more digital input (DI) and output (DO) groups are required if the user installs direct machine monitoring and/or digital output-driven devices, such as lamp indicator boxes. The number of DI and DO groups depends on the hardware attached and the addressing technique applied.

- 1 IBM 5022 Disk Storage Module mdl 1 or 2, with one removable disk recommended for fast exchange of full disks. Up to three IBM 5022 modules can be supported with or without Cycle Steal features (#2662, #2664).

- 1 IBM 5026 C03 Enclosure or 1K with Storage Power Addition (#7401).

- 1 IBM 5028 001 Operator Station.

IBM 2790 Data Communication System with:

- 1 IBM 2791 and/or 2793 Area Station.

The following devices can be attached to area stations:

- IBM 2796/2797 Data Entry Unit,
- IBM 1053 Remote Printer, and
- IBM 1035 Badge Reader.

The number and type of devices depend on the user's plant organization, transaction load, and plant layout.

Refer to the System/7 and IBM 2790 documentation for restrictions regarding the number of terminals attachable to the 2790 loop of System/7.

Additional input/output devices, such as the IBM 129 Card Data Recorder and the IBM 7431 Serial Printer, can be supported by MMS if appropriate user-supplied interface programs are attached to MMS user exits.

For generation of the MMS Basic System/7 Code, and for compilation and execution of the S/370 Data Feature, the minimum machine requirements are as follows (in addition to those stated above):

An IBM S/370 Central Processing Unit supported by OS/VS1, OS/VS2, or DOS/VS. Address space requirements for the virtual region or partition are as follows:



**MMS V2 (cont'd)**

- For generation of the Basic System/7 Code:  
128K bytes for the System/7 Host Macro Assembler, ASM/7.
- For compilation of the S/370 Data Feature:  
256K bytes for the OS/VS Assembler  
128K bytes for the DOS/VS Assembler
- For execution of the S/370 Data Feature:  
48K bytes for data set generation and for data transmission.

Any IBM Direct-Access Storage Facility supported by the operating system, Assembler, and access methods used.

If the IBM System/7 is to be connected to the host system via a teleprocessing linkage, an IBM 2701 Data Adapter or equivalent transmission control unit and PTT (Post - Telephone - Telegraph: common carrier) or IBM modems are required.

MMS system generation can also be performed at an IBM Center.

**Licensing 5707-M33, MMS with OS/VS Host System:** MMS consists of System/7 code required for plant monitoring and communication and of S/370 code required for MMS data set generation and teleprocessing capabilities.

The basic System/7 code offered as MMS Basic Material is assembled on a host S/370, and used on a System/7.

The S/370 code offered as MMS S/370 Data Feature is assembled, and used on a S/370.

The Basic Material (System/7 code) and the S/370 Data Feature (S/370 code) each must be licensed on a designated central processing unit (Designated CPU).

The Basic Material must be licensed on a System/7. The S/370 Data Feature must be licensed on a S/370.

**TERMS and CONDITIONS:** See PP Index

## SYSTEM/7 PROCESS CONTROL PROGRAM (PCP/7)

5707-XN3 (using HPPF-II/OS Systems)

5707-XN4 (using HPPF-II/DOS Systems)

5707-XN5 (using System/7 Program Preparation)

### PURPOSE

System/7 Process Control Program (PCP/7) is designed to provide process monitoring, supervisory control, and direct digital control of continuous industrial processes. The program executes in a System/7 and is prepared on a S/360 or S/370 using the MSP/7 Host Program Preparation Facility-II (HPPF-II) or on a System/7 using the System/7 Program Preparation Facilities (System/7 PPF). Process operator communication with the program is supported through the RPQ 7414 Interactive Console or 5028 Operator Station used as a Process Operator Console (POC) attached to the System/7. In addition, support is provided for communications to a S/360, S/370, 1800, or 1130 System operating with the appropriate Distributed System Program (DSP).

The program is tailored to specific monitoring or control applications by means of user-specified information, which is stored in tabular form in the program. All of the information required to describe each process variable is specified in this table along with the program steps which must be executed to achieve the required control action. The table (Process Variable Record [PVR] Table) is scanned on a periodic basis and each variable is then processed in accordance with the information in the table. The table is generated by specifying the pertinent parameters of each process variable through a fill-in-the-blanks procedure. The parameters specified include the symbolic variable name, such as T100 to F005; type of measurement, analog or digital; range and units of measurement; and frequency of processing.

In addition, the macro permits the user to specify digital control processing steps for a variable and also the parameters for each step. Control processing options include:

- Two types of Digital Filtering
- Control algorithm selection
- Limits and limit violation action
- Selection of output type and disposition

### HIGHLIGHTS

- **Measurement Processing** - Scanning of process variables, measurement conditioning, limit checking, and alarm annunciation. Measured variables are converted to engineering units for display and calculation.
- **Direct Digital Control Processing** - Several control algorithm options, including a five-mode controller and a ratio controller. The five-mode algorithm provides standard three-term (proportional, integral, derivative) control with two additional non-linear modes. The absolute form of the algorithm is used to produce absolute or incremental output on an individual PVR basis.
- **Supervisory Control** - PCP/7 solves a difference equation that computes the appropriate change in the target of a controlled variable based both on the deviation of the current value of a primary variable from its target and on the changes in other related variables. The change to the target of the controlled variable can be staged over a period of time.
- **Setpoint Adjustment** - The ability to adjust the setpoint of an external analog controller.
- **Operator Communication** - Support for up to two RPQ 7414 Interactive Consoles or one 5028 Operator Station when used as a Process Operator Console (POC). Two console-selectable modes of information access are provided. In the operator mode, the process operator is restricted to accessing only that information with which he must be concerned. In the engineer mode, nearly unlimited information access is possible.
- **Error Analysis and Control** - The ability to detect and take control on system errors. If the System/7 configuration includes the optional 5022 disk, the PCP/7 program and data can be stored on disk and used for restart purposes.
- **Multiple Utilities** - The ability to load and dump System/7 process data in the form of the PVR table via the 5028 Operator Station.
- **Process Data Preparation** - Users specify the characteristics of their process data to the system through fill-in-the-blanks forms. APG/7, if installed on the host preparation system, not only provides forms for specifying process data, but also for specifying system characteristics.

### CUSTOMER RESPONSIBILITIES

To install PCP/7 on a System/7, the user must perform the following:

- **Define the Application** - Users must first determine the scope of the application and the control strategy to be used. Also, they must identify instrumentation and cabling, including sensors and computer output stations that will interface the process with the System/7.

- **Determine System/7 Configuration** - The computer system equipment necessary to satisfy the application scope must be identified.
- **Specify PCP/7 System Generation Options** - Depending on the specific System/7 configuration and scope of application, PCP/7 will require different modules and/or will take different action within the modules. Users tailor PCP/7 to meet the needs of their specific application by a user-oriented specification procedure that identifies the equipment they have and the program options they require. This requires extensive knowledge of the application but minimal knowledge of MSP/7 and programming.
- **Prepare Any User Additions** - Any processing routines added to PCP/7 must be prepared by the user. These routines may require MSP/7 specification macros in addition to those generated by PCP/7 as a result of the specification procedure. APG/7, if used, includes a high-level procedural language facility for coding user routines. PCP/7, in turn, provides an interface that allows APG/7 or System/7 FORTRAN IV to access and modify the PVR Table. User routines that compete with PCP/7 for such System/7 resources as the disk and the host communication adapter, require special consideration. In order to ensure maximum PCP/7 performance, users should be aware of the way in which PCP/7 uses these resources and organize their additions in the complementary manner. A good knowledge of programming and MSP/7 is required for any additions.
- **Generate PCP/7 Storage Load** - This may be done using either the MSP/7 Host Program Preparation Facility II on any S/370 that meets the minimum machine requirements, or the System/7 Program Preparation Facilities on a System/7 that meets the minimum machine requirements.
- **Generate Process Variable Record Table** - The user generates the PVR Table by using fill-in-the-blanks facilities to define each measured or controlled variable. The table, once loaded into System/7 storage, can be modified online using the POC in either operator or engineer mode.
- **Load Storage Module and PVR Table** - If PCP/7 is generated on a S/370 host and the System/7 is not host-connected, both the PCP/7 program and the PVR Table must be punched onto paper tape and loaded to System/7 using the 5028 Operator Station. If the System/7 is host-connected, the storage load and PVR Table can be loaded directly from the host system. In the case of a host 1800 or 1130 System, the appropriate DSP or Disk Monitor facility is used to load System/7 object code, generated on a S/360 or S/370, to 1800 or 1130 disk storage. DSP is subsequently used to transmit a storage load to the System/7.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The minimum IBM System/7 configuration for PCP/7 program execution is:

- One IBM 5010 Processor, mdl A14 or B14 (14K words of storage).
- One 5012 Multifunction Module with sufficient sensor-based features to measure the variables and output control signals.
- One 5026 Enclosure
- One 5028 Operator Station.

The 5012 Multifunction Module provides the following:

- As many as 32 analog input points
- As many as 128 digital input points
- As many as 64 digital output points
- One or two analog output points

This system supports a useable group of digital control functions, including five-mode control of 50 process variables. (Storage requirements increase by approximately 25 words for each control variable added.) The complete set of input processing, control processing, and console functions, requires additional storage. Selection of certain user program options, disk support, or host communication support (DSP) also increases the storage requirement.

PCP/7 provides more user-selectable processing options than are likely to be used in a single process control system. The inclusion of the full range of these options, within any one application of PCP/7, together with the disk support and host communication functions, would result in a program exceeding 22K of System/7 storage. The detailed storage requirements for system options are available in the appendix of the *IBM Process Control Program (PCP/7) Operations Guide*.

The following components allow implementation of additional PCP/7 functions:

PROGRAM PRODUCTS

**System/7 PCP/7 (cont'd)**

- 5014 Analog Input Module, which handles up to 128 analog inputs.
- RPQ 7414 Interactive Consoles (without buffer of character set expansion), each of which includes a TV monitor (black and white display), alphameric keyboard (block style), function keyboard and 1053 Console Printer (optional). (7414 can be located up to 2,000 feet from the System/7).
- Asynchronous Communications Control Attachment (ACCA) for host communication (except for 1130 host).
- 1130 Host Attachment for 1130 host communication.
- 5022 Disk for checkpoint and restart.
- RPQ Bipolar Analog Output in a 5012 Multifunction Module.
- 5013 Digital I/O Module which provides up to 128 digital input and 64 digital output points. (PCP/7 does not support RPQ's housed in the 5013 Module).

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual (GH19-1007) ... Program Product Specifications (GH19-7008). ... System/370 Distributed System Program General Information Manual (GH20-1171) ... System/370 Distributed System Program - Program Reference Manual (GH20-9500) ... 1130 Distributed System Program - Program Reference Manual (GH20-1144) ... 1800 Distributed System Program - Program Reference Manual (GH20-1143) ... Application Program Generator General Information Manual (GH20-1162) ... Application Program Generator Program Reference Manual (SH20-9502)*

**TERMS and CONDITIONS:** See PP Index

See *IBM System/7 Functional Characteristics (GA34-0003)* and *IBM 7414 Model 1 Control Unit Custom Feature Description and Physical Planning Information (GA27-2743)* for details on these components.

The minimum configuration (S/360, S/370, or System/7) needed to assemble, format, and link-edit PCP/7 is satisfied by the configuration specified for MSP/7 Host Preparation Facilities II or System/7 Program Preparation Facilities, except that PCP/7 under DOS and DOS/VS requires an address space of 40K. The user requires enough direct access storage to support three work files, an MSP/7 library, and a PCP/7 library. 65 cylinders of 2314 space, or its equivalent will suffice. For the minimum configuration specified for stand-alone System/7 program preparation, the MSP/7 Source Library Editor must be used to minimize program listing requirements. The system configuration requirements for both host and stand-alone program preparation are specified in *IBM System/7 Macro Assemblers (GC34-0018)*.

For use with the System/7 Program Preparation Facilities, an additional 5022 Disk Storage Module (mdl 1, 2, 3, or 4) is recommended if the complete MSP/7, PCP/7, and FORTRAN IV Libraries are required to remain online at all times for the user's stand-alone System/7. In this case, the additional disk storage module will provide substantial additional storage for user source and object modules and application program data files.

Since support for the 129 Data Recorder and the 7431 Matrix Printer (see RPQ D08147) is included under the System/7 Program Preparation Facilities, it is strongly recommended that these devices be used for faster and easier PCP/7 preparation.

**SOFTWARE REQUIREMENTS**

The modules that comprise PCP/7 are written using MSP/7 system macros and ASM/7 Assembler Language instructions. PCP/7 can be prepared on an IBM S/360 or an IBM S/370 using the MSP/7 Host Program Preparation Facility II (HPPF II) operating under OS, OS/VS1, OS/VS2, DOS, or DOS/VS, or on an IBM System/7 using the System/7 Program Preparation Facilities (System/7 PPF). Users tailor their PCP/7 system according to the IBM System/7 configuration and the PCP/7 features desired by selecting the appropriate PCP/7 specification macro parameters. The application program preparation facility uses this information to prepare an object module. This nucleus module is then combined with other PCP/7 object modules and user-written modules in object form as input to LINK/7, to produce a link-edited load module. The load module will be processed by FORMAT/7 or \$UDFMT into final executable form.

The PCP/7 load module may be loaded into the IBM System/7 using the facilities of DSS/7 if prepared using the System/7 PPF. If prepared using HPPF-II, the module may be transmitted over a teleprocessing line to the IBM System/7, or it may be punched into 8-track paper tape for input through the operator station's paper tape reader.

IBM programs that can be used in support of PCP/7 are:

Host Program Preparation Facilities II (HPPF II)	
OS	360A-TX-020, 360A-TX-026
OS/VS1	5744-AF1
DOS	360A-TX-010, 360A-TX-016
DOS/VS	5745-AF1
System/7 Program Preparation Facilities (S/7 PPF)	
	5707-AA1
System/7 FORTRAN IV	
OS	5734-FO4
DOS	5736-FO1
S/7	PPF 5707-FO1
System/7 Application Program Generator (APG/7)	
OS	5734-XC3
DOS	5736-XC3
Distributed System Program (DSP)	
OS	360A-TX-032
1130	1130-SV-002
1800	1800-SV-003

PROGRAM PRODUCTS

**SYSTEM TRANSACTION GENERATOR SYSTEM (TGS/7)**

5707-XR1 - Stand-Alone

5740-XR3 - Host Preparation (OS, OS/VS1, OS/VS2)

**PURPOSE**

TGS/7 is a System/7 - 2790 program designed to increase the user's efficiency and productivity. It provides pre-coded transaction processing modules common to most data collection applications, and will support the 2790, disk and teleprocessing facilities available to the System/7. The data collection transaction modules provided include input checking, basic calculations, disk processing, message processing, and inquiry processing.

Users interface to TGS/7 through forms. The users fill in these forms to specify the particular data collection modules they want to employ and to provide parameters for tailoring them to their application environment. The actual selecting and tailoring of these application modules is performed by facilities provided by APG/7, a prerequisite to TGS/7.

TGS/7 first edits the TGS/7 forms data for correctness. The APG/7 program generation facilities then select and tailor the specified application modules and combine them with supervisory nucleus modules to produce an entire application system of System/7 programs. For the last step, the generated programs are assembled, linked, and formatted, and the object programs are ready for loading and execution.

**HIGHLIGHTS**

- TGS/7 can be a significant productivity aid in installing, supporting, and modifying System/7 - 2790 data collection applications.
- The TGS/7 application prototype file provides pre-coded and tested data collection transaction processing modules.
- TGS/7 forms enable the users to select and tailor the particular modules required for their specific data collection application.
- The user need not be an MSP/7 or APG/7 programmer to install a System/7 - 2790 data collection system using TGS/7.
- The *User's Guide* provides an easy to follow sequence of steps for APG/7 and MSP/7 use.
- TGS/7 edit facilities check the forms data for correctness and guide the user in correcting form data errors when they occur.
- APG/7 is a prerequisite to TGS/7 and provides program generation, compiler, and operating system facilities.
- TGS/7 supports the APG/7 Statement of Direction in emphasizing APG/7 as the major IBM application tool for the development and installation of System/7 programs.
- TGS/7 provides the user with a growth vehicle which is compatible with APG/7.

**Use:** The users fill in TGS/7 forms to specify the particular TGS/7 data collection processing modules they want to employ and to provide parameters for tailoring them to their application environment. TGS/7 edits the forms data for correctness and, when errors occur, generates messages to guide the users in correcting their forms input. The APG/7 program generation facilities then select and tailor the specified TGS/7 application procedures and combine them with supervisory nucleus modules to produce an entire application system of System/7 programs.

When using the TGS/7 BSCA and ACCA support to transmit to a remote computer system, receiving and processing transmitted data on the remote system is the user's responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

An IBM 5010 processor with 20K words of storage ... one IBM 5022 Disk Storage Module mdl 1 or 2 ... IBM 5028 Operator Station... one IBM 5026 Enclosure mdl C3 ... one IBM 5013 Digital Input/Output Module (with one 2790 Control #8195).

**Notes:**

1. For host preparation, an IBM S/370 is also required which will support System/7 HPPF and APG/7.
2. For stand-alone preparation, an IBM 129 and 7431 are recommended for entering specification forms input data and for printing intermediate output listings.
3. For generated program execution, at least one IBM 2790 Control feature and at least one 2790 data entry device are required.
4. To determine overall device, feature, and storage requirements for specific system configurations, see the *IBM System/7 Transaction Generator System (TGS/7) User's Guide* (SH20-9511).
5. For the inclusion of online batch program preparation, add an additional 12K words of storage for the batch partition and one more 5022 Mdl 1 or 2 disk storage module. (Also, the 5026 Enclosure mdl C3 will have to be changed to a Mdl C6.)

**SOFTWARE REQUIREMENTS**

For TGS/7 Stand-alone, the following program system is a prerequisite:

Stand-alone APG/7 - 5707-XC1

For TGS/7 Host Preparation (OS, OS/VS1, OS/VS2), the following programming system is a prerequisite:

Application Program Generator (APG/7) - 5734-XC3

Refer to APG/7 and Stand-alone APG/7 in the program product pages for subsequent prerequisite programming systems.

When using the System/7 BSCA feature to transmit to a remote computing system, the remote system must use the following teleprocessing access methods:

For System/370:  
DOS/VS - BTAM  
OS/VS1 - BTAM or TCAM  
OS/VS2 - BTAM or TCAM

For System/3:  
System/3 MLMP

For System/7:  
MSP/7 Communications Access Method

When using the System/7 ACCA feature to transmit to a remote system (S/360 or S/370 only) the remote system must use teleprocessing access methods as specified in the programming section (see System/7 Macro Library/Relocatable).

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual* (GH20-9510) ... *Program Product Specifications* (GH20-9530)

Specification Forms Pad (50 forms per pad) as follows:

Configuration Definition (GX26-3702) ... Transaction Definition (GX26-3703) ... Data Definition (GX26-3704) ... Procedures Control (GX26-3705) ... Update Disk Files (GX26-3706) ... Output to All Devices (GX26-3707).

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**5280 ASSEMBLER LANGUAGE  
5708-AS1**

**PURPOSE**

The 5280 Assembler language provides a symbolic programming language used to write programs for the 5280 system. This program consists of an assembler and the 3740 ACL Conversion Aid program.

**DESCRIPTION**

Source programs written in Assembler language are processed into 5280 machine language. Input to the assembler is a source program data set. If desired, this data set may be created by entering source statements through a user-written DE/RPG or Assembler language program, or the Key Entry Utility program [included in 5280 Utilities (5708-UT1)]. Output of the assembler is an object program written to a disk or diskette data set.

Some of the features provided by the 5280 Assembler Language are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Symbolic Data Representation
- Binary and Decimal Arithmetic
- Operand Expressions
- Source Program Listing
- Cross-Reference Listing
- Error Checking and Diagnostic Messages

**3740 ACL Conversion Aid Program:** Assists the user in converting existing 3740 ACL (Application Control Language) programs into 5280 Assembler language. The program will not convert CRDR, CRDP, EXEC A, COMM, IF CRD or CKPT instructions. Some converted instructions may not function as on the 3740\*.

\* For details, see *IBM 5280 Assembler Language Reference Manual* (SC21-7790).

Input to this program is a diskette data set with ACL source code. Output is a data set containing 5280 Assembler Language source code. Assembler source code requires the 5280 Assembler Language licensed program for assembly.

**Program Use During Customer Pre-installation Testing:** 5280 Assembler Language (5708-AS1) will be available to customers for pre-installation testing on IBM Test Center Systems.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM 5280 Assembler will run on any IBM 5280 system which has, as a minimum, either 2 diskette 1 drives, or 1 diskette 2D drive. The IBM 3740 ACL Conversion Aid Program will run on any IBM 5280 system. Minimum main storage partition size requirements are as follows: for the 5280 Assembler - 9K; for the 3740 ACL Conversion Aid Program - 16K.

**SOFTWARE REQUIREMENTS**

The Assembler, Assembler object programs, and the IBM 3740 ACL Conversion Aid Program require the IBM 5280 System Control Programming (5708-SC1).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 Assembler Language Licensed Program Specifications* (GC21-7801) ... *IBM 5280 Assembler Language Reference Manual* (SC21-7790) ... *IBM 5280 Functions Reference Manual* (GA21-9353).

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**5280 COBOL-OS/V5 HOST COMPILER AND LIBRARY  
5708-CB1**

**PURPOSE**

5280 COBOL-OS/V5 Host Compiler and Library compiles on a S/370, 30XX or 4300 under VM/SP, OS/V51 or OS/V52 (MVS). Output of the compiler is a 5280 machine-language object program that will execute on a 5285, 5286 or 5288. This object program may be copied to diskette (except for VM/SP) for transfer to a 5280 system or transmitted via communications directly to a 5280 system.

**DESCRIPTION**

5280 COBOL provides customers with a powerful, comprehensive, easy-to-use language for use in preparation and execution of commercial application programs. The language offers a wide range of commercial features, plus facilities for handling input and output, structuring the source programs and debugging COBOL programs. 5280 COBOL allows the development of interactive applications by supporting functions that enable users to accept data from and display data on a 5280 keyboard/display.

5280 COBOL is designed for an interactive commercial environment where users can perform transaction processing applications such as order entry, as well as applications that run in a background batch environment.

**HIGHLIGHTS**

- Language
  - Support of American National Standard (ANS) COBOL X3.23-1974.
  - Support of 1975 Federal Information Processing Standard for COBOL.
- Extensive User Options
  - Source listings
  - Cross-reference
  - Storage map of variables
  - Statement offset listing
  - Object listing
  - Object program record size of 80 or 128 bytes
- Program Development and Productivity Aids
  - Symbolic debug
  - Flow trace
  - Extensive error checking
  - FIPS Flagger
  - Generalized CALL
  - A job-to-job facility

**DESCRIPTION**

**I/O Capabilities**

5280 COBOL programs can work with SEQUENTIAL, RELATIVE and INDEXED I/O files.

The access methods supported are as follows:

- Sequential Organization
  - Sequential processing
- Relative Organization
  - Sequential processing
  - Random processing by relative record number
- Indexed Organization
  - Sequential processing
  - Random processing by record key using index file or in-memory index

The new COBOL Transaction I/O extension by IBM provides a set of verbs and syntax for controlling a keyboard/display. Users can write interactive programs which allow an operator to perform functions such as entering data, performing inquiries and updating files. The capability is provided for defining display formats and operator-entered fields. Field editing functions, which are a subset of the DE/RPG functions, are also available. Formats are stored within members of a partitioned data set and copied into the source program as needed.

**Table Handling**

Define and process fixed length tables of up to three dimensions.

**Segmentation**

The Segmentation feature permits:

- Dividing the Procedure Division of a COBOL program into a series of segments.
- Specifying that some segments (fixed segments) must be resident in main storage while the program is running, and cannot be overlaid, while others (independent segments) are loaded into an overlay area when needed.

- Reducing main storage requirements during program execution.

**Interprogram Communication**

This facility allows transferring of control from one COBOL program to another within a partition. Programs can access the same data.

**Data Communications**

Data communications support for COBOL is via a CALL interface to the 5280 Communications Utilities licensed program (5708-DC1) access methods.

**Industry Standards**

5280 COBOL is designed in accordance with the following industry standards as understood and interpreted by IBM as of January 1980.

- American National Standard (ANS) COBOL, X3.23-1974. ANS COBOL is identical to ISO 1989-COBOL, approved February 1978 by the International Organization for Standardization. The following processing modules are supported:

- 1 NUC 1,2
- 1 TBL 1,2
- 1 SEQ 1,2\*
- 1 REL 0,2\*
- 1 INX 0,2\*
- 1 SEG 0,2
- 1 LIB 0,2
- 1 DEB 0,2
- 1 IPC 0,2

\* RERUN clause is checked for syntactic correctness only.

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level specified for American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the Standard.

In addition to the above, the following Level 2 features are also supported:

- COMPUTE statement
- Qualification
- Arithmetic operators
- Complex conditions
- CORRESPONDING phrase
- ACCEPT and DISPLAY verbs
- Multiple operand support for arithmetic statements
- Nested IFs
- Nested REDEFINES
- PERFORM UNTIL
- 01 through 49 and 88 level numbers
- LINAGE
- START verb

- December, 1975 Federal Information Processing Standard (FIPS Pub 21-1), Low-Intermediate Level. The RERUN clause is checked for syntactic correctness only. Additional support is provided for many features of higher FIPS levels.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

**Compilation:** The IBM 5280 COBOL-OS/V5 Host Compiler and Library (5708-CB1) executes on an IBM S/370, 30XX or 4300 with at least 192K bytes of virtual storage as well as a configuration sufficient to run the selected operating system.

**Object Program Execution:** COBOL object programs will run on any IBM 5280 system with a minimum of 48K bytes of main storage capacity. COBOL object programs require a minimum partition size of 16K bytes. Actual partition size requirements are a function of the COBOL source program. If data communications is used, a minimum of 64K bytes of main storage capacity is required.

**SOFTWARE REQUIREMENTS**

IBM 5280 System Control Programming (5708-SC1) is required. The IBM 5280 Communications Utilities licensed program (5708-DC1) is required when using data communications via COBOL and will require a communications partition.

**CONVERSION/COMPATIBILITY**

A high degree of upward compatibility does exist between the 5280 COBOL compiler and the OS/V5 COBOL Compiler and Library (5740-CB1). However, differences do exist and some conversion will be necessary. These differences include transaction I/O support and communications support. Also, computational data will be incompatible with System/370.



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PP 5708-CB1.2

Oct 83

PROGRAM PRODUCTS

**5280 COBOL-OS/VS Host Compiler and Library (cont'd)**

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 COBOL-OS/VS Host Compiler and Library Licensed Program Specifications (GL23-0033) ... IBM 5280 COBOL Language Reference (GL23-0031) ... IBM 5280 COBOL Programmer's Guide (SL23-0032) ... IBM 5280 COBOL Host Compilers Problem Determination Manual (SL23-0043).*

RPQs ACCEPTED: No

## 5708-CB2 - COBOL-DOS/VSE DOS/VSE HOST COMPILER AND LIBRARY

### PURPOSE

5280 COBOL-DOS/VSE Host Compiler and Library compiles on a System/370, 30XX or 4300 under DOS/VSE. Output of the compiler is a 5280 machine-language object program that will execute on a 5285, 5286 or 5288. This object program may be copied to diskette for transfer to a 5280 system or transmitted via communications directly to a 5280 system.

### DESCRIPTION

5280 COBOL provides customers with a powerful, comprehensive, easy-to-use language for use in preparation and execution of commercial application programs. The language offers a wide range of commercial features, plus facilities for handling input and output, structuring the source programs, and debugging COBOL programs. 5280 COBOL allows the development of interactive applications by supporting functions that enable users to accept data from and display data on a 5280 keyboard/display.

5280 COBOL is designed for an interactive commercial environment where users can perform transaction processing applications such as order entry, as well as applications that run in a background batch environment.

### SPECIAL SALES INFORMATION

The method of transferring the 5280 object modules from the host compiler to the using 5280 must be considered. The 5280 object modules may be copied to diskette for transfer to a 5280. This transfer may be directly to a 5280 or by way of communications from a device capable of reading diskettes and transmitting to a 5280. Such a device could be a 3741, 3747 or another 5280. The object modules may also be transmitted directly by the host via communications to a 5280. The 5280 Communications Utilities may be used to receive these modules. Existing data transfer programs on the host may be used. These could include those written to communicate to a 3740 or similar device. The method chosen must be capable of handling either 80- or 128-byte records.

Any of these methods may require additional features, hardware and/or programming on the host.

5280 COBOL is designed for commercial applications. Although development of interactive applications is supported, the language provides only limited transcriptive (high keying rate) key entry capabilities. Therefore, the user should be encouraged to use DE/RPG (5708-DE1) for transcriptive key entry applications.

### HIGHLIGHTS

- Language
  - Support of American National Standard (ANS) COBOL X3.23-1974.
  - Support of 1975 Federal Information Processing Standard for COBOL.
- Extensive User Options
  - Source listings
  - Cross-reference
  - Storage map of variables
  - Statement offset listing
  - Object listing
  - Object program record size of 80 or 128 bytes
- Program Development and Productivity Aids
  - Symbolic debug
  - Flow trace
  - Extensive error checking
  - FIPS Flagger
  - Generalized CALL
  - A job-to-job facility

### DESCRIPTION

#### I/O Capabilities

5280 COBOL programs can work with SEQUENTIAL, RELATIVE and INDEXED I/O files.

The access methods supported are as follows:

- Sequential Organization
  - Sequential processing
- Relative Organization
  - Sequential processing
  - Random processing by relative record number using index file or in-memory index
- Indexed Organization
  - Sequential processing
  - Random processing by record key using index file or in-memory index

The COBOL Transaction I/O extension by IBM provides a set of verbs and syntax for controlling a keyboard/display. Users can write interactive programs which allow an operator to perform functions such as entering data, performing inquiries, and updating files. The capability is provided for defining display formats and operator-entered fields. Field editing functions, which are a subset of the DE/RPG functions, are also available. Formats are stored within books of the source statement library and are copied into the source program as needed.

#### Table Handling

Define and process fixed length tables of up to three dimensions.

#### Segmentation

The Segmentation feature permits:

- Dividing the Procedure Division of a COBOL program into a series of segments.
- Specifying that some segments (fixed segments) must be resident in main storage while the program is running and cannot be overlaid, while others (independent segments) are loaded into an overlay area when needed.
- Reducing main storage requirements during program execution.

#### Interprogram Communication

This facility allows transferring of control from one COBOL program to another within a partition. Programs can access the same data.

#### Data Communications

Data communications support for COBOL is via a CALL interface to the 5280 Communications Utilities licensed program (5708-DC1) access methods.

#### Industry Standards

IBM 5280 COBOL is designed in accordance with the following industry standards as understood and interpreted by IBM as of January 1980.

- American National Standard (ANS) COBOL, X3.23-1974. ANS COBOL is identical to ISO 1989-COBOL, approved February 1978 by the International Organization for Standardization. The following processing modules are supported:

```
1 NUC 1,2
1 TBL 1,2
1 SEQ 1,2*
1 REL 0,2*
1 INX 0,2*
1 SEG 0,2
1 LIB 0,2
1 DEB 0,2
1 IPC 0,2
```

\* RERUN clause is checked for syntactic correctness only.

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level specified for American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the Standard.

In addition to the above, the following Level 2 features are also supported:

- COMPUTE statement
- Qualification
- Arithmetic operators
- Complex conditions
- CORRESPONDING phrase
- ACCEPT and DISPLAY verbs
- Multiple operand support for arithmetic statements
- Nested IFs
- Nested REDEFINES
- PERFORM UNTIL
- 01 through 49 and 88 level numbers
- LINAGE
- START verb

- December 1975 Federal Information Processing Standard (FIPS Pub 21-1), Low-Intermediate Level. The RERUN clause is checked for syntactic correctness only. Additional support is provided for many features of higher FIPS levels.

**5280 COBOL-DOS/VSE Host Compiler & Library (cont'd)****SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

**Compilation:** The IBM 5280 COBOL-DOS/VSE Host Compiler and Library (5708-CB2) executes on an IBM S/370, 30XX or 4300 with at least a 168K byte partition plus the GETVIS space as well as a configuration sufficient to run the selected operating system.

**Object Program Execution:** COBOL object programs will run on any IBM 5280 system with a minimum of 48K bytes of main storage capacity. COBOL object programs require a minimum partition size of 16K bytes. Actual partition size requirements are a function of the COBOL source program. If data communications is used, a minimum of 64K bytes of main storage capacity is required.

**SOFTWARE REQUIREMENTS**

IBM 5280 System Control Programming (5708-SC1) is required. The 5280 Communications Utilities Licensed Program (5708-DC1) is required when using data communications via COBOL and will require a communications partition.

**CONVERSION/COMPATIBILITY**

Some compatibility does exist between the 5280 COBOL compiler and DOS/VS COBOL Compiler and Library (5746-CB1). Both compilers are designed in accordance with American National Standard COBOL. The 5280 COBOL supports the 1974 standard (X3.23-1974), while the DOS/VS COBOL supports the 1968 standard (X3.23-1968). Therefore, differences do exist and some conversion will be necessary.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 COBOL-DOS/VSE Host Compiler and Library Licensed Program Specifications (GL23-0034) ... IBM 5280 COBOL Language Reference (GL23-0031) ... IBM 5280 COBOL Programmer's Guide (SL23-0032) ... IBM 5280 COBOL Host Compilers Problem Determination Manual (SL23-0043).*

**RPQs ACCEPTED:** No

## 5280 COBOL-SYSTEM/34 HOST COMPILER and LIBRARY 5708-CB3

### PURPOSE

5280 COBOL-System/34 Host Compiler and Library compiles on a System/34 under control of the System Support Program (SSP). Output of the compiler is a 5280 machine language object program that will execute on a 5285, 5286, or 5288. This object program may be copied to diskette for transfer to a 5280 system or transmitted via communications directly to a 5280 system.

### DESCRIPTION

5280 COBOL provides customers with a powerful, comprehensive, easy-to-use language for use in preparation and execution of commercial application programs. The language offers a wide range of commercial features, plus facilities for handling input and output, structuring the source programs and debugging COBOL programs. 5280 COBOL allows the development of interactive applications by supporting functions that enable users to receive data from and display data on a 5280 keyboard/display.

5280 COBOL is designed for an interactive commercial environment where users can perform transaction processing applications such as order entry, as well as applications that run in a background batch environment.

### SPECIAL SALES INFORMATION

The method of transferring the 5280 object modules from the host compiler to the using 5280 must be considered. The 5280 object modules may be copied to diskette for transfer to a 5280. This transfer may be directly to a 5280 or by way of communications from a device capable of reading diskettes and transmitting to a 5280. Such a device could be a 3741, 3747 or another 5280. The object modules may also be transmitted directly by the host via communications to a 5280. The 5280 Communications Utilities may be used to receive these modules. Existing user data transfer programs on the host may be used. These could include those written to communicate to a 3740 or similar device. The method chosen must be capable of handling either 80- or 128-byte records.

Any of these methods may require additional features, hardware, and/or programming on the host.

### HIGHLIGHTS

- Language
  - Support of American National Standard (ANS) COBOL X3.23-1974.
  - Support of 1975 Federal Information Processing Standard for COBOL
- Extensive User Options
  - Source listings
  - Cross reference
  - Storage map of variables
  - Statement offset listing
  - Object program record size of 80 or 128 bytes
  - Object listing
- Program Development and Productivity Aids
  - Symbolic debug
  - Flow trace
  - Extensive error checking
  - FIPS Flagger
  - Generalized CALL
  - A job-to-job facility

### I/O Capabilities

5280 COBOL programs can work with SEQUENTIAL, RELATIVE, and INDEXED I/O files.

The access methods supported are as follows:

- Sequential Organization
  - Sequential processing
- Relative Organization
  - Sequential processing
  - Random processing by relative record number
- Indexed Organization
  - Sequential processing

- Random processing by record key using index file or in-memory index

### Table Handling

Define and process fixed length tables of up to three dimensions.

### Segmentation

The Segmentation feature permits:

- Dividing the Procedure Division of a COBOL program into a series of segments.
- Specifying that some segments (fixed segments) must be resident in main storage while the program is running, and cannot be overlaid, while others (independent segments) are loaded into an overlay area when needed.
- Reducing main storage requirements during program execution.

### Interprogram Communication

This facility allows transferring of control from one COBOL program to another within a partition. Programs can access the same data.

### Industry Standards

5280 COBOL is designed in accordance with the following industry standards as understood and interpreted by IBM as of October, 1980.

- American National Standard (ANS) COBOL, X3.23-1974. ANS COBOL is identical to ISO 1989-1978 COBOL, approved February, 1978 by the International Organization for Standardization. The following processing modules are supported:

1 NUC	1,2
1 TBL	1,2
1 SEQ	1,2*
1 REL	0,2*
1 INX	0,2*
1 SEG	0,2
1 LIB	0,2
1 DEB	0,2
1 IPC	0,2

\* RERUN clause is checked for syntactic correctness only.

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level specified for American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the Standard.

In addition to the above, the following Level 2 features are also supported:

- Punctuation characters, arithmetic operators and expressions, the qualifier connectives OF and IN, and series connectives
- Complex conditions
- Plurals of figurative constants
- Comparison of nonnumeric operands of unequal length
- CORRESPONDING phrase
- ACCEPT, ADD, COMPUTE, DISPLAY, DIVIDE, IF, MOVE, MULTIPLY, PERFORM and SUBTRACT verbs
- Nested IFs
- Nested REDEFINES
- 01 through 49 and 88 level numbers
- LINAGE clause
- EXTEND clause for the Sequential I-O OPEN statement
- END-OF-PAGE clause for the Sequential I-O WRITE statement
- START verb for Relative I-O and Indexed I-O
- December, 1975 Federal Information Processing Standard (FIPS Pub 21-1), Low-Intermediate Level. The RERUN clause is checked for syntactic correctness only. Additional support is provided for many features of higher FIPS levels.

### IBM Extensions

- Transaction I/O: The COBOL Transaction I/O extension by IBM provides a set of verbs and syntax for controlling a keyboard/display. Users can write interactive programs which allow an operator to perform functions such as entering data, performing inquiries and updating files. The capability is provided for defining display formats and operator-entered fields. Field editing functions, which are a subset of the DE/RPG functions, are also available. Formats are stored within library source members and copied into the source program as needed.



PROGRAM PRODUCTS

**5280 COBOL-S/34 Host Compiler & Library (cont'd)**

- Data Communications: Data communications support for COBOL is via a CALL interface to the 5280 Communications Utilities (5708-DC1) and 5280-3270 Emulation (5708-EM1) access methods.
- COMPUTATIONAL-3 option of the USAGE IS clause: This option is specified for internal decimal items. Such items appear in storage in packed decimal format.
- COMPUTATIONAL-4 option of the USAGE IS clause: This option is specified for binary items.

**SPECIFIED OPERATING ENVIRONMENT**

**COMPILATION**

The IBM 5280 COBOL-System/34 Host Compiler and Library (5708-CB3) compiles on a System/34.

**HARDWARE REQUIREMENTS**

The compiler requires a minimum of 64K bytes of main storage, and will run on any model of the System/34 which has a 64K region available (i.e., model DX or larger).

**SOFTWARE REQUIREMENTS**

This licensed program is designed to operate with System/34 System Support Program (5726-SS1) Release 8 Modification 0 and subsequent releases and modifications unless otherwise stated.

**OBJECT PROGRAM EXECUTION**

**HARDWARE REQUIREMENTS**

COBOL object programs will run on any 5280 system. COBOL object programs require a minimum partition size of 16K bytes. Actual partition size requirements are a function of the COBOL source program. If data communications is used, a minimum of 64K bytes of main storage capacity is required.

**SOFTWARE REQUIREMENTS**

COBOL object programs will execute with 5280 System Control Programming (5708-SC1) Release 6 and subsequent releases and modifications unless otherwise stated. The 5280 Communications Utilities licensed program (5708-DC1) is required when using data communications via COBOL and will require a communications partition.

**CONVERSION/COMPATIBILITY**

A degree of upward compatibility does exist between the 5280 COBOL compiler and the System/34 COBOL Compiler and Library (5726-CB1). However, differences do exist and conversion will be necessary. These differences include transaction I/O support and communications support.

**Program Use During Customer Pre-installation Testing**

IBM 5280 COBOL-System/34 Host Compiler and Library (5708-CB3) will be available to customers for pre-installation testing on IBM Test Center Systems.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 COBOL-System/34 Host Compiler and Library Licensed Program Specifications (GL23-0035) ... IBM 5280 COBOL Language Reference (GL23-0031) ... IBM 5280 COBOL Programmer's Guide (SL23-0032) ... IBM 5280 COBOL Host Compilers Problem Determination Manual (SL23-0043).*

RPOs ACCEPTED: No

## PROGRAM PRODUCTS

**5280 COBOL-SYSTEM/38 HOST COMPILER and LIBRARY  
5708-CB4****PURPOSE**

5280 COBOL-System/38 Host Compiler and Library compiles on a System/38 under control of the Control Program Facility (CPF). Output of the compiler is a 5280 machine language object program that will execute on a 5285, 5286, or 5288. This object program may be copied to diskette for transfer to a 5280 system or transmitted via communications directly to a 5280 system.

**DESCRIPTION**

5280 COBOL provides customers with a powerful, comprehensive, easy-to-use language for use in preparation and execution of commercial application programs. The language offers a wide range of commercial features, plus facilities for handling input and output, structuring the source programs and debugging COBOL programs. 5280 COBOL allows the development of interactive applications by supporting functions that enable users to receive data from and display data on a 5280 keyboard/display.

5280 COBOL is designed for an interactive commercial environment where users can perform transaction processing applications such as order entry, as well as applications that run in a background batch environment.

**SPECIAL SALES INFORMATION**

The method of transferring the 5280 object modules from the host compiler to the using 5280 must be considered. The 5280 object modules may be copied to diskette for transfer to a 5280. This transfer may be directly to a 5280 or by way of communications from a device capable of reading diskettes and transmitting to a 5280. Such a device could be a 3741, 3747 or another 5280. The object modules may also be transmitted directly by the host via communications to a 5280. The 5280 Communications Utilities may be used to receive these modules. Existing user data transfer programs on the host may be used. These could include those written to communicate to a 3740 or similar device. The method chosen must be capable of handling either 80- or 128-byte records.

Any of these methods may require additional features, hardware, and/or programming on the host.

**HIGHLIGHTS**

- Language
  - Support of American National Standard (ANS) COBOL X3.23-1974.
  - Support of 1975 Federal Information Processing Standard for COBOL
- Extensive User Options
  - Source listings
  - Cross reference
  - Storage map of variables
  - Statement offset listing
  - Object program record size of 80 or 128 bytes
  - Object listing
- Program Development and Productivity Aids
  - Symbolic debug
  - Flow trace
  - Extensive error checking
  - FIPS Flagger
  - Generalized CALL
  - A job-to-job facility

**I/O Capabilities**

5280 COBOL programs can work with SEQUENTIAL, RELATIVE, and INDEXED I/O files.

The access methods supported are as follows:

- Sequential Organization
  - Sequential processing
- Relative Organization
  - Sequential processing
  - Random processing by relative record number
- Indexed Organization
  - Sequential processing

- Random processing by record key using index file or in-memory index

**Table Handling**

Define and process fixed length tables of up to three dimensions.

**Segmentation**

The Segmentation feature permits:

- Dividing the Procedure Division of a COBOL program into a series of segments.
- Specifying that some segments (fixed segments) must be resident in main storage while the program is running, and cannot be overlaid, while others (independent segments) are loaded into an overlay area when needed.
- Reducing main storage requirements during program execution.

**Interprogram Communication**

This facility allows transferring of control from one COBOL program to another within a partition. Programs can access the same data.

**Industry Standards**

IBM 5280 COBOL is designed in accordance with the following industry standards as understood and interpreted by IBM as of October, 1980.

- American National Standard (ANS) COBOL, X3.23-1974. ANS COBOL is identical to ISO 1989-1978 COBOL, approved February, 1978 by the International Organization for Standardization. The following processing modules are supported:

1 NUC	1,2
1 TBL	1,2
1 SEQ	1,2*
1 REL	0,2*
1 INX	0,2*
1 SEG	0,2
1 LIB	0,2
1 DEB	0,2
1 IPC	0,2

\* RERUN clause is checked for syntactic correctness only.

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level specified for American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the Standard.

In addition to the above, the following Level 2 features are also supported:

- Punctuation characters, arithmetic operators and expressions, the qualifier connectives OF and IN, and series connectives
- Complex conditions
- Plurals of figurative constants
- Comparison of nonnumeric operands of unequal length
- CORRESPONDING phrase
- ACCEPT, ADD, COMPUTE, DISPLAY, DIVIDE, IF, MOVE, MULTIPLY, PERFORM and SUBTRACT verbs
- Nested IFs
- Nested REDEFINES
- 01 through 49 and 88 level numbers
- LINAGE clause
- EXTEND clause for the Sequential I-O OPEN statement
- END-OF-PAGE clause for the Sequential I-O WRITE statement
- START verb for Relative I-O and Indexed I-O
- December, 1975 Federal Information Processing Standard (FIPS Pub 21-1), Low-Intermediate Level. The RERUN clause is checked for syntactic correctness only. Additional support is provided for many features of higher FIPS levels.

**IBM Extensions**

- Transaction I/O: The COBOL Transaction I/O extension by IBM provides a set of verbs and syntax for controlling a keyboard/display. Users can write interactive programs which allow an operator to perform functions such as entering data, performing inquiries and updating files. The capability is provided for defining display formats and operator-entered fields. Field editing functions, which are a subset of the DE/RPG functions, are also available. Formats are stored within library source members and copied into the source program as needed.

## PROGRAM PRODUCTS

**5280 COBOL-S/38 Host Compiler & Library (cont'd)**

- Data Communications: Data communications support for COBOL is via a CALL interface to the 5280 Communications Utilities (5708-DC1) and 5280-3270 Emulation (5708-EM1) access methods.
- COMPUTATIONAL-3 option of the USAGE IS clause: This option is specified for internal decimal items. Such items appear in storage in packed decimal format.
- COMPUTATIONAL-4 option of the USAGE IS clause: This option is specified for binary items.

**SPECIFIED OPERATING ENVIRONMENT****COMPILATION**

The IBM 5280 COBOL-System/38 Host Compiler and Library (5708-CB4) compiles on a System/38.

**HARDWARE REQUIREMENTS**

The compiler will execute on any model of the System/38.

**SOFTWARE REQUIREMENTS**

This licensed program is designed to operate with System/38 Control Program Facility (5714-SS1) Release 4.1 and subsequent releases and modifications unless otherwise stated.

**OBJECT PROGRAM EXECUTION****HARDWARE REQUIREMENTS**

COBOL object programs will run on any 5280 system. COBOL object programs require a minimum partition size of 16K bytes. Actual partition size requirements are a function of the COBOL source program. If data communications is used, a minimum of 64K bytes of main storage capacity is required.

**SOFTWARE REQUIREMENTS**

COBOL object programs will execute with 5280 System Control Programming (5708-SC1) Release 6 and subsequent releases and modifications unless otherwise stated. The 5280 Communications Utilities licensed program (5708-DC1) is required when using data communications via COBOL and will require a communications partition.

**CONVERSION/COMPATIBILITY**

A degree of upward compatibility does exist between the 5280 COBOL compiler and the System/38 COBOL Compiler and Library (5714-CB1). However, differences do exist and conversion will be necessary. These differences include SELECT statement, I/O and communications support and a limited support of the transaction file data description specifications.

Also, some forms of computational data will be incompatible with System/38. The System/38 Source Entry Utility may be used for source entry of COBOL statements, but the syntax checking option should not be used.

**Program Use During Customer Pre-installation Testing:** 5280 COBOL-System/38 Host Compiler and Library (5708-CB4) will be available to customers for pre-installation testing on IBM Test Center Systems.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 COBOL-System/38 Host Compiler and Library Licensed Program Specifications (GL23-0036) ... IBM 5280 COBOL Language Reference (GL23-0031) ... IBM 5280 COBOL Programmer's Guide (SL23-0032) ... IBM 5280 COBOL Host Compilers Problem Determination Manual (SL23-0043).*

RPOs ACCEPTED: No

## PROGRAM PRODUCTS

**5280 PROCEDURE CONTROL LANGUAGE  
5708-CL1****PURPOSE**

The 5280 Procedure Control language is a licensed program which provides 5280 users with job stream capability and the ability to execute a program with little or no operator intervention. The licensed program consists of a control program and supporting programs. Use of this licensed program is optional for 5280 users.

**HIGHLIGHTS**

**Control Language:** The control language consists of a set of statements which are used to identify a job and its processing requirements to the system. The language provides a method of describing a job stream, together with all associated prompts and program specifications. A series of related control language statements is referred to as a 'procedure'. A procedure is used to provide control for a job or series of jobs. Control language facilities include:

- Specification of the name of the program(s) to be compiled and/or executed.
- Specification of the device from which a program is to be loaded.
- Specification of the data sets to be processed and the location of the data sets.
- Control language statement and error logging. Control language statements can be logged in order to provide a history or to provide a diagnostic aid in the event of abnormal procedure termination.
- A logical IF statement, which provides for intelligence within procedures. It is possible to execute different jobs based on tests performed within a procedure.
- Specification of default responses with optional operator override capability. Responses can be made to specific user program generated prompts or to prompts from IBM-supplied programs, such as a utility or a sort.
- Ability to provide default responses or operator-keyed responses to error messages.
- Internal subroutines and variables.

**DESCRIPTION**

**Procedure Data Sets:** Control language statements required to control a specific job or sequence of jobs are stored on a source procedure data set. The source procedure data set can be created in two ways:

1. During standard (not controlled) execution of a job, the source procedure data set can be automatically created through use of the Procedure Build Initiator Program. The data set will contain all the information required to repeat that job sequence, including all program load specifications and prompt responses.
2. The data set can be created by directly entering each control language statement via a data entry program. The data entry program can be a user-written program or an IBM-supplied program such as the Key Entry utility (part of the 5280 Utilities licensed program).

The source procedure data set must be translated into object form in order to be utilized in a 'controlled' environment. The Procedure Preprocessor program converts the source data set into an object procedure data set. The object procedure data set is used by the Controller program to control execution of a specific program or series of programs.

**Controlled Program Execution:** Programs running in a controlled environment execute under control of the Controller program. The Controller program provides the link between controlled programs and object procedure data sets. It detects and services requests from controlled programs. An interface to the operator is available via a set of operator commands.

In a controlled environment, the Controller program supplies program load parameters and keyboard responses. A sequence of program prompts can be answered without operator intervention. The only time an operator is required to enter input to a controlled program is when an operator response is specifically requested by a control language statement, an error occurs that is not handled by the object procedure data set, or keyboard entry is required by a data entry program such as DE/RPG.

The Controller program resides in a background partition and must remain in main storage during execution of controlled programs. Standard, 'not controlled' 5280 programs can be concurrently executed in other partitions. These programs are functionally unaffected by and do not interface with the Controller Program.

**Operator Commands:** The keyboard operator can communicate with the Controller Program via a set of commands. The commands allow the operator to restart or terminate procedure execution and to update system parameters such as the system date or default Controller program prompt responses.

**Controlled Programs:** The following IBM programs can operate under control of the Controller Program:

- 5280 System Control Programming (5708-SC1)
- 5280 COBOL Host Compilers and Libraries (5708-CB1, 5708-CB2, 5708-CB3, 5708-CB4) (object programs)
- 5280 Communications Utilities (5708-DC1)
- 5280 DE/RPG (5708-DE1) (compiler and object programs)
- 5280-3270 Emulation (5708-EM1)
- 5280 Sort/Merge (5708-SM1)
- 5280 Utilities (5708-UT1)
- 5280 Assembler Language (5708-AS1) (Assembler and object programs\*)
  - \* Keyboard accesses in Assembler language programs will not be controlled.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM 5280 Procedure Control Language will run on any 5280 system which has, as a minimum, 48K bytes of main storage capacity and one diskette drive. Minimum main storage partition size requirements are as follows: 6K for the Procedure Build Initiator program; 12K\* for the Controller Program; 14K for the Procedure Preprocessor program. The common functions area SYSJJCFA requires 22K.

- \* 12K will control one partition, with the Controller program and object procedure data sets both residing on a diskette with formats 1, 2, 4, 5, or 7 or on disk. The Controller program partition size will vary between 12K and 23K depending up on the number of partitions controlled and the diskette format used. The Controller program diskette must remain resident while the Controller program is running. See the *IBM 5280 Procedure Control Language Reference Manual* for specific requirements for the Controller program partition size.

**SOFTWARE REQUIREMENTS**

IBM 5280 System Control Programming (5708-SC1) is required. A customer-created IPL data set containing common function area four (SYSJJCFA) is also required. SYSJJCFA is included in this licensed program.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 Procedure Control Language Licensed Program Specifications (GC23-0753) ... IBM 5280 Procedure Control Language Reference Manual (SC23-0706).*

**RPOs ACCEPTED:** No

## 5708-DC1 - 5280 COMMUNICATIONS UTILITIES

### PURPOSE

The 5280 Communications Utilities program, used with a communications adapter feature (#2500 or #3270) consists of Communications Access Method (CAM) support, a set of communications utility programs, and an interface to the access method for communications application programs written in 5280 COBOL, 5280 DE/RPG, or 5280 Assembler language.

### HIGHLIGHTS

- MULTI-LEAVING Remote Job Entry (MRJE)
- SNA Remote Job Entry (SRJE)
- Batch Data Transfer and Inquiry
- Communications Configuration and Job Description
- General support includes:
  - Communications Access Methods (CAM)
  - Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC)
  - Binary Synchronous Communications (BSC)
  - Application program interface to DE/RPG, COBOL and Assembler Language
  - BSC Multipoint Monitor
  - Direct Device Support
  - Diskette Data Management
  - Concurrent Program Operation
  - Diagnostics (BSC Online Test, Trace Capability, Communications Job Statistics)

### DESCRIPTION

**MULTI-LEAVING Remote Job Entry (MRJE):** The 5280 Communications Utilities permit a 5280 system to function as a Remote Job Entry (RJE) workstation for submission of jobs to a S/370 under OS/VS1 RES, OS/VS2 JES2, OS/VS2 JES3 or VM/370 RSCS. The MRJE Utility communicates with the host system over a point-to-point (switched or nonswitched) communication line via the Binary Synchronous mode of the communications adapter. Host system RJE programming support should be generated specifying System/3 as the supported terminal with:

- One Console (input and output)
- One Reader
- One Printer
- One Punch

Highlights of the MRJE workstation are:

- MULTI-LEAVING support permits taking advantage of concurrent 5280 device operation.
- Card I/O operation is simulated by disk or diskette storage.
- Expansion of blanks and duplicate characters may be performed to increase host output line utilization.
- Job streams can originate at the 5280 disk or diskette or keyboard.
- Punch data streams are written to disk or diskette.
- Print data streams can be directed to disk or diskette or printer.
- Supports special printer forms
- Operates with detached keyboard/display.
- Supports transmission of multivolume data sets.
- Console data streams are used for sending and receiving commands and operator messages between the 5280 and the host.
- MRJE utility control statements can be entered from the keyboard or from a disk or diskette data set.
- Job statistics are maintained which are displayed at the end of the session.

**SNA Remote Job Entry (SRJE):** The 5280 Communications Utilities enable the 5280 system to submit RJE jobs to a host S/370 using SNA/SDLC link protocol. The utility supports a single LU-LU session with the following host subsystems using ACF/VTAM and ACF/NCP/VS:

- OS/VS1 Remote Entry Service (RES)
- OS/VS2 Job Entry Subsystem 2 (JES2)
- OS/VS2 Job Entry Subsystem 3 (JES3)
- DOS/VSE/POWER

SRJE has the following functions available to the host system:

- One Console (Input and Output)
- One Reader
- One Printer
- One Punch

Highlights of the SRJE workstation support are:

- Job streams can originate at the 5280 disk, diskette or keyboard.
- Card I/O operation is simulated by disk or diskette.
- Job output from the host is sent to the 5280 as a print or punch data stream.
- Punch data streams are written to disk or diskette.
- Print data streams can go to the disk, diskette or printer.
- Special printer forms are supported.
- Console data streams are used for sending and receiving commands and operator messages between the 5280 and the host system.
- SRJE Utility Control Statements can be entered from the keyboard or from a disk or diskette data set.
- Job statistics for each session are maintained which are displayed at the end of the session.

**Batch/Inquiry Data Transfer:** The capability to perform batch data transfer and interactive inquiries with various host systems using either BSC or SNA/SDLC protocol is supplied as part of the communications utilities. These batch data transfer and inquiry utilities use the information created/maintained by the preparation utilities for program execution.

The utilities permit the user to easily transfer information over the communications line with minimum operator involvement.

### Binary Synchronous Communications (BSC)

These utilities provide the interface to support data communications with S/370 models 115 to 168 and 30XX, 4331 and 4341 processors operating under DOS/VSE, VSE/Advanced Function, OS/VS1 and MVS accordingly. Attachment is through 3704/3705 with Emulation Program (EP) or the Partition Emulation Program (PEP) extension to 3704/3705 ACF/NCP/VS or the Integrated Communications Adapter for S/370, 115, 125 and 138 or the Communications Adapter of the 4331.

Using the 5280 Communications Utilities, the 5280 system appears as a:

- 3741 to CICS/VS and IMS/VS
- 3780 to VSE/POWER

The preferred 5280 support to CICS/VS and IMS/VS is SNA LU1. The 3741 line protocol of the BSC Data Communications Utility (SYSBDCU) would normally be used when replacing a 3741.

SYSBDCU is also used to interface the 5280 to DOS/VSE/POWER using 3780 line protocol.

SYSBDCU should not be considered as providing 3741 or 3780 emulation capabilities.

The 5280 system also appears as a 3741 to:

- System/3 with CCP or RPG II
- System/32 with RPG II
- System/34 with RPG II or SSP-ICF
- System/38 with RPG III or COBOL
- Series/1 RPS Version 3/4
- 3741 models 2 and 4
- 3747
- 5265
- 5280

The 5280 communications configuration utility allows the user to describe certain communication characteristics, prior to program execution, such as terminal type, terminal address and timeouts.

**5280 as a Terminal (LU TYPE1) to S/370 CICS/VS and IMS/VS Using SNA/SDLC Protocols**

The 5280 communicates with IMS/VS applications under OS/VS1 or MVS or CICS/VS applications executing under DOS/VSE, VSE/Advanced Function, OS/VS1 or MVS in S/370 models 145 to 168 for IMS/VS, and models 138 to 168 for CICS/VS. The 5280 communicates with IMS/VS or CICS/VS applications in 30XX, 4331

PROGRAM PRODUCTS

**5280 Communications Utilities (cont'd)**

and 4341 processors. Multiple (up to 4) LU-LU sessions with ACF/VTAM are supported by IMS/VS or CICS/VS.

The 5280 communications configuration utility allows the user to describe certain communication characteristics, prior to program execution, such as station address, pacing counts and Logon.

**Communications Configuration and Job Description:** The primary functions of the communications configuration and job description utilities are to:

- Describe the communications environment.
- Describe the transmit, receive and/or inquiry functions that make up a job.

Users of the 5280 system describe the communications jobs for execution by running easy-to-use keyboard/display prompt/response preparation utilities. The responses to the prompts are saved on disk or diskette and identified by name. The information is then supplied to the appropriate utilities at execution time to control the communication session with the remote host or terminal system.

Multiple job records may be maintained to provide communications flexibility within the 5280 system.

**Disk and Diskette Support:** Disk and diskette support is an integral part of the 5280 Communications Utilities. It permits users to maintain and control a disk or diskette data set(s) in a variety of ways. Included in the support is the capability to transmit and receive single and multiple data sets from/to one or more physical disk or diskette drives; to support data sets spanning one or more disks or diskettes; to allocate and write received data to a new data set, add received data to the end of an existing data set and replace received data in an existing data set.

**Direct Device Support:** The 5280 Communications Utilities provide direct device support as to the origin and destination of the data transferred over the communications line.

To the Line	From the Line
Data Set(s)	Data Set(s)
Magnetic Stripe Reader (for BSC support only)	Printer
Keyboard	Display

In addition, certain combinations of multiple 5280 output devices are allowed.

**Application Program User Interface:** The 5280 Communications Utilities provide an interface to the Communication Access Methods (CAM) for a user to write DE/RPG, COBOL or 5280 Assembler language programs. As an example, this could provide 5280 users additional communications capabilities for those applications requiring random inquiries to remote host master files with the response data processed by the 5280 application.

**BSC Multipoint Monitor:** The BSC Multipoint Monitor provides, for the communicating 5285 Programmable Data Station and the 5288 Programmable Control Unit residing on a BSC multipoint network, the ability to respond to host polling and selection without the requirement to have a Communications Access Method (CAM) loaded into main storage. The Multipoint Monitor resides in the common functions area.

Use of the Multipoint Monitor prevents the host from removing the 5280 from polling lists, which would thereby require reactivation at the host when communications are desired.

**Concurrent Program Operation:** The 5280 Communications Utilities require a minimum of two partitions: one for a Communications Access Method (CAM) and one for an IBM-supplied 5280 Communications Utility or a user communications application program.

For concurrent program operation, the system may be running other application programs concurrent with a Communications Utility. The limitation is the amount of main storage available, number of partitions and possible performance considerations.

**Diagnostics (BSC Online Test, Trace Capability, Communications Job Statistics):** The Communications Utilities maintain information and provide statistics on the job just executed, such as the number of input/output records processed. Additional communications information such as status indicators, counters, error logs and communications trace table is available.

**Program Use During Customer Pre-installation Testing:** The 5280 Communications Utilities (5708-DC1) will be available to customers for pre-installation testing on IBM Test Center Systems.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration required to support communications in a BSC network is:

AN IBM 5285 with 32K bytes of main storage capacity, the Communications Adapter (#2500) and a display size of 960 characters. Because the SNA support requires either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4960), the customer should carefully evaluate his future requirements when installing a BSC system.

OR:

An IBM 5288 with 32K bytes of main storage capacity, the Communications Adapter (#2500), and an auxiliary data station (5281 or 5282) with a display size of 960 characters. Because the SNA support requires either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955), the customer should carefully evaluate his future requirements when installing a BSC system.

The MRJE has the same requirements as above except that it requires 48K bytes of main storage capacity on the 5285 and 64K bytes of main storage on the 5288.

The minimum system configuration required to support communications in an SNA network, including the SRJE utility, is:

An IBM 5285 with 64K bytes of main storage capacity, the Communications Adapter (#2500), a display size(s) of 960 characters, and either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4960).

OR:

An IBM 5288 with 64K bytes of main storage capacity, the Communications Adapter (#2500), an auxiliary data station (5281 or 5282) with a display size(s) of 960 characters, and either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955).

One communications line can be connected (via the appropriate line interface) to the adapter.

Optional hardware that is available for use with the Communications Utilities is:

- IBM 5217 Printer
- IBM 5222 Printer
- IBM 5224 Printer
- IBM 5225 Printer
- IBM 5242 Printer
- IBM 5256 Printer
- 3270 Emulation Communications Adapter
- Magnetic Stripe Reader

**SOFTWARE REQUIREMENTS**

5280 System Control Programming (5708-SC1).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 Communications Utilities Licensed Program Specifications (GC34-0387) ... IBM 5280 Communications Reference Manual (SC34-0247).*

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**5280 DE/RPG  
5708-DE1**

**PURPOSE**

DE/RPG provides advanced data entry and associated processing capability for the 5280 system. DE/RPG uses the Data Description Specifications (DDS) form, which is also supported on the System/38. An RPG subroutine capability is included which is a subset of RPG III calculation operation codes. DE/RPG program consists of a Compiler and a Source Entry Program.

**DESCRIPTION**

A broad range of capability is provided to allow the user to perform jobs ranging from simple, transcriptive key entry, to high-function data entry requiring extensive editing, data set access and user-defined processing. User-defined formats, presented on the display, constitute the framework for entering data, creating a record and writing that record to a disk or diskette data set. Extensive data editing is available to maximize productivity of the data entry process and reduce the need for expensive error correction procedures. Using General Utility Specification forms and Data Description Specification forms, the user can define a data entry program by simply specifying which edits and checks are required.

DE/RPG uses DDS forms for specification of data entry formats. A format or series of formats provide the framework for a data entry job. Sequence of execution of formats is determined by job definition, operator selection, or dynamically, based on analysis of current data.

Basic function is expanded through use of the RPG Calculation Specifications. This provides the user with the capability of defining specialized routines, such as complex arithmetic calculations, array handling, device I/O operations or initiate/terminate and read/write to communications. This RPG subroutine capability can also be used to create a stand-alone batch DE/RPG program.

**HIGHLIGHTS**

- Display Screen Design
  - Prompts and data fields can be positioned anywhere on the screen below the status line (Line 1 of the display).
  - Multiple formats can be displayed on a single screen.
  - Display attributes for prompts and data fields include highlight, blink, reverse image, underline, nondisplay and column separators.
- High-Function Editing
 

Provides the capability of checking and performing operations on data as it is entered. Edits can be performed on a character, field, or record basis, and include:

  - Character check - alpha, alpha only, numeric, numeric only, signed numeric, digits only, hexadecimal
  - Mandatory enter
  - Mandatory fill
  - Data required
  - Exit key required
  - Duplication - from previous record or named field
  - Right adjust with blank or zero fill
  - Self check/generate - Modulus 10/11 or user-defined
  - Counter arithmetic
  - Automatic field insert - constant, named field or results of an arithmetic expression
  - Comparison test - compare to constant, named field or arithmetic expression
  - Substitute table data for keyed data
  - Table lookup - test for matching table entry
  - Range test - compare to constants, named fields or table entries
  - Reformat field position - resequence fields for output record
  - Set indicators on/off
  - Exit to user subroutine
  - User-written error messages
  - Crosscheck - compare values of two fields against a table to ensure valid combination
  - Sequence check - compare current value of field with previous value
  - Picture check - multiple keyboard shifts in a single data field
- Production Statistics
 

All DE/RPG programs will maintain production statistics on a job basis and on a station basis. Statistics that can be maintained include: Keystrokes, records, elapsed time, marked records, verify correction keystrokes, number of jobs (on a station basis).
- User-Written Subroutines
 

Through use of the RPG Calculation Specifications, capability is provided to create subroutines for DE/RPG programs. In addition, this capability allows the user to write a non-interactive, stand-alone DE/RPG program that can run in any partition. The operation codes available are a subset of System/38 RPG III Calculation Specification operation codes. This capability can be used for such functions as complex edit routines, extensive arithmetic calculations,

master data set access and report printing. Simple read/write statements provide access to communications via a direct interface to the 5280 Communications Utilities licensed program (5708-DC1) and the 3270 Emulation licensed program (5708-EM1). Sequence of instruction execution is user-defined - the RPG 'cycle' does not apply. The following operation codes are available:

- Arithmetic and data manipulation - ADD, Z-ADD, SUB, Z-SUB, MULT, DIV, MVR, LOKUP, MOVE, MOVEA, MOVEL, COMP
- Branching - CABxx, GOTO, TAG
- Indicator testing - SETON, SETOF, BITON, BITOF, TESTB
- Subroutine operations - EXSR, BEGSR, ENDSR
- Special I/O operations:
  - Diskette - OPEN, CLOSE, READ, READP, WRITE, CHAIN, SETLL, UPDAT, DELET
  - Printer - OPEN, CLOSE, WRITE
  - Keyboard/display - EXFMT, WRITE
  - Communications - OPEN, CLOSE, READ, WRITE
  - Assembler subroutine exit - CALL
- Disk/Diskette Data Set Support
 

The 5280 system supports the sequential data set organization. The access methods available are: Sequential, direct by relative record number and key indexed. Data sets can be shared by multiple programs on a read or write/update basis. Concurrent update of a record by multiple programs is prevented.
- Modes of Operation
 

The four basic modes of operation of a DE/RPG program are:

  - Enter: Initial data entry. The record created is written to a disk or diskette data set.
  - Update: Review and modification of selected records in an existing data set.
  - Verify: Verify data in an existing data set for accuracy.
  - Rerun: Sequential processing of an existing data set performing all field edits and checks without operator intervention (that is, normal key input is bypassed).
- Special Functions
 

During operation of a DE/RPG program, the operator can select from a number of available special functions. These special functions include:

  - Search Data Set - locate and retrieve a record in a data set by its position within the data set, or by record content.
  - Manual Format Selection - operator selection of a format within the current job.
  - Record Insert/Delete - insert a record into or delete a record from a data set.
  - Copy - transfer a record from a data set to the current transaction data set.
  - Print - an unformatted printing of the current record.
  - Mark Field - mark a field in error to facilitate later correction.
  - Edit Release - suspend editing of a field.
- Device Support
 

All devices available on the 5280 system are supported by DE/RPG:

  - Disk Storage Drive
  - Keyboard/display
  - Diskette 1 drive
  - Diskette 2D drive
  - Magnetic Stripe Reader (#4950)
  - 5217 Printer
  - 5222 Printer
  - 5224 Printer
  - 5225 Printer
  - 5242 Printer
  - 5256 Printer
- DE/RPG Source Entry Program
 

The DE/RPG Source Entry program is used to create a DE/RPG source statement data set, which becomes input to the DE/RPG compiler. Operating through the keyboard/display, the user selects the required statement type and is prompted to enter the parameters required to complete the statement. The parameters are entered via the keyboard, the program automatically formats the statement into the form required by the DE/RPG compiler, and the record is written to disk or diskette. Three modes of operation are normally used:

**5280 DE/RPG (cont'd)**

- Enter Mode - for the original entering of statements for a source program.
- Update Mode - for making corrections or additions to an existing DE/RPG source statement data set.
- Verify Mode - for verifying data in an existing source statement data set for accuracy.

- Program Use

Input to the compiler is a DE/RPG source statement data set. This data set may be created by the DE/RPG Source Entry Program, a DE/RPG user-defined data entry program or the 5280 Key Entry Utility program (part of the 5280 Utilities licensed program - 5708-UT1). During compilation, a source listing is optional, and if requested, can be directed to a printer, disk or diskette. Output of the compiler is an object program data set written to disk or diskette. For object program execution, when the requirement exists for multiple operators to perform the same job, each operator must have an individual copy of the program, executing in a separate partition.

**Program Use During Customer Pre-installation Testing:** 5280 DE/RPG (5708-DE1) will be available to customers for pre-installation testing on IBM Test Center Systems.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The DE/RPG compiler will run on any IBM 5280 system which has, as a minimum, either two diskette 1 drives or one diskette 2D drive. The DE/RPG Source Entry Program will run on any IBM 5280 system. Minimum main storage partition size requirements are as follows: 9K for the DE/RPG compiler; 13K for the DE/RPG Source Entry program. The compiler will take advantage of additional main storage capacity if it is available.

If the user desires to maintain the elapsed time production statistic, the Elapsed Time Counter or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (special features) is required as follows: For the IBM 5285 - #3610, #4955 or #4960; for the IBM 5286 - #3610 or #4955; for the IBM 5288 - #3610 or #4955.

**SOFTWARE REQUIREMENTS**

The DE/RPG compiler, DE/RPG object programs and the DE/RPG Source Entry Program require the IBM 5280 System Control Programming (5708-SC1). In addition, DE/RPG object programs and the DE/RPG Source Entry program have, as a prerequisite, the IBM 5280 Utilities licensed program (5708-UT1). DE/RPG object programs and the DE/RPG Source Entry program require a customer-created IPL data set, containing the common functions area SYSCFA or SYSHELP (part of the 5280 Utilities).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 DE/RPG Licensed Program Specifications (GC21-7798) ... IBM 5280 DE/RPG Reference Manual (SC21-7787) ... IBM 5280 DE/RPG User's Guide (SC21-7804) ... IBM 5280 Introduction to DE/RPG (SC21-7803) ... IBM 5280 DE/RPG Problem Determination Procedures for the Programmer (SC21-7852).*

**RPOs ACCEPTED: No**

PROGRAM PRODUCTS

**5280 - 3270 EMULATION  
5708-EM1**

**PURPOSE**

5280 - 3270 Emulation allows the 5280 Distributed Data System to appear as selected 3270 control units and devices.

**HIGHLIGHTS**

The operating environments supported are:

- 3270 Device Emulation under System Network Architecture/ Synchronous Data Link Control (SNA/SDLC) and Binary Synchronous Communications (BSC). The 3270 Device Emulation Utility allows the 5280 to appear as selected 3270 control units and devices to existing host applications.
- 3270 Batch Transfer - BSC. Using this utility program, the 5280 user can transmit and receive batch data over a 3270 BSC network using 3270 line protocols. An appropriate user-written program is required at the host. Only graphic data (hex characters '40'-'FF') can be transmitted.
- 3270 Program Interface - BSC. This provides an interface for a user-written program in the 5280, written in DE/RPG or COBOL, to exchange records with a user-written program in a host system using 3270 BSC protocols. Only graphic data can be transmitted.

**3270 Device Emulation**

**Control Unit:**

- The 5280 appears to the host as a 3274 model 1C Control Unit under SNA/SDLC or as a 3271 model 2 Control Unit under BSC.

**Display/Keyboard:**

- The 1,920-character 5281 Data Station (attached to a 5288 Programmable Control Unit) and the 1,920-character 5285 Programmable Data Station appear to a host system as a 3277 model 2 Display Station with selected features.
- Typewriter, data entry, and data entry with proof arrangement keyboards are supported. 3270 Program Function keys are supported.
- The Local Print Key function is supported in SNA/SDLC and BSC.

**Printer:**

- The 3270 Printer Emulation Utility allows the 5217, 5222, 5224, 5225, 5242, and 5256 Printers to appear as the 3284 model 2, 3286 model 2, or 3288 model 2 Printer in BSC, or the 3287 model 1 and 2 Printer in SNA/SDLC.

**3270 BSC Batch Transfer Utility Program**

- Data on a 5280 disk or diskette can be sent to (or received from) an appropriately written host application program. Only graphic data can be transmitted.
- This utility is designed for batch transfer and limits the interference to other interactive sessions on the line. As a result, transfer of a data set can take more time than a normal batch transfer operation.
- The transmission and reception of multivolume disk and diskette data sets is supported.
- Unsolicited host operator messages are handled by the 5280 display while the utility program is in operation.
- Logon to an interactive host is allowed prior to starting Batch Transfer.
- The use of a user-provided record identifying character in the data stream permits distinguishing user data from system messages.
- Fixed length, blocked or unblocked records up to 1,918 bytes are supported.

**3270 BSC Program Interface**

- Read/write level of interface on a logical record basis is available in an interactive mode using DE/RPG and COBOL.
- The DE/RPG or COBOL application program provides a 1,920-character Device (Image) Buffer and 4,096-character, or less, Data Stream Buffer.
- User-written programs must be provided at both ends of the communications link with careful consideration given to the application design and the characteristics of the communications subsystem.

**DESCRIPTION**

The 5280 - 3270 Emulation licensed program consists of the following six basic parts:

- 3270 Device Emulation Program - BSC and SNA/SDLC
- 3270 Batch Transfer Utility - BSC
- 3270 Program Interface - BSC
- Communications Access Method - BSC

- Communications Access Method - SNA/SDLC
- Communications Access Method - 3270/SRJE

**3270 Device Emulation Program - BSC and SNA/SDLC**

Host system communication subsystems that are supported are: S/370 IMS/VS, CICS/VS, TSO, and System/3 model 15D CCP.

**Control Unit:**

The 3270 Device Emulation Program allows the 5280 to appear to a host system as a 3274 model 1C (SNA/SDLC) or a 3271 model 2 (BSC) Control Unit.

Device emulation of the 3270 allows the 5280 to reside on the same communications link that supports a 3274 model 1C or 3271 model 2 Control Unit. Since this program provides data stream translation, host application programs will generally require little or no changes to support the 5280 as a 3270. Performance, however, may be degraded.

**Display/Keyboard:**

The 1,920-character 5281 Data Station (attached to a 5288 Programmable Control Unit) and the 1,920-character 5285 Programmable Data Station appear to a host system as a 3277 model 2 Display Station with selected features. Features not supported include: ASCII, Magnetic Stripe Reader, Light-Pen, and the Copy Command (from the host).

Certain keys are in different locations on the 5280 keyboards. The EBCDIC typewriter, data entry, and data entry with proof arrangement keyboards and the EBCDIC transmission codes are supported. Function keys on the 3277 will be mapped onto the 5280 keyboard to provide for equivalent function: that is, Field Mark, Erase Input, PA, and PF keys. Up to 24 PF keys are supported. The host initiated local copy (print) is supported for SNA/SDLC. The local print key function is supported for SNA/SDLC and BSC. The magnetic stripe reader and the light-pen are not supported.

**Printer:**

The 3270 Printer Emulation utility provides to the 5280 user a method of using a 5280 printer as if it were a 3270 printer. The data to be printed is transmitted from the host system. The 3270 printers emulated are 3284 model 2, 3286 model 2, and 3288 model 2 in BSC. The 3287 Printer (models 1 and 2) is supported in SNA/SDLC. Special features available on these printers are not supported.

The 5280 printers supported are the 5217, 5222, 5224, 5225, 5242 and 5256. They will print characters that match 3270 printer characters where it is physically possible. Characters that do not match will print a standard default character. Users that must print all characters exactly as on a 3270 printer can do so by using a printer with the multinational character set. Upper and lower case printing is supported on all printers and vertical forms control is supported as on the 3287 and 3288 Printers.

The Printer Emulation Utility operates in either a foreground or background partition, and a maximum of five printer emulations may be active at one time.

The printers may operate in local mode, systems mode (entirely under host control) or shared mode.

**3270 Batch Transfer - BSC**

The 3270 Batch Transfer Emulation Utility will enable the user to transmit and receive batch data when communicating with a host system via 3270 BSC. Record lengths can be a maximum of 1,918 bytes. Transaction IDs and how they are to be used during transmission may be specified. It is possible to transmit and receive single or multiple volume data sets containing graphic text (hex characters '40'-'FF') only. Unsolicited messages and interactive logon/logoff can also be handled. The utility executes in a foreground partition. A user program is required at the host to send or receive batch data.

**3270 Program Interface - BSC**

This function provides the 5280 user with a program-to-program interface that uses 3270 BSC protocols. The 5280 application program that uses this function appears to the host system as a 3271 model 2 device. Up to seven concurrent sessions are supported. Each session represents a different 3270 device address.

The user application interface for this function is through DE/RPG and COBOL. The DE/RPG support for the 3270 program interface will provide a new parameter on the DEVICE keyword. The user will specify 'COMM3270' as the device type. A file defined with this device code may be accessed from the calculation specifications using READ, WRITE, OPEN, and CLOSE operations.

The COBOL support is implemented by use of the COBOL CALL routines. A COBOL program interfaces to the 3270 CAM through library routines. Communications are initiated by activating the CALL verbs that open and close data sets and read or write records.

## PROGRAM PRODUCTS

**5280 - 3270 Emulation (cont'd)**

**BSC Considerations:** Primary operation is on nonswitched multipoint communications facilities. Switched network backup (SNBU) may be utilized if the associated modems and application programs support this capability.

The following BSC host system support is provided for 5280 - 3270 Device Emulation:

- IMS/VS with BTAM under OS/VS1 or MVS
- IMS/VS with ACF/VTAM under OS/VS1 or MVS
- IMS/VS with ACF/TCAM under OS/VS1 or MVS
- CICS/VS with BTAM under OS/VS1 or MVS
- CICS/VS with ACF/TCAM under OS/VS1 or MVS
- CICS/VS with BTAM-ES or ACF/VTAM or ACF/VTAME under DOS/VSE
- CICS/VS with ACF/VTAM under OS/VS1 or MVS
- TSO with ACF/VTAM under MVS\*
- TSO with ACF/TCAM under MVS\*
- RSCS with VM/370 (printer emulation)
- CMS with VM/370 (display emulation)
- System/3 model 15D under CCP

\* TSO does not support printers.

**Notes:**

1. All of the above systems (except System/3) are also supported when under control of VM/370.
2. The 3270 Batch Transfer - BSC and the 3270 Program Interface - BSC functions are not supported by IMS or CICS/VS. Support for these functions is limited to those specific interfaces described in the *IBM 5280 - 3270 Emulation Reference Manual (SC34-0384)*.

**SNA/SDLC Considerations:** Operation is on point-to-point switched as well as nonswitched point-to-point or multipoint communications facilities. The point-to-point switched capability is a function of the 5280 - 3270 Emulation licensed program (not a function of the 3274).

The following SNA/SDLC host system support is provided for 5280 - 3270 Device Emulation:

- IMS/VS with ACF/VTAM under OS/VS1 or MVS
  - IMS/VS with ACF/TCAM under OS/VS1 or MVS
  - CICS/VS with ACF/VTAM under OS/VS1 or MVS
  - CICS/VS with ACF/TCAM under OS/VS1 or MVS
  - CICS/VS with ACF/VTAM or ACF/VTAME under DOS/VSE
  - TSO with ACF/VTAM under MVS\*
  - TSO with ACF/TCAM under MVS\*
  - VSPC (Version 2 of later) with ACF/VTAM under MVS
- \* TSO does not support printers.

**Note:** All of the above systems are also supported when under control of VM/370.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum 5280 system configuration required to support the 5280 - 3270 Device Emulation capabilities is:

An IBM 5285 with 64K\* bytes of main storage capacity, the 3270 Emulation Communications Adapter (#3270), and Optional 1,920-Character Display Size (#3505). SNA support requires, in addition, either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4960).

OR

An IBM 5288 with 64K\* bytes of main storage capacity, the IBM 3270 Emulation Communications Adapter (#3270), and an IBM 5281 Data Station with a display size of 1,920 characters. SNA support requires, in addition, either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955).

Refer to the *IBM 5280 - 3270 Emulation Reference Manual (SC34-0384)* for required main storage requirements of other functions.

**SOFTWARE REQUIREMENTS**

The current release of IBM 5280 System Control Programming (5708-SC1) and the current release of IBM 5280 Communications Utilities (5708-DC1)

- \* 96K bytes if a printer is used in conjunction with the keyboard/display

96K bytes may be required depending upon the host system network parameters effect on the SNA CAM buffer size. Refer to the *IBM 5280 - 3270 Emulation Reference Manual (SC34-0384)*.

160K bytes is required if the 3270/SRJE CAM is to be run with two utilities, (96K with one utility), such as the IBM 3270 SNA Display Emulation program and the SNA Remote Job Entry Utility (part of the 5280 Communications Utilities licensed program), executing concurrently.

**COMPATIBILITY**

**5280 Communications Support Compatibility:** The 5280 - 3270 Emulation licensed program can co-exist on a 5280 system with other non-communicating programs. Running a 3270 Emulation program concurrently with Transcriptive (that is, high keying rate) Key Entry (TKE) may degrade TKE performance.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 - 3270 Emulation Licensed Program Specifications (GC34-0382) ... IBM 5280 - 3270 Emulation Reference Manual (SC34-0384).*

**RPOs ACCEPTED:** No



PROGRAM PRODUCTS

**5280 SORT/MERGE  
5708-SM1**

**PURPOSE**

The 5280 Sort/Merge consists of a Sort program and a Merge program. The Sort and Merge programs support any disk and diskette data set organization supported by the 5280 system. The 5280 Merge program supports multi-volume data sets.

**DESCRIPTION**

The 5280 Sort program sorts a single disk or diskette data set into ascending or descending sequence.

**FEATURES**

- Sort parameters are entered at the keyboard or read from a 'Command' data set which contains previously recorded parameters. Use of the 'Command' data set allows easier execution of most frequently desired sort functions.
- Records are sorted by a control field which can consist of from one to six subfields from different locations of the record.
- Control fields can be sorted in ascending or descending sequence or mixed (some ascending and some descending).
- Records can be selected, omitted, or reformatted.
- An alternate collating sequence can be specified.
- Records can be in EBCDIC or ASCII code.
- Work space and data sets are automatically allocated by the program.
- The order of records with identical control fields is preserved.
- Output from the sort program will be 1 of 4 formats:
  1. Full record
  2. Address Out - A data set of 4-byte relative record numbers.\*
  3. Record Subset - A data set containing user-specified data fields.
  4. Index/Key - A data set with records consisting of a key and a relative record number.\* The key is a user-specified input record data field.

\* The relative record number corresponds to the position of the input record in the input data set.

**MERGE PROGRAM:** The 5280 Merge program will combine records from two sequentially-ordered disk or diskette data sets into another disk or diskette data set. The records can be in ascending or descending order. An alternate collating sequence can be specified. Multivolume data sets are supported for both input and output. Merge parameters are entered at the keyboard or read from a 'Command' data set which contains previously recorded parameters. Use of the 'Command' data set allows easier execution of most frequently desired merge functions.

**Program Use During Customer Pre-installation Testing:** The 5280 Sort/Merge (5708-SM1) will be available to customers for pre-installation testing on IBM Test Center Systems.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The Sort/Merge will run on any IBM 5280 system. Minimum main storage partition size requirements for the Sort and Merge Programs is 16K. The Sort and Merge Programs will take advantage of additional main storage capacity if it is available.

**SOFTWARE REQUIREMENTS**

IBM 5280 System Control Programming (5708-SC1).

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM 5280 Sort/Merge Licensed Program Specifications (GC21-7800)  
... IBM 5280 Sort/Merge Reference/Operation Manual (SC21-7789).*

**RPOs ACCEPTED:** No

## PROGRAM PRODUCTS

**5280 UTILITIES  
5708-UT1**
**PURPOSE**

The 5280 Utilities provides the following utilities for the 5280 user: Initialization Utility, Clear Utility, Label Maintenance Utility, Label List Utility, Copy Utility, Print Utility, SCS/BSC (3741) Print Utility, Resource Allocation Utility, 3740 Format Conversion Utility, Compress Utility, Key-Entry Utility, System Status Utility, Menu Configuration Utility, Menu Utility and Data Set Display Utility.

**DESCRIPTION**

**Initialization Utility** Formats the diskette according to user requirements. The program will initialize diskettes 1 and 2 with sector sizes of 128, 256 or 512 bytes, and diskette 2D with sector sizes of 256, 512 or 1,024 bytes. For disk, this utility clears the data set labels and allocates additional data set label space.

**Clear Utility:** Performs the following functions:

- **DROP:** Clears the data set(s) in preparation for the recording of new data.
- **FREE:** Deletes the data set(s) and its header label from the disk or diskette so that space is no longer assigned to that data set.

**Label Maintenance Utility:** Provides the user with the capability to allocate new data sets, delete old data sets, and to modify volume and data set labels.

The following capabilities are provided:

- **ALLOCATE:** Used to establish space for a new data set on a disk or diskette.
- **DELETE:** Offers capability to either drop or free a header label.
- **MODIFY VOLUME LABEL:** Can be used to alter the Volume ID, Owner ID and accessibility field.
- **MODIFY DATA SET LABEL:** Provides the user with the capability to modify header label fields.

**Label List Utility:** Provides the user with the capability to display, print, or write to disk or diskette: Disk or diskette volume labels, data set labels, data set names, and data set directories.

**Copy Utility:** Allows the user to copy all or a portion of a disk or diskette onto the same or another disk or diskette. Multivolume data sets are supported. The following functions are provided:

- **IMAGE COPY:** Copies the entire contents of an input disk to an output disk. Copies the entire contents of an input diskette onto an output diskette. Input and output diskettes must be the same type and format.
- **VOLUME COPY:** Copies a group of data sets or the entire contents of an input disk or diskette onto an output disk or diskette. Input and output diskettes can be different types and have different formats. Deleted data sets are not copied.
- **DATA SET COPY:** Copies the contents of up to four input data sets to an output data set.
- **SPECIFY RECORD COPY:** Copies the contents of a data set between 'from-to' relative record numbers to an output data set.
- **SPECIFY KEY COPY:** Allows the user to specify by key(s) which records are to be copied.
- **SINGLE DRIVE DATA SET COPY:** Copies a data set from one diskette to another using only one diskette drive.

**Print Utility:** Allows the user to print all or selected records on a disk or diskette. The program provides the following options:

- Print all records in a data set.
- Print all records from a group of data sets or all data sets.
- Print all records in a data set between user-specified relative record numbers.
- Print all records in a data set matching a user-specified key(s).
- Print hexadecimal values of selected records within a data set.

Records are printed exactly as recorded on disk or diskette without reformatting or editing.

The program also provides the capability to print a data set consisting of printer output previously directed to disk or diskette. The data set must have been created from printer output (such as a DE/RPG compiler output listing) directed to a disk or diskette, or from data transmitted over a communications line, and must be a valid Standard Character String (SCS) data set with appropriate printer format control.

**SCS/BSC (3741) Print Utility:** Provides the following print functions:

- **Print BSC (3741 protocol) data sets** that have not undergone the Standard Character String (SCS) mapping process. The utility will perform the SCS processing and provide a halt when an invalid escape sequence is encountered.

- Print a single SCS data set which contains valid printer format control characters.
- Print a group of SCS data sets having a common forms type identified. This capability supports data sets transmitted to a 5280 in the form 'PRINTsss' or 'Asssxxxx'.

Other features of this utility include:

- Printer format information for SCS processing may be supplied from the keyboard or from a printer format record on diskette.
- Printer forms alignment option. The first line of output may be reprinted multiple times.
- Print restart capability. For SCS data sets, the operator can halt printing and restart at any point in the data set.
- Multivolume input.

**Resource Allocation Utility:** Allows the user to display, alter, or delete the logical device identifier and physical address of an existing entry, or add an entry to the resource allocation table. The resource allocation table contains physical device addresses with corresponding logical identifiers, and is originally built using the System Configuration Program [part of 5280 System Control Programming (5708-SC1)].

**3740 Format Conversion Utility:** Allows the user to convert 3740 key entry program levels into source DE/RPG jobs. This utility converts basic field definitions such as right adjust, skip, dup, bypass, self check, field totals and their associated prompts. 3740 functions that are not converted by this utility can be implemented by adding appropriate DE/RPG statements to the DE/RPG program. Input to this utility is 3740 key entry string language from a diskette data set.

**Compress Utility:** Permits the user to rearrange data sets to make one contiguous space out of the unused space between data sets. Deleted data sets are removed from the disk or diskette.

**Key Entry Utility:** Provides the capability to create formats for basic key entry functions using the 3740 key entry string language. The key entry functions are functionally and operationally similar to the 3740 for enter, update, and verify operations.

This program takes advantage of 5280 ease-of-use characteristics to provide improvements in data set allocation, searches, and production statistics. Basic 3740 key entry functions are provided, except for self check, auxdup, 'numbers only' switch, online field totals, and non-key entry functions, such as printing and offline field totals.

The 3740 string language is entered at the keyboard and the resulting formats are immediately available or may be saved on disk or diskette for later use.

This utility is intended for simple key entry with little editing. It is not a 3740 emulator.

The Key Entry Utility requires an IPL data set containing the common functions area SYSCFA or SYSHELP (part of this licensed program).

**System Status Utility:** Provides the user with the capability to retrieve certain system status information. Current system status can be displayed, providing information on each main storage partition. This information includes partition number, name of program currently being executed (if any), partition size, and partition type (foreground or background).

System configuration parameters, stored on an IPL data set, can be retrieved and displayed or printed. These parameters define the configuration of the system for which the IPL data set was generated, and include: System size (main storage), common function area size, printer type(s) and address(es), partition definitions (number, type and size) and type and number of keyboards.

**Menu Configuration Utility:** Provides the programmer with the means to create and maintain a menu for a set of programs or procedures. A menu provides a displayed list of items (for example, job descriptions) from which an operator makes a selection. Menu selection allows the operator to start a job (or procedure) by simply selecting a menu item number. This utility creates a data set which contains the menu(s) and all information necessary to access, load, and initiate execution of the associated programs and/or procedures. The data set is stored on the disk or diskette which contains the programs and/or procedures associated with the menu(s).

**Menu Utility:** Provides the operator with the means to display and use menus. Initial execution of this utility provides a menu containing an entry for each online disk or diskette which contains a menu data set. The operator can then select a menu for a specific set of programs and choose a specific job to be executed. The program will automatically be loaded and executed in a pre-selected background partition, the smallest available background partition, or the partition in which the Menu Utility is executing.

**Data Set Display Utility:** Provides the user with an easy way to review the contents of a data set. The unformatted records are presented on the display, one line per record. For records with more than 80 characters,



PROGRAM PRODUCTS

**5280 Utilities (cont'd)**

the user can move the display right or left to view the entire record. Up to 22 lines of records (depending on display size) are displayed on each screen. The user can scroll forward and backward through the data set. Each successive display will index through the data set a user-specified number of records.

**Program Use During Customer Pre-installation Testing:** The 5280 Utilities (5708-UT1) will be available to customers for pre-installation testing on IBM Test Center Systems.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM 5280 Utilities (except Volume Copy, the write-to-diskette option of the Label List Utility, and the Menu Utility) will run on any IBM 5280 System. Volume Copy and the write-to-disk or diskette option of the Label List Utility will run on any IBM 5280 System which has, at a minimum, two diskette drives. The Menu Utility will run on any IBM 5280 system which has a display size of 960 or 1,920 characters.

Minimum main storage partition size requirements are as follows: 8K for the Key Entry Utility; 9K for the Data Set Clear, Label Maintenance, Label List, System Status\*, Initialization, Copy, Print, Resource Allocation, Compress and 3740 Format Conversion Utilities; 12K for the Data Set Display Utility; 16K for the Menu Utility; 20K for the Menu Configuration Utility; and 22K for the SCS/BSC (3741) Print Utility. Each of the Utilities (except Initialization, Resource Allocation, Menu Configuration, and Menu) will take advantage of additional main storage capacity if it is available.

\*16K for the IPL data set option

For the Key Entry Utility, if the user desires to maintain the elapsed time production statistic, the Elapsed Time Counter or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (special features) is required as follows: For the 5285 - #3610, #4955, or #4960; for the 5286 - #3610 or #4955; for the 5288 - #3610 or #4955.

**SOFTWARE REQUIREMENTS**

5280 System Control Programming (5708-SC1).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 Utilities Licensed Program Specifications (GC21-7799) ...  
IBM 5280 Utilities Reference/Operation Manual (SC21-7788).*

RPOs ACCEPTED: No



## PROGRAM PRODUCT

**1130 COBOL  
5711-CB1****PURPOSE**

IBM 1130 COBOL implements a high level business language designed according to specifications of the American National Standards Institute. It operates under IBM 1130 Disk Monitor System Version 2, Modification Level 9 and later releases.

**DESCRIPTION**

**Features:** The following is a comparison of 1130 COBOL to the System/360 COBOL D, 360N-CB-452:

**IDENTIFICATION DIVISION**

DATE COMPILED is not included

**ENVIRONMENT DIVISION****CONFIGURATION SECTION****SOURCE-COMPUTER**

COPY is included

**OBJECT-COMPUTER**

COPY is included

MEMORY SIZE is included

**Special Names**

COPY is included

Implementor-name IS mnemonic-name is included

ON STATUS is included

OFF STATUS is included

Implementor-name series is included

CURRENCY SIGN is included

**INPUT-OUTPUT SECTION****FILE-CONTROL**

ASSIGN TO Implementor-name series is included

MULTIPLE UNIT is included

FILE-LIMIT is included

**DATA DIVISION**

Spanned Records are included

Variable length records are not included

**OCCURS**

3 levels of indexing are included

Index by index-name

Index-name series is included

DEPENDING UPON is not included

USAGE IS INDEX is included

VALUE OF is included

SYNCHRONIZED is included

Abbreviations PIC, JUST, COMP, SYNC are included

Alphameric Items: A X 9 in same PICTURE are included

Alphameric Edited Items: A X 9 0 B are included

**PROCEDURE DIVISION**

Switch-Status Condition is included

ACCEPT (expanded use)

FROM mnemonic-name is included

DISPLAY (expanded use)

UPON mnemonic-name is included

DIVIDE

BY identifier is included

IF

Nesting is not included

SEEK is included

SET

Index-name identifier is included

Index-name series is included

UP BY is included

DOWN BY is included

USE

Declaratives are not included

WRITE

BEFORE ADVANCING is included

Mnemonic-name is included

CONTINUATION OF LINES

Continuation of Words and Numeric Literals is included

These exclusions are as follows:

Indexed Sequential

Packed Decimal

Floating Point

The TRANSFORM Verb

**CUSTOMER RESPONSIBILITIES**

The user of 1130 COBOL must train system analysts, programmers and operators and maintain a Source Library if one is desirable.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

A minimum installation for compilation and execution begins with an IBM 1131, model 2B or 4B Central Processing Unit having 8,192 words of main storage plus one disk as a 1B or 5B secondary storage facility. The disk can provide residence for the Disk Monitor System, the COBOL compiler, and user-written COBOL programs. The following components are essential supporting items:

One IBM 1442 Card Read Punch, model 6 or 7

or

One IBM 2501 Card Reader, model A1 or A2

One IBM 1132 Printer, model 1

or

One IBM 1403 Printer, model 6 or 7 with the 1133 adapter device

A console typewriter is an integral member of the IBM 1131 Central Processing Unit, serving the system operator.

**Utilization of Extended Computing Facilities:** Providing a larger-than-minimum-sized machine installation will increase the capacity of IBM 1130 COBOL in terms of program size or program complexity, or both. Similarly, the I/O devices or the faster CPU in more extensive installations may promote faster throughput. This improved operation of the licensed program will depend on the system having components that can augment or substitute for the devices specified as minimum, as follows:

**Facilities At Compilation Time**

CPU with faster core storage - (2.2 msec)

IBM 1442 Card Punch, model 5, if an IBM 2501 Card Reader is installed instead of a reader/punch

IBM 2310 Disk Drive Units - up to four drives or 2311 Disk Drives - up to two drives

**Facilities At Execution Time:** All compilation-time devices plus a second printer. Both an IBM 1403 Printer and an IBM 1132 Printer can be used for printed output, but two 1403s or two 1132s cannot be used. A 1403 with either 120 or 132 print positions can be used.

**SOFTWARE REQUIREMENTS**

The IBM 1130 COBOL Compiler is written in IBM 1130 Assembler language and operates under control of the IBM 1130 Disk Monitor system, Version 2, Modification Level 9 and subsequent releases (Program Number 1130-OS-005). 1130 COBOL can be incorporated in the Disk Monitor System, at Modification Level 9, or later. The COBOL Compiler requires that the COBOL Source Statements be in card form. The user should note that statements can be stored in the Source Library on disk and COPY'd into a program when required.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual* (GH20-0799)

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCT

**LINEAR PROGRAMMING SYSTEM  
5711-C01****PURPOSE**

The Linear Programming System/1130 (LPS/1130) provides IBM 1130 Disk Monitor Version 2 users with a simple, easy-to-use and easy-to-understand means of solving linear programming problems. It offers many significant advantages over LP-MOSS/1130. Performance is substantially better than LP-MOSS/1130 and, in addition, LPS/1130 will take advantage of additional core storage and input-output devices. Input data for LPS/1130 are compatible with those of LP-MOSS/1130 and LPS/360.

**DESCRIPTION**

Mathematical optimization is any mathematical technique for determining the optimum use of various resources to attain a particular objective (such as minimum cost or maximum profit) when there are alternate uses for resources. Linear programming is the most widely used of these techniques and has been used to allocate, assign, schedule, select, or evaluate the uses of limited resources for such jobs as blending, mixing, cutting, trimming, bidding, pricing, purchasing, planning, and the transportation and distribution of raw materials and finished products.

LPS/1130 has a logical processing capacity for 500 rows on an 8K 1130, and 1,500 rows on a 16K or larger 1130. Since problem capacity is limited by disk storage space available, more than the capacity of one 2315 disk may be required to process larger problems. For example, many 500-row problems will require the capacity of two such 2315 disk cartridges, and many 1,500-row problems will require the capacity of three such 2315 disk cartridges. 2310 models B1 and/or B2 Disk Storage Drives may be utilized, or 2311 models 11 or 12 to reach maximum problem size. Problem size is also limited by the arithmetic accuracy of the 1130.

**Features:** Large problem capacity (500 rows on an 8K 1130 and 1,500 rows on a 16K or larger 1130) ... flexible processing control (optional conditional control of processing sequence) ... simple problem definition (easy-to-use format and extensive data maintenance functions, specifications of starting solution basis, combination of problems to form master problems) ... advanced mathematical methods—automatic interactive input scaling for accuracy, revised simplex method (product form of inverse), bounded variable feature for range ( $\leq$  and  $\geq$ ) constraints and bounded variables to simplify problem description and to increase problem capacity and solution speed ... multiple pricing ... efficient triangularization inversion method for accuracy ... extensive post optimal analysis options (discrete parametric analysis for all problem data and activity-cost-bound relationships for all variables) ... extensive checking (input check for duplicate entries, solution processing check to test for need of early inversion and automatic solution check).

**Use:** LPS/1130 is governed by procedure control cards which specify the solution sequence. Input data may originate on cards and be stored on disk for subsequent processing. Several problems may be stored on the disk and updated, rerun, or combined. For example, a corporate model can be formed from divisional models or a total production plan from the plans for individual products.

Reports may be on cards or printer. Output options include a full solution report, a solution analysis report, and parametric analysis reports.

**CUSTOMER RESPONSIBILITIES**

A working knowledge of the 1130 Disk Monitor System Version 2 is recommended for installation. Since the LPS documentation is written in a tutorial fashion, little mathematical background or linear programming experience is needed.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Execution of LPS/1130 requires at least an 8K disk 1130 system and one of the following:

- IBM 1442 Card Read Punch model 6 or 7
- IBM 2501 Card Reader
- IBM 1134 Paper Tape Reader

System generation and maintenance of LPS requires at least an 8K disk 1130 system and one of the following:

- IBM 1442 Card Read Punch model 6 or 7
- IBM 2501 Card Reader and IBM 1442 Card Punch model 5
- IBM 2501 Card Reader and IBM 1442 Card Read Punch model 6 or 7

The 1130 system used to generate LPS must have at least as much core storage and at least as many logical disk storage drives as the 1130 system on which LPS will be used.

A paper-tape-only configuration may not be used for system generation and maintenance. To run the sample problem on a paper-tape-

only LPS system, the cards must be put on paper tape. To do this a 1055 Paper Tape Punch is required in addition.

**Compilation** of LPS source decks requires at least an 8K 1130 system and one of the following:

- IBM 1442 Card Read Punch model 6 or 7
- IBM 2501 Card Reader

LPS can use up to 32,768 words of core storage and up to three 2310-type disk storage drives or one 2311-12 disk storage drive. LPS can also use an IBM 1132 Printer, 1403 Printer, 1442 Card Punch model 5, and a 1055 Paper Tape Punch.

The recommended IBM 1130 system for good performance and easy operation includes a model 2C (16,384 core storage and one disk storage device), a 2310 Disk Storage Device model B1, a 1442 Card Read Punch model 6 or 7 (or a 2501 Card Reader) and an IBM 1132 Printer (or an IBM 1403 Printer).

LPS versions can be generated for three core sizes: 8K, 16K and 32K (K=1, 024). When executing, LPS uses almost all of the core for which it was generated, except for approximately 530 words used by the 1130 Monitor. The programs for the 16K and 32K versions use the same amount of core as the programs for the 8K version (except for several programs which use locals on the 8K version). The extra core on the 16K and 32K versions is used for larger data storage.

**SOFTWARE REQUIREMENTS**

The source language of LPS/1130 is primarily FORTRAN with some Assembler language routines. LPS/1130 operates under the control of the IBM 1130 Disk Monitor System Version 2.

**DOCUMENTATION**

(available from Mechanicsburg)

*Introduction to Linear Programming* (GE20-8171) ... *Aluminum Alloy Blending* (GE20-0127) ... *Electric Arc Furnace Steelmaking Manual* (GE20-0147) ... *Feed Manufacturing* (GE20-0148) ... *Ice Cream Blending* (GE20-0156) ... *Blast Furnace Burdening* (GE20-0160) ... *Cotton Blending* (GE20-0164) ... *Gasoline Blending* (GE20-0168) ... *Linear Programming System/360 Application Description Manual* (GH20-0513) ... *Functional Description* (GH20-4091).

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCT

**ELECTRONIC CIRCUIT ANALYSIS PROGRAM II**  
**1130 (5711-EE1) - System/360 (5734-EE1)**

**PURPOSE**

Provides a flexible and powerful tool for investigating the behavior of electronic circuits.

**DESCRIPTION**

The Electronic Circuit Analysis Program (ECAP) II is an integrated system for performing direct current (DC) and transient analysis of both linear and non-linear electrical networks. ECAP II provides fast computation of results, large problem size capability, model library facilities, and the ability to handle a wide variety of non-linear problems.

The ECAP II language provides flexibility in specifying the network parameters and configuration and in selecting the output variables to be displayed. Both printed and plotted formats are provided. As an aid in preparing correctly formatted input statements, extensive user-oriented diagnostic messages are printed during the input phase. This feature greatly reduces the time required to prepare valid input data and begin productive computation. Other features, such as the choice of electrical units, accuracy checks, and automatic data storage and retrieval from disk, enhance the utility of the program.

For the 1130 System, ECAP II (5711-EE1) is provided, while ECAP II (5734-EE1) functions under the IBM Operating System. Both programs require the support of the respective IBM Problem Language Analyzer (PLAN) program (see "Software Requirements").

**Features**

- Integrated system of programs for DC and Transient Analysis; consistent standards and conventions; single specification of network for both DC and Transient Analyses.
- Convenient, flexible, simple, and expandable language for describing the problem.
- Efficient programming techniques and computational algorithms; accurate results.
- Fast turnaround and better utilization of both user time and computer time because of extensive, user-oriented diagnostics.
- Modification, rerun, and parameter-study capabilities, including modification of topology.
- Non-linear elements which can be described by arbitrary, user-defined functions.
- Storage and retrieval of device models and circuits in the Model Library, including hierarchical (nested) model definitions.
- Large problem size capability without program changes, when additional core storage is available.
- Increased speed, accuracy and problem size through sparse matrix techniques.
- Modular construction to permit subsequent addition of user-defined computation modules and/or algorithms.

**Problem Size Limits:** The core storage for a problem depends on the topology of the circuit and the type and amount of input specifications to describe the circuits. These circuit variables determine the matrix and table sizes and the corresponding core storage required. The table below shows ranges for a given core storage:

System/Machine	Problem Program Core Storage	Range of Problem Size Limits
DMS/1130	16K (words)	30-100 branches
DMS/1130	32K (words)	130-400 branches
OS/360-MFT	170K (bytes)	100-300 branches
OS/360-MVT	200K (bytes)	100-300 branches
OS/360-MFT	370K (bytes)	400-1200 branches
OS/360-MVT	400K (bytes)	400-1200 branches

**Throughput Timings:** Timing figures below are for a typical analysis, consisting of a 30-branch circuit resulting in 27 equations. The transient analysis continues for 100 time steps and the nonlinear DC solution requires six iterations to converge. For the IBM Operating System program, a five-fold replication of the 30-branch problems is assumed:

Problem	1130	S/360 Mdl 65 (MVT)
Number of branches	30	150
Number of Equations	27	135
Core Storage	16K words	200K bytes
<b>Throughput Timing</b>		
DC Analysis (6 iterations)	3 minutes	4 minutes
Transient Analysis (100 time steps)	25 minutes	6 minutes

**Use:** By means of a flexible, easy-to-use language, users can describe their circuit, indicate the analyses to be performed, and specify the output variables to be displayed in the tabular and/or plotted formats. To assist the user in quickly correcting input format error, diagnostic messages are printed immediately during the input phase and the processing is terminated if the errors are too serious to permit a valid analysis. In this way, the time required to prepare valid input data is greatly reduced and excessive wastage of machine time is avoided.

**CUSTOMER RESPONSIBILITIES**

Users must have a basic knowledge of circuit theory. They must learn the ECAP II language formats and the sign conventions for network elements. They must also learn to interpret the results. The user may supply equivalent circuits for the model library. A few device models will be supplied. A knowledge of FORTRAN is required if analytical functions are to be used for element non-linearities; otherwise, tables of values or supplied functions may suffice.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

- IBM 1131 Central Processing Unit model 2C (16K core storage)
  - IBM 1442 Card Read Punch model 6
  - IBM 2311-12 Disk Storage Drive
  - IBM 1133 Multiplex Control Enclosure with #1865 Channel multiplexer feature
  - Expanded IBM 1130 System Configuration: Additional core storage and faster I/O units such as the following will improve speed and throughput.
    - IBM 1131 Central Processing Unit model 2D (32K, 3.6 microsecond cycle time) or model 3D (32K, 2.2 microsecond cycle time)
    - IBM 1442 Card Read Punch model 7
    - IBM 1403 Printer
  - Minimum Operating System Configurations: The Operating System and the Problem Language Analyzer (PLAN) Program are required. In addition to core and auxiliary storage required for the IBM Operating System and the auxiliary storage required for PLAN, ECAP II requires two million bytes of auxiliary storage and minimum problem program core storage as follows:
    - 170K partition under OS MFT
    - 200K region under OS MVT
- The user may install additional core storage and disk drives and faster I/O units for improved operational efficiency.

**SOFTWARE REQUIREMENTS: None**

**DOCUMENTATION**  
 (available from Mechanicsburg)

*Application Description Manual (GH20-0983).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**1130 CONSTRUCTION ESTIMATING PROGRAM  
5711-M61**

**PURPOSE**

This program provides the ability for a contractor in the construction industry to produce fast, accurate cost estimates for construction projects. Summaries of estimated costs may be produced for subdivisions of work for a project and for the entire project.

**DESCRIPTION**

Examples from three of the 16 divisions (concrete, masonry, and steel) set forward in the AGC Manual (Uniform System for Construction Specifications, Data Filing and Cost Accounting: Title One Buildings) have been provided with this package. Linkages are provided for the remaining 13 divisions. Within each division the program permits up to 846 categories, numbered 101 to 194, 201 to 294 ... 901 to 994.

For each category to be implemented, the user will assign a unit cost for labor, material, and equipment, as required. The user will then input the dimensions from the take-off taken from the building plans and specifications for each category. In the case where the given category has a pre-assigned formula for arriving at the estimated quantity, the user will input only the appropriate dimensions. In the case where it is a one-time formula or one which the user has not as yet added to the program coding, the formula may be provided on the input card.

The program then extends the dimensions into a quantity in the pre-assigned units of measure. These quantities are accumulated on the disk by category. At a command from the user, all of these accumulated quantities are extended by the appropriate unit costs and the summary for that particular division is produced.

**CUSTOMER RESPONSIBILITIES**

Users should be familiar with the theory and practice of construction estimating. No programming or classroom training is required unless customers decide to alter or extend the system. In these cases, they must be familiar with the 1130 Disk Monitor System, FORTRAN, and 1130 PLAN, as well as the practice of construction cost estimating.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

- 8K disk IBM 1131 Central Processing Unit
- IBM 1442 Card Read Punch model 6 or 7
- One IBM 1132 Printer
- One IBM 2315 Disk Cartridge

**SOFTWARE REQUIREMENTS:** None

**DOCUMENTATION**

(available from Mechanicsburg)

*Application Description Manual (GH20-0742) ... PLAN Application Description Manual (GH20-0490) ... PLAN Program Description Manual (GH20-0594) ... 1130 PLAN Operations Manual (GH20-0595).*

**TERMS and CONDITIONS:** See PP Index

**1130 CONSTRUCTION COST CONTROL SYSTEM  
5711-M62****PURPOSE**

The IBM Construction Cost Control System is designed to assist a construction contractor in the monitoring and control of job construction costs.

**DESCRIPTION**

This system receives job cost information, completed work information, and payroll information. The program processes and stores this information by job number, for jobs currently being monitored. The cost data is categorized by labor, material, equipment, and/or sub-contractor.

The system prepares payroll information, prints checks, generates cost comparisons of estimated costs versus actual costs, and prints a wide range of reports at the option and request of the user.

The contractor using this system will receive the following benefits:

**Reduction of costs**

- Through automatic preparation of payroll and project cost reports.
- By generation of administrative reports.
- By establishing a cost system for a project directly from the 1130 Construction Estimating Program (5711-M61), if the contractor uses that licensed program for estimating activities.
- Through improved cash flow resulting from the knowledge of current status of cost data.

**Improved Business Operations**

- Because of the availability of job performance reports based upon current and timely cost and completion data.
- Because of the detailed breakdown of information to depth desired by the contractor.
- Through improved accuracy and completeness of operating reports which measure actual costs against estimated costs.
- Because of early warning of pending overruns.

**HIGHLIGHTS**

- Programs which operate under the 1130 Disk Monitor are stored on either the payroll disk or the cost control disk.
- The disk packs are interchanged as required to provide a multiple disk pack operation on a single disk drive.
- Data filing code organizations provide for control on a three digit job or project number - a five digit item code (for example, AGC code established by the Construction Estimating Program) - an employee identification code of up to 11 characters.
- Records are maintained on disk files to provide reporting for 500 employees - 50 government projects - 2,400 subcontractor work categories - 4,800 labor work categories - 4,800 material work categories - and/or 500 equipment work categories.
- Cost control data may be reported by units of work completed or percentage of work item completed. The user may choose either of these reporting methods.
- System outputs consist of payroll checks - a certified payroll for government project reporting - union reports of hours worked - a general ledger recap - a sub-contractor report - quarterly tax schedules - W-2 forms - 941A reports - a labor comparison report - a material comparison report - an equipment comparison report - a job summary report.
- Card input consists of employee time cards - employee deduction cards - sub-contractor billing data - sub-contractor disbursement data - sub-contractor completion data - work completion data - material order and receiving data - equipment usage and rate data - project estimate data - report heading data.
- Provision for user-written FORTRAN subroutines to accommodate city and state income tax processing and to provide for system extension for user-specified functions. The licensed program provides for one state tax and one city tax computation for any reporting period.
- Easy modification of payroll check format by FORTRAN subroutine modification.

**Use:** The required programs are selected from the disk by entry of the appropriate //XEQ monitor control card followed by the required input data. The programs, loaded from disk by monitor, read the input data from the card reader and provide output on the card punch and line printer.

**CUSTOMER RESPONSIBILITIES**

The user of the 1130 Construction Cost Control System must:

- Define the data filing code structures.

- Assign cost codes.
- Provide the project cost estimate (potentially through use of the 1130 Construction Estimating Program, 5711-M61).
- Develop employee data.
- Prepare necessary government project data.
- Select the cost reporting mode (percent or units).
- Prepare labor codes and descriptions.
- Design and implement state and local tax FORTRAN subroutines where required. This requires knowledge of 1130 FORTRAN.
- Modify the check writing subroutine if desired. This requires knowledge of 1130 FORTRAN.
- The entire system is designed on the basis of (1) many program modules capable of being independently executed and (2) separation of data into six files. This design permits easier user modification of files and operating programs or extended application through additional programming.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum machine configuration required to compile, execute, and maintain the program is an IBM 1131 CPU-model 4B or 2B (8K with internal disk drive ), two IBM 2315 disk cartridges, an IBM 1442 card read punch, and an IBM 1132 printer.

The user may install faster card and print devices to attain faster throughput. The card punch function is required. Additional core size and/or disk drives will improve performance. A card sorter is required to sort the input decks.

**SOFTWARE REQUIREMENTS**

The programs are coded principally in IBM 1130 Basic FORTRAN IV with lesser use of 1130 Assembler language.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Application Description Manual (GH20-0975) .*

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**1130 DISTILLATION PROGRAM  
5711-P71****PURPOSE**

The Distillation Program is a fast, efficient, and versatile program that solves the steady state distillation problem for a multi-feed, multi-sidedraw, multi-heat exchange column by rigorous heat and material balances.

The program provides the user a distillation computation capability normally found only in programs written for large machines. The ability to solve complex distillation problems on the IBM 1130 meets a growing need of plant operating engineers, plant technical service engineers, process designers, consultants, and students.

**DESCRIPTION**

The 1130 Distillation Program consists of four major sections: Physical data preparation, distillation calculations, case study driver, and report writer.

The physical data preparation section is an integral part of the distillation code and may be used in one of three mutually exclusive modes.

In the first mode ("Name" option) for a selected number of components (primarily hydrocarbons), the specification of the component name suffices to determine the liquid and vapor enthalpies from the Yen-Alexander correlations and the equilibrium data from the Chao-Seader correlations.

In the second mode, the user specifies input data coefficients of polynomial approximations to the liquid and vapor enthalpy and equilibrium data curves.

In the third mode, the user supplies required liquid and vapor enthalpy and equilibrium data in tabular form.

The distillation calculations solve the steady-state distillation column problem by rigorous heat and material balances using the Thiele-Geddes method as presented by Holland and modified by Billingsley. The program is designed to handle a highly complex column with multiple feed streams, multiple side-draws, and multiple external heat exchangers (intercoolers and interheaters).

The Thiele-Geddes method, in contrast to the Lewis-Matheson technique, is essentially an "operating column" method rather than a design method. The Thiele-Geddes method is designed to answer how a distillation column operates given the number of stages, feed stage locations, component feed rates, feed thermal condition, reflux ratio, and total bottoms rate. With these specifications, the 1130 Distillation Program will compute overhead and bottoms component product rates, vapor or liquid composition at each stage, a phase flow at each stage, and stage temperatures.

The design problem to determine the number of stages needed to accomplish a specified separation from a given feed stock is solved using the case study driver capability. This capability permits the engineer to run a number of cases which are modifications to the initial design conditions. Solution times for cases using the driver are less for all cases except the first, since each case uses the preceding solutions as its initial conditions.

A report writer lists the computed output in a standard form. It also prints out diagnostics.

The program is very efficient in terms of core storage and time for solution. The program may be normally expected to solve distillation problems for a wide variety of feed stocks including crude oil. It may also be used for a limited class of strippers and absorbers.

**HIGHLIGHTS**

- Up to sixty-five stages
- Up to fifteen components
- Up to a total of eight feed streams and sidedraw streams
- Up to a total of eight interheaters and intercoolers
- Three options for specifying enthalpy and equilibrium data
- Option to make enthalpy and equilibrium data dependent on composition
- Option for users to create their own component file for physical data
- Option to employ case study capability

**Use:** Once the program and files have been stored on the disk, the user merely inserts the disk, places 1130 Monitor control cards and the data cards in the card reader and starts the execution of the program as described in the *Program Description and Operations Manual*.

**CUSTOMER RESPONSIBILITIES**

Users can create their own "Name" option compounds by following the instructions in the *Program Description and Operations Manual*. If users desire to enter their own physical data via mode two, they must curve fit their enthalpy and equilibrium data according to the polynomial approximations described in the *Program Description and Operations Manual*. The distillation program accepts the coefficients after they have been determined. For mode three, the user enters the enthalpy

and equilibrium data in tabular form. The program internally curve fits the data.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

- 1 IBM 8K Disk 1131 CPU
- 1 IBM 1442 Card Read Punch or 2501 Card Reader and IBM 1442 Card Punch
- 1 IBM 1132 Printer or 1403 Printer (option)
- 1 IBM 2315 Disk Cartridge

**SOFTWARE REQUIREMENTS**

- Language employed is 1130 Basic FORTRAN and 1130 Assembler
- Operating system is 1130 Disk Monitor System Version 2 and all subsequent releases unless so stated in a future revision.

**DOCUMENTATION**

(available from Mechanicsburg)

*Application Description Manual* (GH20-0889).

**TERMS and CONDITIONS:** See PP Index

**SUBROUTINE LIBRARY-MATHEMATICS (SL-MATH)  
1130 and 1800 (5711-XM2)  
S/360 and S/370 (5736-XM7) §**

**PURPOSE**

SL-MATH provides FORTRAN users with powerful computational tools to solve their mathematical problems.

**DESCRIPTION**

SL-MATH is a collection of subroutines dealing with matrix algebra and numerical mathematics. The subroutines, computational building blocks written in FORTRAN IV, operate on data that resides in main storage.

This library is an enhancement of the mathematical portion of the Type II application program, S/360 Scientific Subroutine Package (SSP).

SL-MATH provides DOS and OS FORTRAN users with the functional capabilities of the program product PL-MATH (Procedure Library - Mathematics, written in PL/1).

The subroutines included in SL-MATH can be classified into three groups:

- Subroutines taken from S/360 SSP and adapted to new conventions, but with functional capabilities and coding virtually unchanged. (Approximately 40% of SL-MATH subroutines.)
- Subroutines replacing functional capabilities of IBM S/360 SSP, now using improved algorithms. (Approximately 15% of SL-MATH subroutines.)
- Subroutines presenting new functional capabilities. (Approximately 45% of SL-MATH subroutines.)

A major objective was to select and implement algorithms that represent the state of the art in numerical mathematics.

The subroutines in this library can be applied to the solution of many problems in industry, science, and engineering. Individual subroutines, or a combination of them, can be used in the following general areas:

- Elementary array operations
- Solution of linear equations
- Eigenanalysis\*
- Optimization\*
- Computation of extrema of functions
- Computation of roots of functions
- Polynomial operations
- Quadrature
- Differentiation
- Interpolation\*
- Evaluation and computation of transforms\*
- Approximation\*
- Smoothing
- Convergence acceleration
- Solution of differential equations\*
- Evaluation of special mathematical functions

\* Sample programs that can be used for the solution of standard problems are provided for these areas.

**HIGHLIGHTS (S/360/370)**

With respect to SSP, S/360/370 SL-MATH includes these additions or major modifications:

- Pseudo-random number generator.
- Solution of linear equations with sparse coefficient matrices.
- Iterative refinement of the solution of systems of linear equations.
- Solution of the general eigenanalysis problem.
- Linear programming.
- Solution of capacitated network-flow problems.
- Computation of extrema of functions.
- Computation of the roots of a polynomial with real or complex coefficients.
- Interpolation and approximation by cubic splines.
- Interpolation by exponential sums.
- Chebyshev approximations.
- Solution of systems of ordinary differential equations.
- Evaluation of special mathematical functions.

**HIGHLIGHTS (1130/1800)**

Compared with 1130 SSP, IBM 1130-1800 SL-MATH includes the following:

(1) New Areas –

- Optimization
- Computing extrema of functions
- Differentiation
- Interpolation
- Evaluation and computation of transforms
- Approximation
- Smoothing
- Convergence acceleration

(2) Additions and/or Modifications in the Areas –

- Elementary array operations
- Solution of linear equations
- Eigenanalysis
- Computing roots of functions
- Polynomial operations
- Quadrature
- Solution of differential equations
- Evaluation of special mathematical functions.

**Use:** The user can invoke any subroutine from SL-MATH by means of the standard (FORTRAN) CALL statement, just as he does with his own subroutines.

**CUSTOMER RESPONSIBILITIES**

Six source files for System/360/370 and four source files for 1130 and 1800, which are stored on one reel of magnetic tape, are shipped to the user. Utility programs for installation and updating are included. The user must be familiar with the FORTRAN language.

SL-MATH is distributed on one reel of magnetic tape. It is the 1130/1800 customer's responsibility to arrange for the conversion of the tape to cards for use on their system.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS (S/360/370)**

The minimum machine requirements for the compilation of SL-MATH subroutines are an IBM S/360 or S/370 that meets the requirements of the operating systems listed above and of the appropriate (lowest level) FORTRAN IV compiler.

The storage requirements for a specific problem depend on the number of the subroutines used, the size of the compiled subroutines, the size of the compiled main program, the size of the control program, and the data storage requirements.

**HARDWARE REQUIREMENTS (1130/1800)**

The minimum machine requirement for the compilation of SL-MATH subroutines is an IBM 1130 or IBM 1800 system that meets the requirements of the 1130/1800 Basic FORTRAN IV compiler.

The storage requirements for a specific problem depend on the number of subroutines used, the size of the compiled subroutines, the size of the compiled main program, the size of the control program, and the data storage requirements.

**SOFTWARE REQUIREMENTS**

The SL-MATH subroutines, written in FORTRAN IV, can be used under the following programming systems:

IBM System/360/370

- Operating System (OS)
- Disk Operating System (DOS)

IBM 1130/1800

- IBM 1130 Disk Monitor System Version II
- IBM 1800 Time Sharing Executive System, and
- IBM 1800 Multiprogramming Executive System.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual (GH12-5103) ... Procedure Library-Mathematics (PL-MATH) Program Description Manual (SH20-0985) ... Specifications for SL-MATH (5734-XM3) (GH20-4109).*

**TERMS and CONDITIONS:** See PP Index

**PROJECT CONTROL SYSTEM II/1130  
PCS II/1130 (5711-XP1)****PURPOSE**

IBM PCS II/1130 provides a basic tool to aid management in the planning, supervising and controlling of project-oriented work by the critical path method. In addition to critical path analysis, the system provides capability for summarizing externally prepared resource and cost information.

For critical path networks, PCS II/1130 processes 2,000 activities, either in the form of precedence lists or, alternatively, in IJ notation. Its design allows for a simple approach to networking, but also offers many of the features normally found only in programs designed for large computers.

**HIGHLIGHTS**

Up to 2,000 work items (or IJ/CPM activities) are allowed ... up to 4,500 precedence relationships are permitted ... each precedence relationship can be logged ... the number of days and the starting day of the work week can be specified for each item ... for in-progress work items, progress can be assigned to both the beginning and end of each work item ... basic resource and cost summarization capability is provided ... tabular and graphic charts are available ... card or disk master files may be used ... arbitrary non-work days, in addition to regular holidays, can be incorporated into the calendar.

**Use:** To use PCS II/1130, the customer must describe the work items and their relationships, which constitute the project network. This data is punched into cards for entry into the 1130. Optional data, including resource and cost information, may be entered initially or during a later network updating run. Requests for a variety of output reports can be made during any type of PCS II/1130 computer run.

**CUSTOMER RESPONSIBILITIES**

All users should be familiar with the various features of this system before attempting to use it for actual project control. New users will need a knowledge of the fundamentals of the critical path technique, including precedence list concepts, before they can prepare input. Networks generated under PCS II/1130 Version 2 can be reformatted and updated under PCS II/1130.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

- An IBM 8-disk 1131 with an IBM 2315 Disk Cartridge.
- An IBM 1442 Card Punch or an IBM 2501 Card Reader in conjunction with an IBM 1442 Card Punch.
- An IBM 1132 or 1403 Printer.

**SOFTWARE REQUIREMENTS**

PCS II/1130 is written in both 1130 FORTRAN and Assembler language and runs under the 1130 Disk Monitor System Version 2. While the program is designed to meet the needs of most users without modification, it is recognized that special individual requirements do arise. Therefore, the elements of the program written in FORTRAN include those that the user is most likely to modify to suit his own application.

**DOCUMENTATION**

(available from Mechanicsburg)

*Introduction to PCS II/1130 (GH20-0878).*

**TERMS and CONDITIONS:** See PP Index

## 1130 CONTINUOUS SYSTEM MODELING PROGRAM II 5711-XS1

### PURPOSE

The IBM 1130 Continuous System Modeling Program II (1130 CSMP II) provides a versatile means for digital simulation of continuous systems or processes. It uses a block-oriented input language familiar to engineers and scientists. By means of the console keyboard and output devices, 1130 CSMP II provides the user with an online interactive mode of operation while developing and testing continuous system models. The simplicity of the language statements and console procedures enables a user to become rapidly proficient with the program.

### DESCRIPTION

The 1130 CSMP II is based upon the earlier PACTOLUS program for the IBM 1620 and its adaptation, 1130 CSMP, for the 1130 Computing System. 1130 CSMP II permits even larger models, faster runs, and greater ease-of-use. It also uniquely combines Interpretive and Compiler modes of operation (both completely interactive) to provide a balance favoring flexibility during model development and execution speed for parametric studies after the model is perfected.

For many types of investigation, 1130 CSMP II obviates any requirement for an analog computer facility. Indeed, both the design and implementation of a simulation study are considerably simpler with this system than with an analog computer. There is a corresponding significant savings in project time and expense.

1130 CSMP II requires limited knowledge of computer programming or operation and limited proficiency with machine operating procedures. A limited knowledge of FORTRAN is required for the definition of Special elements; such knowledge is not required to use an element once defined.

This program is classified as a "digital analog simulator". It provides a complement of functional elements similar to those of the analog computer and a block-oriented language to specify their interconnection. Included in its complements of functional elements are all those common to analog simulation. Additionally, it includes a group of special elements for which the user may define the functional relationships, thus adapting the language to specific needs. Users develop the block diagram showing the interconnections of the elements required to implement their model. 1130 CSMP II permits models consisting of up to 99 blocks and up to five function generators. Since its elements are generally more versatile than their analog computer counterparts, the problem-solving capacity of the program approximates that of a medium size analog computer facility.

Although 1130 CSMP II was developed specifically for continuous simulation, it has the capability of addressing a broad scope of mathematical problems involving initial value differential equations.

### HIGHLIGHTS

- A block-oriented input language familiar to the engineering and scientific user.
- A library of 25 standard functional element types common to analog simulation.
- The ability to define special functional elements with characteristics pertinent to a particular field of study.
- Up to 99 functional elements including up to five function generators can be incorporated in each model.
- Input statements may be entered via punched cards as well as the console keyboard.
- Provisions for extensive online man-machine interaction during model development and model simulation, including the ability to interrupt a run, enter modifications and then proceed with the run from the point of interruption or initiate a new run.
- Instructional messages to guide user through model development and model simulation procedures in online mode.
- Diagnostic messages to facilitate online correction of errors.
- An Interpretive mode for flexibility during model development.
- A Compiler mode for faster runs after model configuration is perfected.
- Optional output of updated problem deck to facilitate simulation reruns.
- A print-plot of simulation results on console typewriter or high speed printer.
- A smooth-plot of simulation results on on-line plotter.

**1130 CSMP II Compared to 1130 CSMP:** 1130 CSMP II offers improved performance, extended capability, and simpler operation than its predecessor, 1130 CSMP. Specifically the new features include:

- Compiler mode for faster runs once the model configuration is completed. Runs are up to three times faster than in the Interpretive mode.

- 1130 CSMP II supports high speed line printers thereby significantly improving throughput speed over the console keyboard.
- The maximum number of functional elements which can be incorporated in a single model has been increased from 76 to 99, allowing the user to model larger problems.
- The maximum number of function generators which can be incorporated in a single model has been increased from three to five, thereby permitting the user to model more complex problems.
- The instructional and diagnostic messages have been significantly expanded and improved.
- 1130 CSMP II enables 1130 CSMP users to run existing models with little or no modification.

**Use:** Each functional element is identified by both a block diagram symbol and a language statement. After developing the block diagram, the user translates it into the corresponding set of 1130 CSMP II statements. A most important feature is the option of entering these language statements either by way of punched cards or directly from the console keyboard. When introducing a problem in the online mode, the users are provided with automatically typed instructions which guide them through the procedures.

During a run, users have the ability to interact with the model as directly and spontaneously as they would on an analog computer. This interaction is accomplished by means of the console switches and keyboard, again with the aid of typed instructions.

Model development is performed using 1130 CSMP II in its Interpretive mode. This permits flexibility in modifying the configuration of the model. When satisfied with the configuration, the user may elect to operate using the Compiler mode of 1130 CSMP II. In this mode all the previous options are available except that of further modification of configuration. Runs are up to three times faster, however, than in the Interpretive mode. This feature is of particular value with parameter studies requiring lengthy run sequences.

### CUSTOMER RESPONSIBILITIES

- A thorough understanding of the principles of continuous system modeling.
- Complete definition of system model.
- Data to be used as input to the model.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

An 8K disk IBM 1131 Central Processing Unit ... IBM 1442 Card Read Punch or 2501 Card Reader and IBM 1442 Model 5, 6, or 7 ... IBM 1132 Printer or 1403 Printer model 6 or 7. The IBM 1627 Plotter is optional but highly desirable for this type of online experimentation.

#### SOFTWARE REQUIREMENTS

IBM 1130 CSMP II operates under Version 2 of 1130 Disk Monitor System and uses FORTRAN IV source language.

#### DOCUMENTATION

(available from Mechanicsburg)

*Introduction to 1130 Continuous System Modeling Program II* (GH20-0848) ... *Block Diagramming Template* (GX20-1820) ... *Configuration Data Coding Form* (GX20-1824) ... *Initial Condition and Parameter Data Coding Form* (GX20-1825). ... *Function Generator Data Coding Form* (GX20-1826).

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**CUSTOMER INFORMATION SYSTEM  
APPLICATION DESIGN SERVICE  
5712-AAA with feature #9096**

**PURPOSE**

Customer Information System Application Design Service (CIS ADS) is a special installation service to support the marketing and the installation of the Customer Information System concept to public utility customers. This service provides utility customers with a standardized solution for the CIS application along with planning assistance that helps utility customers understand this solution. The service includes a description and planning guide ... design specifications ... planning assistance.

**DESCRIPTION**

**CIS Description and Planning Guide:** The first component of the CIS is the description and planning guide. This guide is available at no charge and provides public utility customers with broad information about the CIS application with an overview of the standardized solution.

It includes a definition of the CIS application and its subsystems, a description of the application requirements and topics that address economic and implementation considerations. The guide is designed to encourage utilities to investigate and evaluate CIS and to provide the basic information required to carry out a study of the application.

**CIS Design Specifications:** The second component of CIS is the design specifications.

The specifications provide public utility customers with a standardized, specific design for the Customer Information System. The specifications expand the application solution previously outlined in the description and planning guide. The guide provides a basic set of requirements that must be addressed by the CIS application; the specifications offer a design that satisfies this set of requirements.

The specifications provide a complete design solution for the most important elements of the Customer Information System. In doing this, the design includes a detailed description of how CIS performs its functions and specifies the overall system architecture, subsystem design, terminal displays, data base, programming techniques and implementation considerations.

This standardized design solution is tailored by the individual utility company for its own requirements before the subsystems are programmed. This is directed at reducing the time and effort normally expended in the implementation of these systems.

**CIS Planning Assistance (for base order only):** As part of CIS, utility customers are provided with five contiguous days of on-site assistance from a person who is knowledgeable in the standardized CIS solution described in the CIS specifications. The assistance helps customers understand their standardized solution as presented. This includes assistance in understanding the application documentation and its organization, reviewing the fundamentals of the application design and suggestions for establishing an implementation plan for the development of CIS.

**HIGHLIGHTS**

- Access of customer account information by account identifiers (account number, service address, customer name or meter number).
- Inquiry paging to access additional customer information.
- Fill-in-the-blanks technique for service order entry with operator guidance for required fields.
- Generalized editing modules to validate and have corrected all orders as they are entered.
- A file maintained for pending service orders and other customer activity with the ability to indicate on terminal displays that these orders exist, and modify and enter completion information for these orders.
- Process all service outage, priority or trouble calls and enter them into the system.
- Trouble order crisis status maintained and design provided for printing trouble orders when they are entered.
- Schedule orders by date, considering customer requirements and available manpower.
- Efficient method of assigning and dispatching field orders provided, and display summary of workloads by day, area or order type.
- Batches of cash and meter readings accepted and balanced, and transmitted to central processing location.
- Data base design for VSAM.
- 3270 displays for all five subsystems using dual intensity screen, protected data fields, readmodified data only, selector light-pen, program tab and large 1920 character screen.
- The capabilities of CICS used to provide file management support ... multi-tasking environment ... terminal management ... storage

management ... data management ... program management services ... time management.

- The design compatible with DOS/VS and OS/VS.

**Highlights of CIS ADS Feature:** The CIS feature includes the services described above for the base product and is expanded and enhanced to include:

- Addition of all design specifications required for a customer to develop and implement CIS using DL/I data base control rather than native VSAM. Major additions include DL/I data base design, module specifications and input/output specifications. See section on Customer Responsibilities, pertaining to Customer Accounting System (CAS) processing.
- Conversion of all CIS modules from CICS macros to the new CICS High Level Programming Interface (HLPI) command language.
- Update of design information regarding recovery/restart and scratch pad usage to take advantage of CICS/VS Version 1 Release 4.0. Paging design to allow multiple pages within a generalized inquiry page (subpaging).
- Display design changes to improve content and format recommendations.
- Paging design to provide a subpaging capability and to speed processing time of a generalized inquiry.
- CIS activity file record key changes to allow use of the account number and the order control number rather than the account number and the order sequence number.
- Redesign of the trouble order subsystem so that the crisis status can be maintained for multiple service areas rather than for the whole system.

**CUSTOMER RESPONSIBILITIES**

To implement the Customer Information System successfully, users must:

- Acquire knowledge and understanding of the design solution in the CIS ADS from the documentation and the on-site planning assistance.
- Tailor the data base and terminal formats to meet their requirements.
- Standardize service addresses and customer names to satisfy index to customer master file requirements.
- Tailor the subsystem modules to meet their requirements.
- Program test, and debug modules.
- Develop operator training manual and train terminal operator in the operation of the 3270 Display Station.
- Secure and generate CICS/VS and be knowledgeable in its operation and functional characteristics.
- If the feature is being used, secure and generate applicable DL/I data base facility and be knowledgeable in its operation and functional characteristics.

This feature assumes implementation based on periodically loading the CIS DL/I customer master data base and daily updating of this data base with changes which reflect the processing of the sequential batch Customer Accounting System (CAS), which is non-DL/I based.

Before using the CIS DL/I data base for batch CAS processing, customers must determine the applicability in their own specific environment of updating a DL/I data base in place for CAS.

- Be knowledgeable in the characteristics of the applicable operating system environment and its data management facilities, including the applicable access methods.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum machine requirement is an IBM S/370 processor operating with OS/VS1, OS/VS2 or DOS/VS. The applicable S/370 and partition or region size will vary from customer to customer depending on the functions included and the size of the terminal network.

DASD space is required for the customer master file, indexes, support files, the program libraries and the system control program requirements.

Also required is the 3270 Information Display System with appropriate control units (local or remote). The design assumes the use of a 1920 position display screen and 12 program function keys. The field order dispatching subsystem assumes the use of the selector light-pen.



PROGRAM PRODUCTS

**CIS/ADS (cont'd)**

**SOFTWARE REQUIREMENTS**

The CIS ADS feature #9096 is designed to work with either CICS/DOS/VS or CICS/OS/VS, Version 1 release 4, and all subsequent releases and modification levels, unless otherwise stated. The DOS/VS or OS/VS requirements are the same as those for CICS/VS. The CIS ADS support of CIS DL/I data bases is designed to work with CICS/VS. CICS/OS/VS provides access to the DL/I facilities of IMS/VS. CICS/DOS/VS application programs can access DL/I data bases by using the interface to DL/I DOS/VS. The CIS ADS may be programmed in any of the programming languages supported by CICS/VS. (See CICS/VS pages for details.)

**DOCUMENTATION:** (available from Mechanicsburg)

*Overview, Electric and Gas (GE20-0441) ... Description and Planning Guide, Electric and Gas (GE20-0424) ... Overview, Water (GE20-0520) Description and Planning Guide, Water Systems (GE20-0477) ... Application Briefs for Arkla Gas (GK20-1065), Stadtwerke Bielefeld (GE15-6101), Consolidated Edison (GK20-0754), and Union Electric (GK20-0769).*

**Customer Documentation Evaluation:** Customers may evaluate this service for one week at no charge.

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SYSTEM/38 BASIC  
5714-BA1****PURPOSE**

System/38 BASIC, which includes both an interpreter and a compiler, is a high-level interactive programming language for use in problem solving and commercial application areas. The language provides the ease-of-use characteristics associated with BASIC, while providing System/38 functions, such as the use of externally described files in programs, and a CALL statement to access programs written in other languages on the System/38.

**HIGHLIGHTS**

- Compile commands provided (one each in BASIC and System/38 Control Language) to compile BASIC source.
- Ability to CALL another program, such as a compiled BASIC, RPG III, COBOL, or CL program, from any BASIC program or procedure.
- Externally described files (data base, display, and printer) can be used in BASIC programs.
- BASIC command provided to list variables in an externally described file.
- Binary floating-point with the representations for Positive Infinity, Negative Infinity and Not-a-Number provided.
- Integer data type support.
- SYSTEM command, which allows access to authorized System/38 CL commands from within the BASIC session.
- Function provided in SEU to enter and syntax-check BASIC source.
- Extensive HELP facility.
- System/38 Debug function provided for on compiled BASIC program.
- Support for 40-character variable and label names.
- Following matrix operations supported:
  - Assignment (scalar, array)
  - Addition
  - Subtraction
  - Multiplication
  - Scalar multiplication
  - Setting of all elements to zero
  - Ascending and descending array sort
  - Setting of all elements to a constant
  - Creation of an array of index elements that specifies ascending or descending sequence of the data associated with each index element
- Default BASIC source file provided at installation.
- Support for 7-dimension arrays.
- Parameter on LISTP command provides cross-reference source listings.
- Support for System/38 data areas and local data areas.

**DESCRIPTION**

System/38 BASIC consists of an interpreter for interactively entering, debugging, and running BASIC source programs or procedures. Each line of code is syntax-checked upon entry. In the interpreter mode, program execution can be interrupted, variables examined and changed, and execution resumed. A compiler is provided for those applications which need the performance advantages of compiled code. Source for programs and procedures may also be entered through SEU, with each statement syntax-checked and saved in a source file for later execution or compilation.

A CALL statement is provided, which allows a call to a compiled BASIC program or programs written in other System/38 supported languages such as CL, RPG III, or COBOL. The CALL statement may be issued in interpretive or compiled BASIC programs. A CALL command allows a call to a compiled program from a BASIC procedure or from the interactive session display when in immediate execution mode.

Externally described files may be accessed by BASIC programs (either data base files, display files, or printer files). The files, defined using System/38 Data Description Specifications, may be created specifically for use by the BASIC program or may be a file also used by other languages. BASIC automatically appends a \$ to all character-defined field names of externally defined files. This allows files previously described for existing programs to be used by BASIC programs. Two BASIC commands, LISTFMT and LISTFMTP, are provided to allow the user to display or print the variables in an externally described file.

To execute authorized System/38 CL commands without having to terminate the BASIC session and enter System/38 command mode, the user may use the SYSTEM command. The SYSTEM command may be used in a BASIC procedure or from the interactive session display when in immediate execution mode.

The BASIC HELP facility provides a brief description and guide to proper syntax for commands, statements, and intrinsic functions in BASIC. HELP may be accessed by pressing the HELP key, using the HELP command, or pressing Command Key 4 (CF4). Pressing the HELP key or using the HELP command with no parameters presents the user with the primary HELP menu. If the cursor is placed on a statement or command when CF4 is pressed, the HELP text for that statement or command will be presented to the user.

A sorted cross-reference listing may be printed by using an option on the LISTP command. The list cross-references the line numbers, labels and variable names used in the program. The variable names obtained from an externally described file will be included. The listing can assist in program documentation and debugging.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, selecting and training personnel, installing System/38 licensed programs, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum configuration under which this program was designed to operate is:

- IBM 5381 System Unit (any model).
- One IBM 1920-character display from the IBM 5250 Information Display System.

**SOFTWARE REQUIREMENTS**

The IBM System/38 BASIC licensed program is designed to operate under the control of the IBM System/38 Control Program Facility (5714-SS1), Release 5.0.

*Program Use During Customer Pre-installation Testing:* IBM System/38 BASIC (5714-BA1) is available to customers for pre-installation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM System/38 BASIC Licensed Program Design Objectives* (GC21-9044).

**RPQs ACCEPTED: No**



PROGRAM PRODUCTS

**SYSTEM/38 COBOL  
5714-CB1**

**PURPOSE**

IBM System/38 COBOL, a licensed program, operates under the IBM System/38 Control Program Facility. The program consists of:

- Compiler
- Command for Invoking the Compiler
- Source File for COBOL Source Statements
- Compilation Message File
- Syntax Checker (for Source Entry Utility)

**HIGHLIGHTS**

System/38 COBOL provides high-level COBOL function, significant functional improvement beyond the System/3 COBOL, extensions for data base and workstation support, and enhanced programmer services.

**High-Level Function**

- ANS 74 Standard
- Functions in addition to those available with
  - System/3 COBOL
  - System/34 COBOL

**Extensions for Data Base and Work Station Support**

- Externally Defined Data and Display Device Definitions
- Data Base File Extensions
- Subfile Extensions
- Workstation Extensions
- Local/Remote Work Station Transparency

**Programmer Services**

- Enhanced Documentation
- Batch and Interactive Syntax Checking
- New Compiler Features

**High-Level Function**

- Industry Standards: IBM System/38 COBOL is designed according to the specifications of the following industry standards as understood and interpreted by IBM as of June 1980.
  - American National Standards (ANS) COBOL, X3.23-1974. ANS COBOL is identical to ISO 1989-COBOL, approved in February 1978 by the International Organization for Standardization. IBM System/38 provides the following ANS processing modules:

2 NUC 1,2	Nucleus
2 TBL 1,2	Table Handling Module
2 SEQ 1,2	Sequential I/O Module (Note 2)
2 REL 0,2	Relative I/O Module (Note 2)
2 INX 0,2	Indexed I/O Module (Notes 2 and 3)
2 SRT 0,2	Sort/Merge Module
2 SEG 0,2	Segmentation Module
2 LIB 0,2	Library Module
2 DEB 0,2	Debug Module
2 IPC 0,2	Interprogram Communication Module

**Notes:**

1. The first digit above represents the level of the modules included in the System/38 COBOL compiler; the second digit represents the lowest level specified for ANS COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the Standard.
2. The RERUN clause is treated as a comment.
3. System/38 does not support the ALTERNATE RECORD KEY clause.
  - December 1975 Federal Information Processing Standards (FIPS PUB 21-1), Low-Intermediate.
- Additions: In addition to the standard language, the following additional features are provided:
  - Optional use of apostrophes instead of quotes.
  - Extended data types of computational-3 (packed) and computational-4 (binary).
  - SET condition name to TRUE.
  - SET mnemonic name to ON/OFF.

The System/38 COBOL compiler provides the user with significant increase in function beyond the System/3 COBOL and some functions in addition to those available with System/34 COBOL.

**Enhancements beyond the System/3 COBOL include:**

- COBOL SORT/MERGE verbs are supported for multiple input files. More than one sort/merge is allowed in the same program.
- Nested IF statements are supported.
- ADD, SUBTRACT, and MOVE CORRESPONDING are supported. These operations allow a reduction in the number of instructions required to edit group items for printing or data conversion of group items.
- Support for abbreviated combined relations will allow users to code implied subjects and operands such that the following statement will be valid:  
IF A = B, OR C . . .
- Substring capability has been added so the user can use the verbs STRING and UNSTRING to combine or take apart fields respectively. These powerful instructions are useful in text processing.
- Table processing has been enhanced to support the ASCENDING/DSCENDING options and the SEARCH (sequential search) and the SEARCH ALL (binary search) functions.
- Variable length tables are also supported by the OCCURS DEPENDING ON option. This allows the user to restrict table searches to valid data only and thus save processing time.
- The INSPECT verb replaces the 1968 level EXAMINE. The function has been enhanced to allow use of multiple characters.
- File processing support has been expanded in the following areas:
  - Record DELETE option is supported.
  - Add to sequential files is supported via the OPEN EXTEND option.
  - START verb supports partial key values which will allow the user to do generic searches on indexed files.
  - Optional files allow the user to continue to run even if some of the files do not exist.
  - DYNAMIC ACCESS option allows a user to process the same file both sequentially and randomly without having to define the file more than once.
  - User can specify top and bottom margins for a printer file.
  - FILE STATUS function allows the user to interrogate the result of a file operation.
  - USE after STANDARD ERROR/EXCEPTION allows the user to combine error/exception logic in one section of the program.
- The level 88 value clause supports multiple values. The THROUGH option also allows users to do range checking easily.
- Multiple result fields in arithmetic statements are supported.
- The REMAINDER option of the DIVIDE is supported.
- The RENAME capability has been extended with:
  - Level 66 items
  - THROUGH option
- The edit character of '/' is allowed.
- The COPY function has been enhanced to support the REPLACING option. This will allow users to replace copied character strings, either entirely or partially, to fit the requirements of the source program.
- The 1974 debug module is supported. This gives the user a special group item called DEBUG-ITEM which can be processed at desired debug points in the program. This support also includes both compile and execution time switches for suppression of the debug function.

**Functions in addition to those available with System/34 COBOL include:**

- 96-column card support
- Diskette support
- Tape support
- Dynamic CALL and CANCEL function which permits improved flexibility in interprogram communication.
- USE FOR DEBUGGING on identifier or file name which extends the COBOL debugging capability.

System/38 COBOL is highly compatible with System/34 COBOL (5726-CB1, Release 5). For batch functions and most workstation functions, source changes are not necessary before compiling on the System/38.

System/38 COBOL permits a COBOL program to call or be called by a program written in System/38 CL, System/38 RPG III, or System/38 COBOL.

**Extensions Supporting Data Base and Work Station Processing**

**S/38 COBOL (cont'd)**

The System/38 COBOL programmer will be able to define data as done presently. Standard COBOL Environment and Data Division entries can be used to specify file identification, field definitions, and data structures. Clauses have been added to the Read, Write, Open, Rewrite, Delete, and Start verbs to support the System/38 data base and workstations.

The COBOL programmer is also provided with the following capabilities:

- Workstations may be programmed without regard to whether they are local or remote.
- System/38 COBOL provides the ability to utilize System DDS data base and display device definitions by translating them to COBOL source statements.
- The COBOL user may utilize previously announced System/38 SNA/SDLC or BSC files communications support by using CPF communication files.

**Programmer Services:** The following functions are available to the COBOL programmer:

- Enhanced documentation, including information such as data base relationship, file/field definitions, and program references (for example, data name cross-reference and verb usage list).
- Syntax checking of COBOL programs in either batch mode or interactively with the Source Entry Utility (SEU).
- FIPS (Federal Information Processing Standards) Flagger, which makes it possible to ensure that the level of COBOL language used in a particular programming department conforms to a particular 1975 FIPS level.

**RELEASE 5 ENHANCEMENTS**

System/38 COBOL is being enhanced in Release 5.0 to include support for CPF commitment control, local data area, and multiple devices in a file.

**Highlights**

- CPF Commit Support in COBOL
  - Additional verbs
  - Additional clause
- Multiple Device Support in COBOL
  - Additional verbs
  - Additional phrases
  - SPECIAL-NAMES addition
  - Extended file status
  - Supports mixed files
- CPF Local Data Area Support in COBOL
  - SPECIAL-NAMES addition
  - Additional phrases

**Description:** Definition of files under CPF commitment control and verbs to cause commitment or return to the prior commitment boundary are being added to COBOL to support CPF Commitment control. This support provides the programmer with greater flexibility in designing interactive applications and greater ease in backing out undesired changes.

Changes are being made to support multiple devices in a file. Provision is being made to ACQUIRE or DROP terminals or sessions, to ACCEPT attribute data of ACQUIRED terminals, and to add phrases to READ, WRITE and REWRITE statements when used with a TRANSACTION file. This support will provide functions similar to those provided by System/34. This multiple device support applies to CRT display and mixed files.

A local data area will be accessible from a COBOL program, by use of the ACCEPT and DISPLAY statements. This support will provide a function similar to that provided by System/34.

An extension is being implemented in System/38 COBOL which allows paragraphs in SORT/MERGE input and output sections to perform paragraphs in other sections and vice-versa. This is being implemented to provide additional compatibility with System/34 and System/370 COBOLs.

The COBOL user will benefit from a CPF improvement that will allow the use of elements of a table with CPF debug. The debug support will allow subscripted data names to be specified.

**Planning Information**

**Customer Education:** System/38 COBOL education is available as follows:

ANS '74 COBOL Language (self-study)	SBOF-0465
ANS '74 Programming (self-study)	SBOF-4526
ANS '74 Batch Workshop	D2085
S/38 COBOL Workshop	S2534

**Conversion Requirements:** Conversion requirements appear in the *S/38 Installation Manual - Conversion Planning* (GC21-7732).

**CUSTOMER RESPONSIBILITIES**

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/38 COBOL runs on all models of IBM System/38.

**SOFTWARE REQUIREMENTS**

IBM System/38 COBOL is designed to operate with the IBM System/38 CPF (5714-SS1).

**Program Use During Customer Preinstallation Testing:** System/38 COBOL (5714-CB1) is available to customers for preinstallation testing on IBM test center systems in accordance with IBM's program testing policy.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/38 COBOL Licensed Program Specifications* (GC21-7764) ... *IBM System/38 Concepts for the COBOL User* (GC21-7855).

The following documents are scheduled to be updated for Release 5 and available in June 1983:

*S/38 Guide to Publications, Glossary and Master Index* (GC21-7726) ... *S/38 Installation Manual - Conversion Planning* (GC21-7732) ... *S/38 Concepts for the COBOL User* (GC21-7855) ... *S/38 COBOL Reference Manual and Programmer's Guide* (SC21-7718) ... *S/38 Messages Guide: COBOL* (SC21-7781) ... *S/38 COBOL Reference Summary* (SC21-7781).

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SYSTEM/38 CONVERSION REFORMAT UTILITY  
5714-CV2****PURPOSE**

The IBM System/38 Conversion Reformat Utility licensed program is provided to assist the System/3 conversion by providing function similar to the System/3 Disk Sort Utility with the exception of summary sort. The Conversion Reformat Utility performs a variety of operations classified in the general categories of SORT, MERGE, and COPY. The utility is designed to operate upon data from either a data base or device file. Operations similar to SORT, MERGE, and COPY are also provided by the System/38 Data Base Data Management and COPY support.

**HIGHLIGHTS**

- The utility is capable of performing the following types of operations:
  - Sort a single physical data base file producing a record address file as output (similar to System/3 ADDRUT SORT).
  - Sort a single data base/device file producing a physical file as the output. In this case, the output file contains records and not record addresses (similar to System/3 tagalong sort).
  - Sort/Merge up two or more files producing a single data base physical file as output.
  - Copy, without sorting, records from one or more files producing a single data base physical file.
- The utility can be directed to accept all or selected records from the input file. Individual records to be included or omitted are recognized by:
  - Record code.
  - Relation of a field to a constant.
  - Relation of two fields within a record.
  - Any relationship in a series (ORing).
  - All relationships in a series (ANDing).
  - Multiples of the above tests in any combination.
- Control fields may be in different locations in records within the file, depending upon the function chosen.
- Specifications of record selection, parameters, and tagalong data fields is accomplished by filling in simple, RPG-like coding sheets.

The main difference between the System/38 Data Base and Copy support and the Conversion Reformat Utility is the manner in which file records are treated. Whereas, the data base and the copy support recognize the data descriptions associated with a file and operate upon the related data in accordance with that description; the conversion reformat utility does not. This utility recognizes file records strictly as a string of bytes (the length of which is determined by the file). This is true both of input to the utility and output from the utility. If a file has a detailed record format description associated with it, the Conversion Reformat Utility makes no attempt to assure requested operations are consistent with the description other than record length considerations. It is the user's responsibility to assure such consistency.

Any specific execution of the Reformat Utility is driven by a set of reformat specification statements. The reformat specification statements are similar to those used by the System/3 Disk Sort. The CL reformat specification statements are considered to be source statements and are treated accordingly by the System/38.

The set of statements to control a specific execution is identified to the utility via the Format Data (FMTDATA) CL command that is used to invoke the utility. Execution of the utility proceeds by interpreting the instructions given by the control statement set and performing the requested operations.

The output of the Reformat Utility is always a single data base physical file. In some cases, that file will contain nothing but record addresses and equates to a record address file. In other cases, the file will contain actual records. Which type of file is constructed by a specific execution of the utility is controlled by the utility statements used.

**Program Use During Customer Preinstallation Testing:** The System/38 Conversion Reformat Utility (5714-CV2) is available to customers for preinstallation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

**CUSTOMER RESPONSIBILITIES**

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

IBM System/38 Conversion Reformat Utility runs on all models of the IBM System/38.

**SOFTWARE REQUIREMENTS**

IBM System/38 Conversion Reformat Utility is designed to operate with the IBM System/38 CPF (5714-SS1).

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM System/38 Conversion Reformat Utility Licensed Program Design Objectives (GC21-7779).*

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SYSTEM/34 TO SYSTEM/38 CONVERSION AID  
5714-CV5**

**PURPOSE**

The System/34 to System/38 Conversion Aid (5714-CV5) is designed to assist a System/34 customer in migrating to the System/38. Executing on a System/34 and a System 38, this aid converts System/34 RPG and Auto Report source code, OCL, displays, sorts, menus, and data files, which can then be processed on a System/38. In addition, programs that substitute for System/34 functions are provided for the System/38.

**HIGHLIGHTS**

- User menu prompting for ease-of-use.
- Prints converted code listings. Unconvertible statements found by the conversion aid are flagged, and error messages are listed.
- Prints conversion control log on demand for auditing purposes.
- Converts the following:

System/34		System/38
RPG II	-	RPG III
Auto Report	-	Auto Report
Operation Control Language	-	Control Language
Display Format Specifications	-	Data Description Specifications
Sorts	-	Reformat Utility
Menus	-	Data Description Specifications, Control Language
Message Member	-	Message File
Data Files	-	Data Files

- Generates the following System/34 functions on the System/38 through programming:
  - RPG II SUBR21 - Access to display station Local Data Area (LDA)
  - RPG II SUBR23 - Message Member Retrieval (Single Level)
- Unloads converted source code from the System/34 to diskette.
- Loads diskettes containing the converted source code to the System/38.
- Provides for parameter substitution into converted Sort Specifications on System/38.
- Provides menu for compiling on System/38.
- Generates field or record level data description specifications for converted files.
- Unloads data files to diskette and provides System/38 control language to load files on the System/38.

**DESCRIPTION**

The Conversion Aid (5714-CV5) is designed to help a System/34 customer in converting programming source code and data files to a System/38. Programs are provided for tasks to be done on the System/34 and on the System/38. These programs are menu oriented in that the user makes selections which then generate jobs to be executed in a batch mode. These functions are stated in the "Highlights" section.

Two System/34 functions accessing the Local Display Area (LDA) and Message Member retrieval, do not exist on the System/38 and are provided on the System/38 by Control Language procedures.

The product *Reference Guide/Runbook* will provide the detailed information necessary to use this conversion tool effectively. However, a comprehensive conversion plan for each customer is strongly recommended to assure a smooth transition from the System/34 to the System/38.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum configurations for IBM System/34 and System/38 are intended to define the licensing requirement necessary for the customer to obtain IBM Program Services for this product. Although there is nothing inherent in the design of this product that prevents the use of the minimum system configurations, the configuration for a particular customer must be able to accommodate the expected program libraries, data files and operating requirements. The amount of disk storage required is affected by:

- Amount of space used by the installed applications
- Amount of source code to be converted in each conversion session
- Amount of space required for the converted source code in each conversion session

System/34 minimum configuration for this conversion aid is:

- IBM 5340 System mdl B22 (48K, Diskette 2D Drive, 13.2MB disk)
- One IBM 5211 Line Printer, mdl 1 (160 lpm)
- One IBM 5251 mdl 11 Display Station (1920-character)

IBM System/38 minimum configuration required is the size needed to compile and execute the user's application. The conversion aid programs to replace IBM System/34 function execute on an IBM System/38 of the following configuration, (or larger):

- IBM 5381 Processing Unit mdl 322 (512K, diskette magazine drive, 128MB disk)
- One IBM 5211 Line Printer, mdl 2 (300 lpm)
- One IBM 5251 mdl 11 Display Station (1920-character)

**SOFTWARE REQUIREMENTS**

**System/34:** This product is written in IBM System/34 RPG II programming language and executes under control of the IBM System/34 System Support Program (5726-SS1), Release 9 or later. It requires 24K of user area, and spooling with user access support must be active.

The IBM System/34 Utilities (5726-UT1) must be available to use the sort program. IBM System/34 RPG II (5726-RG1) must be available. (It is recommended that SEU be installed for use in modifying the user converted source.)

**System/38:** This product is written in the IBM System/38 RPG III programming language and executes under control of the IBM System/38 Control Program Facility (5714-SS1) Release 5.0 or later. Spooling with user access support must be active. The IBM System/38 Conversion Rformat Utility (5714-CV2) must be ordered for use with the system. The IBM System/38 RPG III Compiler (5714-RG1) must also be available. Optionally, the IBM System/38 Interactive Data Base Utilities (IDU) (5714-UT1) with SEU should be installed if the user plans on making any online changes to source code.

**DOCUMENTATION**

(available from Mechanicsburg)

*Design Objectives* (GH30-0455)

**RPQs ACCEPTED:** No

**SYSTEM/3 CCP TO SYSTEM/38 CONVERSION AID  
5714-CV7**

No longer available effective March, 1983.

**PURPOSE**

The IBM System/3 CCP to IBM System/38 Conversion Aid helps IBM System/3 models 8, 10 disk, 12, and 15 users convert their CCP programs to run on the IBM System/38. The Conversion Aid will reduce the time required to make a number of the repetitive and time consuming changes to the source code and to identify where user decisions and/or changes are necessary.

The IBM System/3 CCP to System/38 Conversion Aid assists the user in converting System/3 RPG II CCP programs to System/38 RPG III programs using native System/38 syntax. It assists in converting source Display Format Facility (DFF) statements to source Data Description Specifications (DDS) for display files. CCP Sort program specifications are converted to System/38 Reformat Utility specifications.

Separate RPG III programs, called 'driver' programs, are generated by the Conversion Aid. These 'driver' programs implement the CCP command screen and the CCP PRUF-like technique. The programs are converted one-for-one with each converted program performing the same function as its CCP counterpart. Thus, the converted CCP applications maintain the workstation user's view of the application.

The Conversion Aid programs are written in System/3 RPG II and distributed in source form. They may be compiled and executed on System/3 mdls 8, 10 disk, 12, and 15. The conversion functions handled by the Conversion Aid are:

- Analysis of the user's assignment set, DFF formats, RPG II CCP programs, and CCP Disk Sort programs.
- Listing of items that require additional information to allow conversion. Some items cannot be converted by the Aid and are flagged for action by the user.
- Conversion of DFF statements to Data Definition Specifications (DDS) for display files. Workstation printer formats are not converted.
- Conversion of RPG II CCP source programs to native System/38 RPG III source programs on a one-for-one basis.
- Generation of separate 'driver' programs to implement the CCP command screen and the PRUF-like environment on System/38.
- Conversion of System/3 CCP sort program specifications to System/38 Reformat Utility Specifications.
- Generation of record level DDS for data base files.

The Conversion Aid is executed in easy-to-manage procedures. These procedures are designed to provide breakpoints that allow the conversion process to be divided into logical portions. User involvement is required to control the conversion process and provide additional information to the Aid. The steps are:

1. The CCP Conversion Aid is loaded into a System/3 and the programs are compiled. Procedures are provided to tailor the programs to the user's environment prior to compilation.
2. Work files are sized and CCP Conversion Aid-provided OCL procedures are tailored to the user's environment.
3. Work files are created and initialized. The assignment set is scanned and analyzed. DFF, RPG II CCP programs, and CCP Disk Sort program specifications are copied into the work files.
4. The DFF is scanned and analyzed. 3270 display field/format information is consolidated to be used later in RPG II program scan and analysis.
5. RPG II CCP source programs are scanned and analyzed. The user is requested to supply additional information to the Aid for conversion.
6. CCP Disk Sort program specifications are scanned and analyzed. DFF source statements are converted to DDS Disk source statements, and RPG II source statements are converted to RPG III source statements. 'Driver' programs are generated.
7. CCP Disk Sort program specifications are converted and Control Language (CL) programs to execute the Reformat Utility are generated. Converted sorts are offloaded to offload media.
8. DDS, RPG III source, and Control Language job streams for compiling on the System/38, are offloaded to the offload media.

Some CCP programs converted by the Aid will require additional modifications to compile and execute on the System/38.

Corrections may be necessary during conversion, or the user may want to alter the conversion output. A comprehensive maintenance procedure is provided to allow the user to resolve and correct RPG II statements needing attention prior to moving to the System/38.

**CUSTOMER RESPONSIBILITIES**

Installation of IBM licensed programs is a customer responsibility. IBM may provide marketing assistance in accordance with Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/3 CCP to System/38 Conversion Aid runs in a 40K byte partition on IBM System/3 mdls 8, 10 disk, 12, or 15. A minimum of 5 million bytes of online disk storage is required for use by the Conversion Aid.

**SOFTWARE REQUIREMENTS**

The IBM System/3 CCP to System/38 Conversion Aid operates under the control of the current version of SCP for IBM System/3 mdls 8, 10 disk, 12, or 15. The Conversion Aid also requires the use of the IBM System/3 RPG II compiler and Disk Sort.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/3 Communications Control Program (CCP) to System/38 Conversion Aid Licensed Program Specification (GC21-7772).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/38 DISTRIBUTION MANAGEMENT SYSTEM  
(DMS/38) CUSTOMER SERVICE  
WITH PURCHASING APPLICATIONS**

BILLING ... 5714-D41  
ACCOUNTS RECEIVABLE ... 5714-D42  
INVENTORY CONTROL ... 5714-D43  
SALES ANALYSIS ... 5714-D44  
PURCHASING ... 5714-D45

**PURPOSE**

The IBM Distribution Management System for the System/38 (DMS/38) offers a practical approach to information processing for the distributor. The DMS/38 Customer Service and Purchasing licensed programs are functionally based on the programs of the IBM Distribution Management Accounting System (DMAS II) Release 2, which is designed to run on the IBM System/34. These applications have been enhanced to take advantage of the advanced capabilities of integrated data base of the IBM System/38.

DMS/38 consists of a workstation-oriented set of applications which access a data base designed especially for distribution activities, using up-to-date accounting practices and management controls.

The Distribution Management System for the System/38 includes the following applications:

- Customer Service Applications
  - Billing
  - Accounts Receivable
  - Inventory Control
  - Sales Analysis
  - Purchasing
- IMPROVE (Inventory Management, Product Replenishment, and Order Validity Evaluation)
- Financial Applications
  - General Ledger
  - Accounts Payable
  - Payroll

With DMS/38, the emphasis is on availability of up-to-the-minute information, accuracy of input data, and quick turnaround of processing results.

To accomplish these objectives, DMS/38 Customer Service and Purchasing programs use the advanced capabilities and integrated data base facilities of the System/38, to form an application system designed to provide information when and where it is needed.

**HIGHLIGHTS**

- DMS/38 Customer Service and Purchasing provides for data entry in an interactive mode from display stations. The screen displays guide the operators through data entry operations in a logical sequence.
- Workstation data entry is designed for simplicity and operator efficiency. All functions of the display screen are designed to help the operators perform their tasks as quickly, easily, and accurately as possible. System-detected errors are signalled, and descriptive data is displayed to aid in visual verification. Most errors are corrected interactively.
- Multiple interactive display stations may operate concurrently on different jobs. While customer order entry is being done on some workstations, others might be entering receipts against purchase orders, while still others can cash receipts to Accounts Receivable. During these operations, other jobs can be running in the background.
- Modifications are made easier by utilizing the System/38 programming productivity features. Use of the integrated data base facilities by the Customer Service and Purchasing application programs will ease the implementation of functional additions and cosmetic changes.
- DMS/38 Customer Service and Purchasing application programs use the System/38 Control Program Facility for data base, message handling, and SPOOL.
- Comprehensive search and inquiry facilities offer displays of key data for customers, items, and status of customer orders and purchase orders.
- Each application may be installed separately or in conjunction with the others.
- Auditability and control information is provided to help ensure system integrity.
- Application options may be selected at install time, run time, or by overriding standard data during data entry.
- To accommodate larger data requirements, certain field sizes have been increased from those in DMAS II.

- Comprehensive backup, recovery, and restart functions are provided to maximize system availability.
- An Online Information System is provided, which allows the operators to access operating instructions, data field descriptions, and additional information messages without leaving the application flow.

**System Management**

- Provides for phased activation of applications and application functions.
- Allows user to change default values used by the programs (such as tax rates) without reprogramming, in order to keep operations current with changing needs.

**File Loading and Maintenance**

- Accepts and edits master file information interactively from any workstation.
- Provides programs to add, update, or delete data base records.
- Can print lists of all customers, salespersons, vendors and items stored in the system.
- Helps protect against the deliberate or accidental alteration of any sensitive data stored in the system.
- Can load data from diskettes prepared offline.
- Provides audit documentation of changes made to the data base.
- Provides programs to convert DMAS II data files to DMS/38 files.

**DESCRIPTION****DMS/38 BILLING (5714-D41)**

When other Customer Service applications are installed, DMS/38 Billing becomes the primary source of customer and inventory activity information.

Interactive order entry accommodates multiple operators working concurrently. Information can be entered for multiple companies with control and audit information maintained separately for each company. The workstation operator can enter order information, verify it on the display screen, and make corrections and changes to the order before it is used for further processing.

**Billing**

- Retrieves customer names, addresses and other information from the data base
- Selects prices
- Applies discounts, markups, and taxes
- Performs any necessary pricing conversions
- Calculates extensions
- Prints invoices that reflect all customer charges
- Prints an Invoice Register that shows summary information for all invoices printed during a given period

**Features**

- Multiple-company processing
- Alpha search and inquiry into customer information
- Choice of prebilling or postbilling methods
- Interactive entry, edit, and correction of customer orders
- Online allocation of item quantities (if Inventory Control is installed)
- Online addition of new customers
- Credit limit checking and credit hold procedures to help keep customers within assigned limits (if Accounts Receivable is installed)
- Price checking during order entry
- Flexible pricing structure
  - Contract prices selected by contract and item number
  - Prices automatically selected or manually keyed as overrides
  - Quantity-break discounts
  - Discount of markup prices calculated for any item with percentages automatically selected or manually keyed as overrides
- Item substitution under operator control
- Up to 99 taxing jurisdictions
- Multiple ship-to addresses for each customer

**DMS/38 (cont'd)**

- Accumulation of tax, discount and sales amounts for DMS/38 General Ledger
- Automatic backorder processing
- Order acknowledgments and picking lists
- Cash and C.O.D. sales tracking
- Order status inquiry
- Pricing inquiry by customer
- Cost and profit information calculated

**DMS/38 ACCOUNTS RECEIVABLE (5714-D42)**

DMS/38 Accounts Receivable accepts transactions from the Billing module and applies charges to customer accounts. It also provides credit limit status information to the Billing operation to help determine if credit should be extended. Transactions against customer accounts will immediately update an 'amount-in-process' value for each customer, providing current information as needed.

Invoice summary information (totals) can be entered directly into Accounts Receivable customer records, which is especially useful for invoices created outside of the DMS/38 Billing module. The invoice summary and payment information is accumulated and can be used as input to update DMS/38 General Ledger.

**Features**

- Multiple company processing
- Two Accounts Receivable aging cycles that can be user-established and selected for each customer
- Balance forward and open item accounting
- Four aging periods (plus current) and future aging
- Alpha search and inquiry into customer records
- Interactive entry, edit, and correction of customer payments, adjustments, and charges
- Immediate update of customer 'amounts-in-process' to support credit limit checking
- Late charges calculated automatically for all selected customers
- Inquiry into the Accounts Receivable detail data base
- Aged Receivables report on demand
- Delinquency notices printed on demand
- Multiple statements for multiple-location companies
- Data accessible by DMS/38 General Ledger

**DMS/38 INVENTORY CONTROL (5714-D43)**

Inventory Control keeps track of item quantities that are on hand, on order from vendors, and allocated to customer orders. As items are sold or received, and quantities are adjusted, their status is automatically updated so that the latest information is available to the Billing and Purchasing applications (if installed). Item costs are also updated, as well as the date of the last transaction.

The Inventory Control module maintains information about the inventory items, including many exception conditions that could exist, such as abnormally low stock levels, unusual item cost entries, and so forth. This information can assist with replenishment inventory ordering, helping to maximize sales and customer service, while at the same time minimizing unnecessary and special ordering and handling. This module also provides the controls and auditing features needed to monitor activity on a major asset ... inventory.

**Features**

- Multiple-company processing
- Multiple warehouse support within each company
- Alpha search and inquiry by item
- Interactive entry, edit, and correction of inventory transactions
- Online update of quantity available
- Item costing with average cost, last cost, and a user-defined cost
- With Billing, item demand information is accumulated for use by forecasting programs (such as DMS/38 IMPROVE)
- With Purchasing, on-order quantities and receipts will be automatically reflected in the item status
- Item price inquiry capability
- Handling of broken case quantities
- Automated group price maintenance
- Physical inventory aids

**DMS/38 SALES ANALYSIS (5714-D44)**

When integrated with other Customer Service applications, DMS/38 Sales Analysis provides sales, cost, profit amount, and profit percent information for management analysis. Using summaries of sales transactions, and customer and item information, the Sales Analysis reports help to assess profitability on goods sold. In addition, graphic comparative sales analysis displays are available that will show sales, profit, and quantity sold for items, and numbers of orders for customers. Graphs and tables showing percentage comparisons of these items for current month, previous month, this month last year, average of the last 12 months, and current and last year-to-date can be displayed.

Sales Analysis information is more easily obtained when the module is installed after the other DMS/38 Customer Service modules. When installed first, data entry facilities must be provided by the user.

**Features**

- Customer and item sales statistics
- Profit amount and percent (based on sales or cost); reported by customer, item, item within item class, item class within customer within salesperson, and salesperson
- Salesperson productivity measured
- Trend chart displays

**DMS/38 PURCHASING (5714-D45)**

Purchasing provides the major functions needed by most distributors to enter, generate and track purchase orders. When orders are received, Purchasing can speed the check-in and stock processes, making the new inventory received available to fill customer orders as soon as the receipt is entered into the system. Facilities are also provided to ease the reconciliation of vendor invoices for payment. Accounts Payable input information can then be generated as part of the approval cycle, reducing the keying activity related to that application.

When installed along with DMS/38 Inventory Control, Purchasing becomes part of an integrated set of application products that can significantly improve the efficiency and accuracy of purchasing and inventory operations. The Purchasing application can be installed without the DMS/38 Inventory Control module; however, some inquiry and stock status function, which requires the Inventory Control files, will not be available.

If installed with IMPROVE, Purchasing can use the IMPROVE suggested order output as input to the purchase order generation functions. Purchasing can also provide order lead time information needed by the lead time forecasting functions of IMPROVE.

**Features**

- User can browse through a vendor line, and mark items that need ordering, then produce a purchase order
- Purchase orders can also be entered interactively through multiple workstations
- Operator-entered messages can be associated with purchase orders and the items on order, and then directed to specific functional areas
- Multiple-company support
- Multiple-warehouse support
- Orders can be selected for printing either individually or in groups
- Inquiry facilities are provided to review individual purchase orders
- Item inquiry is provided that produces a summary of all active orders that contain a specific item
- Expected Receipts reports can help plan receiving and warehouse activities
- Interactive receiving of full and partial shipments against the purchase orders
- Interactive reconciliation of the vendor's invoice to the purchase order
- Accounts Payable input records can be automatically generated during the reconciliation and approval operation
- Operational reports: Purchase Orders, Expected Shipments Report, Receiving List, Vendor and Item Purchasing Report, and the closing reports
- Control reports: Daily Purchase Order Reconciliation and Alteration Report, Receiving Report, and the Items Ordered/Received Report

**CUSTOMER RESPONSIBILITIES**

Installation of System/38 application programs is a customer responsibility. IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing



## PROGRAM PRODUCTS

**DMS/38 (cont'd)**

accurate ordering information, personnel selection and training, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration for the DMS/38 Customer Service and Purchasing applications are:

- IBM System/38 with 768K bytes of main storage and 128 MB of disk storage.
- One IBM line printer.
- One IBM 5251 display station with 1920-character display screen.

Although there is nothing inherent in the design of DMS/38 to prevent use of the minimum system configuration stated above, the configuration for a particular customer must be able to accommodate the expected business volumes, data base size, and operating requirements ... including the mix and type of applications that will be used.

The amount of disk storage required is influenced by many things, including:

- The number of applications installed
- The volume of daily transactions
- The number of item, vendor item, customer, and ship-to and vendor records
- The number of open customer orders, vendor orders and unpaid invoices
- The number of contract items and items with quantity discounts

Additionally, a main storage capacity greater than the stated minimum will often provide improved performance. For example, performance can be affected by:

- The number of DMS/38 application tasks operating concurrently,
- The number of workstations operating concurrently on the same applications, and
- Any other applications operating concurrently.

**SOFTWARE REQUIREMENTS**

The application programs are written in IBM System/38 RPG III programming language and executed under control of the IBM System/38 Control Program Facility (5714-SS1). The IBM System/38 RPG III Compiler (5714-RG1) is required if modifications to the application programs are planned.

**Education****Operators self-study**

An operator's self-study course will be provided to assist in preparing for the operation of the application. This course provides operator instruction online to the system using a data base and instructions supplied with the course.

**General Information Manuals**

*Customer Service Applications* (GH30-0130) ... *Purchasing* (GH30-0710) ... *Financial Applications* (GH30-0710) ... *IMPROVE* (GH30-0080).

**DOCUMENTATION**

(available from Mechanicsburg)

**IBM System/38 Distribution Management System - Customer Service and Purchasing: User's Guides**

The following manuals provide detailed information about DMS/38 Customer Service and Purchasing applications, guidelines for implementation, and instructions for operation of the products.

*DMS/38 Customer Service with Purchasing System User's Guide* (SH30-0613) ... *DMS/38 Billing User's Guide* (SH30-0615) ... *DMS/38 Accounts Receivable User's Guide* (SH30-0619) ... *DMS/38 Inventory Control User's Guide* (SH30-0617) ... *DMS/38 Sales Analysis User's Guide* (SH30-0621).

**Logic Manuals**

The following logic manuals contain detailed information about program design and logic flow. This information may be used as detailed reference during installation, modification, and error diagnosis.

*DMS/38 Customer Service with Purchasing System Logic Manual* (LH30-0614) ... *DMS/38 Billing Logic Manual* (LH30-0616) ... *DMS/38 Accounts Receivable Logic Manual* (LH30-0620) ... *DMS/38 Inventory Control Logic Manual* (LH30-0618) ... *DMS/38 Sales Analysis Logic Manual* (LH30-0622).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/38 DISTRIBUTION MANAGEMENT SYSTEM -  
INVENTORY MANAGEMENT,  
PRODUCT REPLENISHMENT,  
AND ORDER VALIDITY EVALUATION  
DMS/38 - IMPROVE (5714-D46)****PURPOSE**

Increasing costs, larger capital requirements, more demanding customers, and tougher competition are among the many challenges facing businesses today. If your customers have inventory to manage, they are probably facing problems which call for a set of proven techniques to help improve the management and control of this important investment.

IMPROVE is designed to help your customers meet these challenges. It provides a tool to assist them in ordering the right items, in the correct quantities, at the proper frequencies, and at the optimum time.

IMPROVE is an online, interactive, inventory management and purchasing tool for the customer who has an inventory that requires regular replenishment. It provides the user with the capabilities to measure, monitor and control the inventory and its financial performance, from a display station.

It has features that can help many areas of the business, including: Purchasing, warehousing, marketing, financial and top management. The benefits of enhanced inventory management can include:

- Lower inventory investment
- Reduced inventory operating costs
- Improved customer service
- More profitable inventory/purchasing strategies
- Improved buyer efficiency

**HIGHLIGHTS**

- Forecast demands and lead time for each item based on past performance and user anticipated conditions, such as: Seasonality, promotions, and trends.
- Analyzes various order frequencies to help determine the cost and overall policy for each vendor.
- Calculates order points and suggested order quantities in accordance with rules established by your customer's buyers and top management.
- Takes into account discounts, vendor order criteria, freight rate breaks, and other savings opportunities when calculating orders.
- Provides exception reporting according to your customer's rules for out-of-line conditions.
- Generates timely ranking reports to aid management in identifying potential profits and problems with both items and vendors.
- Provides an evaluation of the actual inventory performance compared with the optimum levels established by the user.
- Assists in evaluating special vendor offers and planned promotions for items by displaying key data such as cash flow, revenue, stock on hand, inventory cost, and expected profit.
- Provides the user the ability to simulate 'what if' conditions with the system, by allowing the temporary change of control, vendor, or item information, then run IMPROVE to test the effects of these changes.
- Online Information System (OLIS) provides HELPTTEXT when using IMPROVE. HELPTTEXT, relevant to the operation you are performing, can be obtained by pressing the HELP key. The system retrieves the associated HELPTTEXT. After reading the HELPTTEXT provided for the operation in progress, you can return to the interrupted operation immediately, or you can review any other HELPTTEXT for IMPROVE. IMPROVE HELPTTEXT contains operating information, command key descriptions and message expansions.
- Installation/Maintenance Support Facility (IMSF): An aid in installing and maintaining the IMPROVE.

**CUSTOMER RESPONSIBILITIES**

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration for IMPROVE is an IBM System/38 with:

Mdl 332 Processor with:

768K Main Storage  
128MB Disk Storage  
System Printer  
5251 mdl 11 Display Station

Although there is nothing inherent in the design of the IMPROVE application which prevents the use of the minimum system configuration stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size, and operating requirements, including the mix and types of applications.

**SOFTWARE REQUIREMENTS**

The application program is written in System/38 RPG III (5714-RG1) programming language and executed under control of the System/38 Control Program Facility (CPF) program (5714-SS1). The System/38 RPG III Compiler is required if modifications to the source code are desired.

**DOCUMENTATION**  
(available from Mechanicsburg)

*User's Guide* (SH30-0582)

Contains descriptions of all application operations typically performed by buyers. It also contains technical information and describes the data that the application uses.

*Logic Manual* (LH30-0583)

Provides the technical detail of the application. It contains such things as logic and flow, program descriptions, and data descriptions used primarily by programmers to maintain the system.

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**SYSTEM/38 DISTRIBUTION MANAGEMENT SYSTEM  
FINANCIAL APPLICATIONS (DMS/38)**

GENERAL LEDGER ... 5714-D47  
ACCOUNTS PAYABLE ... 5714-D48  
PAYROLL ... 5714-D49

**PURPOSE**

The IBM System/38 Distribution Management System (DMS/38) Financial Applications provide an integrated and comprehensive workstation-oriented financial control system for the small-to-large size distributor. The Accounts Payable, General Ledger, and Payroll applications are part of the Distribution Management System, providing computer applications to key areas of the distribution process.

**HIGHLIGHTS**

- The System/38 hardware and software functions of the Control Program Facility are integral parts of the DMS/38 application design.
- Workstation data entry is designed for simplicity and ease-of-use. Screen displays provide guidance for mandatory input or fields that may be overridden. Error messages signal errors which are then corrected interactively by the operator.
- Provides interactive data entry, edit and correction for multiple applications concurrently, and multiple terminals for an application while batch programs may operate in the background.
- Inquiry into master files may be reviewed concurrently with data entry.
- Online file maintenance of all master files provided with optional file maintenance reports.
- Each application may be installed separately.
- System tailoring procedures permit the user to select optional functions and reports. Functions may be modified as the customer environment changes by re-executing the tailoring procedures.
- Source code, ready-to-execute procedures, and object code are provided. Although no additional system design, programming, or compiling is required, the system design incorporates features to assist the user in the modification of source code.
- File load programs for master files are provided.
- Password security deters unauthorized use of terminals, applications, and functions within applications. A second level of security protects selected master file data.
- Optional system procedures for master file backup and restart.
- Documentation for each application includes a *User's Guide* and a *Logic Manual*. From an overall DMS/38 Financial Applications perspective, a *User's Guide* and a *Logic Manual* are also provided. Self-study instructional materials are also available for operator education.
- Sample documents are provided for both data collection and data entry.
- Control features and documents are included to assist in establishing audit trails.
- File load programs for master files are provided as well as file conversion programs from System/34 DFAS II to System/38 format.

**DESCRIPTION**

The Distribution Management System Financial Applications offerings are three independent, yet interrelated, ready-to-execute applications for the small-to-medium distributor:

General Ledger  
Accounts Payable  
Payroll

These applications are designed for marketing in any combination and installation in any sequence.

Each application has certain required records within a cross-application control file which contain questionnaire responses. These records allow the application to select report formats and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered or modified. It provides the following:

- Tailors the application on-site at installation time.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- All functions are included in the application programs, but only required functions are executed.

One systems-level *User's Guide* is provided for the DMS/38 Financial Applications covering all three applications. This *User's Guide* provides an explanation of the system to enable the user to understand the

application from a functional and operational standpoint. Installation guidance is included in this manual and provides detailed instructions on procedures to follow during installation. These instructions include sample numbering systems, sample input and maintenance of data forms, file loading sequences, and control forms with suggested procedures. This manual also gives guidance to the supervisor on managing and running the applications from a total systems viewpoint. For the system console operator, operation guidance is provided containing detailed instructions for the application procedures, an overview of the system and application flow, system considerations, hints for trouble shooting, and all of the error messages that can be generated by any of the applications.

Individual application *User's Guides* for each application provide reference information and instruct the user department manager on how to conduct day-to-day operations of the application. In addition, guidance for the workstation operator is provided and includes a summary of the application and workstation operations, application and screen flow, application messages, and a detailed description of how to run each procedure associated with the application.

Logic manuals are provided, as licensed material, for use by the self-sufficient customer and for the systems engineer. A system-level Logic Manual for maintaining and modifying DMS/38 - Payroll, Accounts Payable and General Ledger is available. Information on system architecture, naming conventions, system controls, system program functions and specifications, relationships among system files, and other information applicable to all applications is presented. In addition, logic manuals for maintaining and modifying each application are available. Information relevant only to the application, such as program descriptions, cross-reference lists, data dictionary, etc., is presented.

Two self-study instructional packages will be provided for the system and workstation operators. The objective of this material is to familiarize the operators with the tasks required to run the applications. They are designed around the operating guides and provide instructions and exercises in the use of the guides.

**GENERAL LEDGER (5714-D47)**

The DMS/38 - General Ledger application is the focal point of all accounting entries and integrates completely with DMS/38 - Accounts Payable and DMS/38 - Payroll. Though integrated, it can be installed apart from the other applications. Since a large number of ledger entries result from the distribution of expenses incurred through Accounts Payable, a majority of General Ledger users will likely install Accounts Payable.

Each transaction entered is assigned a journal number and a line number within that journal. This journal reference number is kept with the transaction until it is posted to the master record during period-end closing. Transactions coming from other interfacing applications also use this reference numbering scheme. This makes auditability easier throughout the application. Thorough editing of all data at entry time plus the fact that a double-entry bookkeeping system is used ensures that all credit entries are offset by an equal value of debit entries and provides for smooth period closings. Diskettes can be used for processing recurring entries. The application gives the user support for up to 20 companies and a choice of either a 12-month or 13-period fiscal year. The general ledger listing displays (by account number) transaction original journal reference number providing a clear and easily used audit trail of all transactions.

The balance sheet and income statement can be formatted to the user's particular requirements by use of a format file which permits special spacing, user-specified columnar printing, user-specified totaling, and up to 73 accounts to be totaled and printed with one line of description. By exploiting the capabilities of the format file, the user can produce departmentalized and/or combined (not consolidated) statements for multiple companies. Both the balance sheet and income statement can be comparative to last year and the income statement can also be comparative to budget figures.

**ACCOUNTS PAYABLE (5714-D48)**

The DMS/38 - Accounts Payable application keeps accurate and detailed records of vendor invoices and credit memos from the time they are entered into the system until they are paid and the check reconciled. Although it can be installed on a standalone basis, it will be frequently used with the DMS/38 - General Ledger to which it can distribute the dollar amounts spent against the proper account numbers while printing the purchase journal and the cash disbursements journal.

Transaction auditing is aided by a journal referencing scheme which causes every transaction affecting the DMS/38 - General Ledger to refer to a particular journal and line number within that journal. A double-entry bookkeeping method keeps transactions in balance.

Procedures for handling manual checks, petty cash, and check reversals are provided as well as online invoice entry and payment selection which includes partial payments, selection by date, and selection by vendor and invoice. Credit memos can be automatically generated,

## PROGRAM PRODUCTS

**DMS/38 Financial Applications (cont'd)**

allowing the user to reverse a previously entered invoice without having to rekey all the invoice's indicative information and distribution.

Support is provided for up to 20 companies. Key reports include a new aged payables report, two vendor analysis reports, plus normal accounts payable audit trails such as purchase journal, cash requirements reports, and cash disbursement journal. When checks are printed, options are available to make the checks payable to 'assignees' (due to factoring by the vendor) and to print remittance advice 'overflow' data on a separate remittance advice form.

**PAYROLL (5714-D49)**

The DMS/38 - Payroll application starts with the basic employee time record as input and handles the calculation of wages, taxes, deductions, checkwriting and file updating for both salaried and hourly pay plans. The Payroll can interface with the DMS/38 - General Ledger application. Transactions may be passed to the DMS/38 - General Ledger during the printing of the payroll distribution journal.

Current payroll data is entered from time cards or job reports either daily or weekly and is edited to validate employee and job information. A user with an incentive payroll must manually calculate gross pay and then enter it into the system. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined. Deduction programs compute voluntary deductions for a specific pay period as well as one-time and union deductions. All necessary reports are furnished including payroll register, deduction reports, checks, Federal 941-A reports, and W-2 reports.

Support for up to 20 companies, a manual payoff check procedure, and the ability to handle an employee working in multiple states, counties, cities, unions, jobs or shifts on the same day are provided to give the user wide flexibility. Labor distribution of payroll hours and dollars is done in the same detail as the basic employee time record, that is, department, work center, job number, operation.

Several other reports are printed:

- Vacation, holiday and sick pay register
- Year-to-date and quarter-to-date earnings register
- State and local tax register
- Workmen's compensation worksheets
- Check reconciliation register
- Union deduction register
- Paychecks (with option to print employee address)
- Federal Government reports, 941-A, W-2 (and associated registers)

**CUSTOMER RESPONSIBILITIES**

Installation of System/38 application programs is a customer responsibility.

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified environment:

**HARDWARE REQUIREMENTS**

Each of these licensed programs will execute on all models of the IBM System/38 with a minimum of:

- 768K of main storage
- 128 megabytes of auxiliary storage
- One line printer
- One IBM 5251 Display Station with a 1920-character display screen.

The DMS/38 financial applications are intended to be an independent yet interrelated set of applications. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Design features have been incorporated into the applications to allow for co-residency of other applications and/or user-written programs with minimum restrictions. Consult the logic manual for further explanation of these restrictions.

**SOFTWARE REQUIREMENTS**

The IBM System/38 licensed programs are written in IBM System/38 RPG III Programming Language and executed under control of the IBM System/38 Control Program Facility (5714-SS1). The IBM System/38 Conversion Format Utility (5714-CV2) must be ordered for use with the system. The IBM System/38 RPG III Compiler (5714-RG1) is required if modifications to the source code are desired.

**DOCUMENTATION**  
(available from Mechanicsburg)

... L Runbook (SB30-0477) ... Diskettes (SV30-0262) ... *Licensed Program Specifications: ... DMS/38 - General Ledger (GH30-0478) ... DMS/38 - Accounts Payable (GH30-0479) ... DMS/38 - Payroll (GH30-0480).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/38 MANUFACTURING ACCOUNTING AND PRODUCTION INFORMATION CONTROL SYSTEM (SYSTEM/38 MAPICS)**

PRODUCTION CONTROL AND COSTING ... 5714-M41  
 PAYROLL ... 5714-M42  
 ACCOUNTS PAYABLE ... 5714-M43  
 ACCOUNTS RECEIVABLE ... 5714-M44  
 INVENTORY MANAGEMENT ... 5714-M45  
 PRODUCT DATA MANAGEMENT ... 5714-M46  
 GENERAL LEDGER ... 5714-M47  
 SALES ANALYSIS ... 5714-M48  
 ORDER ENTRY AND INVOICING ... 5714-M49  
 DATA COLLECTION SYSTEM SUPPORT ... 5714-M4A  
 MATERIAL REQUIREMENTS PLANNING ... 5714-M4B  
 CAPACITY REQUIREMENTS PLANNING ... 5714-M4G

**PURPOSE**

The IBM System/38 Manufacturing Accounting and Production Information Control System (System/38 MAPICS) is based on System/34 MAPICS and is enhanced by utilizing the advanced systems and programming facilities of the System/38. It provides an integrated and comprehensive workstation-oriented accounting, financial, and manufacturing control system for the manufacturing industry and some of the like process industries. The Accounts Payable, General Ledger, and Payroll applications are designed to meet the needs of both the manufacturer and the distributor.

**HIGHLIGHTS**

- The System/38 hardware and system software functions of the Control Program Facility are integral parts of the System/38 MAPICS application design. System/38 MAPICS manufacturing applications also take advantage of the chain file processing techniques employed in System/34 MAPICS to provide for functional compatibility and ease-of-conversion.
- Workstation data entry is designed for simplicity and ease-of-use. Screen displays provide guidance for mandatory input and for fields that may be overridden. Error messages signal errors which can then be corrected interactively by the operator.
- Interactive data entry, concurrent edit and correction for multiple applications and multiple workstations is provided while batch programs operate in the background.
- Inquiry into master files concurrent with data entry.
- System tailoring procedures permit the user to select optional functions and reports. Selections may be modified as the customer environment changes by re-executing the tailoring procedures.
- Source code, ready-to-execute procedures, and object code are provided. Although no additional systems design, programming, or compiling is required, the system design incorporates features to assist the user in the modification of source code.
- Online file maintenance of most master files with file maintenance reports.
- Optional system procedures for master file backup and restart.
- Password security deters unauthorized use of applications, and functions within applications. A second level of security protects selected master file data.
- File load programs for master files are provided, as well as file conversion programs from IBM System/34 MAPICS, System/3 IPICS and System/3 DCSS files to System/38 format.
- Documentation for each application includes a reference manual, a run book and a logic manual. An overall System/38 MAPICS system reference manual, an installation guide, a run book and a logic manual are provided. Self-study instructional material is also available for operator education.
- Sample documents are provided for both data collection and data entry.
- Control features and documents are included to assist in establishing audit trails.

**DESCRIPTION**

System/38 MAPICS is a set of twelve independent, but interrelated, ready-to-execute applications for the small-to-large manufacturer consisting of:

Order Processing and Accounting Applications  
 Order Entry and Invoicing  
 Inventory Management  
 Accounts Receivable  
 Sales Analysis

Financial Applications  
 General Ledger  
 Accounts Payable  
 Payroll

Manufacturing Applications  
 Product Data Management  
 Material Requirements Planning  
 Production Control and Costing  
 Capacity Requirements Planning

Data Collection  
 Data Collection System Support

These applications are designed for marketing in any combination and installing in any sequence, with the following exceptions:

- Sales Analysis requires at least one of the other order processing and accounting applications.
- Material Requirements Planning requires both Inventory Management and Product Data Management.
- Production Control and Costing requires the Inventory Management application. (Although Product Data Management is not an absolute requirement, its use is highly recommended.)
- Capacity Requirements Planning requires the Inventory Management application and either Product Data Management or Production Control and Costing.

Each application has certain required records within a cross-application control file which contain questionnaire responses. These records allow the selection of report formats and functions to suit the user's needs. The questionnaire responses are entered during initial installation and may be changed as needed. The System Tailoring Procedures allow these responses to be entered or modified. It provides the following:

- Tailors the application on-site at installation time.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- All functions are included in the application programs but only required functions are actually executed.

Reference manuals provide an explanation of the system to enable the user to understand the applications from a functional and operational standpoint. Installation guidance is included in this manual and provides detailed instructions on procedures to follow during installation. These instructions include sample numbering systems, sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. One reference manual is provided for System/38 MAPICS covering all twelve applications. This manual gives guidance to the supervisor on managing and running the applications from a total systems viewpoint. Individual reference manuals for each application instruct the user department manager on how to conduct day-to-day operations of the application.

Similarly, one operations guide is provided for the systems console operator and individual application operation guides for the workstation operators. The system operations guide contains detailed instructions for operating System/38 MAPICS at the console. Included are an overview of the system and application flow, system considerations, hints on troubleshooting, and all of the error messages that can be generated by any of the applications in the offering. The individual application operations guides provide a summary of the application and workstation operations, application and display flow, application messages, and a detailed description of how to run each procedure in the application.

The System/38 MAPICS logic manual is provided as licensed material for the use by the self-sufficient customer, and for the Systems Engineer in maintaining and modifying System/38 MAPICS. Information on system architecture, naming conventions, system controls, system program functions and specifications, relationship among system files, and other information applicable to all applications is presented in this system manual. In addition, logic manuals for maintaining and modifying each application are available. Information relevant only to the subject application, such as program descriptions, cross-reference lists, and data dictionary, is presented.

Two self-study instructional packages will be provided for the console and workstation operators. The objective of this material is to familiarize the operators with the tasks required to run the applications. They are designed around the operations guides and provide instructions and exercises in the use of the guides.

Modular Application and Systems Training (MAST) is available to help identify and quantify benefits for top executives. MAST aids your customer in planning an effective implementation and includes techniques to assure top priority and the commitment of all the necessary resources. To assist in determining Management function and fit, there is a MAPICS features course for all MAPICS applications. In addition, for Inventory Management, Product Data Management, and Production Control and Costing, there will be concepts, implementation and 'using the system' courses to make the customer more self-sufficient and reduce the effort and time required to install these applications.

**S/38 MAPICS (cont'd)****PRODUCTION CONTROL AND COSTING (5714-M41)**

The Production Control and Costing application provides for shop packet creation and for the tracking and costing of an ordered item as it is manufactured; it also measures work center utilization and efficiency plus queue analysis and control functions, similar to the IPICS FDPs. The application also creates, maintains, and updates the operation and miscellaneous charge information associated with jobs within the user's shop. It requires the installation of Inventory Management and has optional interfaces with Accounts Payable, Payroll, and Product Data Management as well as accepting data from Data Collection System Support (Product Data Management is highly recommended). Open operation information may also be passed on to Capacity Requirements Planning.

This application uses information which Inventory Management creates and maintains in conjunction with its own information to produce all necessary reports to track and cost an order. In addition, it produces a prioritized worklist by work center to assist production control in moving work through the shop in the most efficient manner.

The capability of accepting transactions via the workstation and/or diskette is provided in order to support Data Collection System Support diskette output. The transactions passed via the Data Collection System Support interface are labor, moves, and machine times. The labor transaction depends on the user's request of a Payroll interface. If the Payroll interface has been requested, the labor transactions are passed through payroll to Production Control and Costing.

Additional functions include inquiry of order status, item status, and work center status, as well as report printing of order status and open order exceptions.

IBM System/38 MAPICS Production Control and Costing requires the use of the MAPICS Inventory Management (5714-M45) application.

**PAYROLL (5714-M42)**

The Payroll application starts with the basic employee time record as input, and handles the calculation of wages, taxes, deductions, checkwriting, and file updating for both salaried and hourly pay plans. Employee time data may be entered from a workstation or can be passed from the Data Collection System Support application. Payroll can interface with both the General Ledger and Production Control and Costing applications. Transactions may be passed to General Ledger on either a cash or accrual basis during printing of the payroll distribution journal. Relative to MMAS, the accrued procedures have been modified to precisely relate pay periods to accounting periods. Job-related data for both hourly and salaried employees can be passed to the Production Control and Costing application.

Current payroll data is entered from time cards or job reports either daily or weekly, and is edited to validate employee and job information. A user with an incentive payroll must manually calculate gross pay and then enter it into the system. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are entered. Deduction programs compute voluntary deductions for a specific pay period as well as one-time and union deductions. All necessary reports are furnished including payroll register, deduction reports, checks, Federal 941-A reports, and W-2 reports.

Support for up to 20 companies, a manual payroll check procedure, and the ability to handle an employee working in multiple states, counties, cities, unions, jobs, or shifts on the same day are provided to give the user wide flexibility. Labor distribution of payroll hours and dollars is done in the same detail as the basic employee time record; that is, department, work center, job number, operation.

Several other reports are printed:

- Vacation, holiday, and sick pay register
- Year-to-date and quarter-to-date earnings register
- State and local tax register
- Check reconciliation register
- Workmen's compensation worksheet
- Union deduction register
- Paychecks (with option to print employee address)
- Federal Government reports 941-A, W-2 (and associated registers)

**ACCOUNTS PAYABLE (5714-M43)**

The Accounts Payable application keeps accurate and detailed records of vendor invoices and credit memos from the time they are entered into the system until they are paid and the check reconciled. Although Accounts Payable can be installed on a standalone basis, it is frequently used with the General Ledger application to which it can distribute the dollar amounts spent against the proper account numbers. There

also exists an interface to Production Control and Costing by which Accounts Payable can pass job-related purchase information.

Transaction auditing is aided by a journal referencing scheme which causes every transaction affecting General Ledger to refer to a particular journal and line number within that journal. A double-entry bookkeeping method keeps transactions in balance.

Procedures for handling manual checks, petty cash, and check reversals are provided as well as online selection of invoices for payment selection, including partial payments, selection by date, and selection by vendor and invoice. Credit memos can be automatically generated, allowing the user to reverse a previously entered invoice without having to rekey all the invoice's indicative information and distribution.

Support is provided for up to 20 companies. Key reports include an aged payables report, two vendor analysis reports, plus normal accounts payable audit trails such as purchase journal, cash requirements reports, and cash disbursements journal. When checks are printed, options are available to make the checks payable to 'assignees' (due to factoring by the vendor) and to print remittance advice 'overflow' data on a separate remittance advice form.

**ACCOUNTS RECEIVABLE (5714-M44)**

The Accounts Receivable application keeps detailed records of customer charges, cash payments, credit and debit memos, and other adjusting entries from the time they are entered into the system until they are paid or otherwise applied. The application allows for a combination of open item and balance forward handling of individual customer accounts. Interfaces with Order Entry and Invoicing, Sales Analysis, and General Ledger are provided.

Invoices and credit memos can be entered directly and/or received from the Order Entry and Invoicing application. Cash receipts and adjustments are entered into the system directly, update the accounts receivable immediately, and generate general ledger transactions. The application provides optional late charges by customer for both open items and balance forward accounting and support for up to 20 companies.

The user can generate account status reports as required, for a single customer or a group of customers as well as an aged trial balance in any of the following forms:

- Summary or detail
- Past due accounts only
- Delinquent accounts only
- Minimum balance
- Aging based on current status
- Aging based on date of next statement

Additionally, statements and delinquency notices can be printed at user-determined frequency. The following features are provided:

- Option to age unapplied cash/adjustment.
- Ability to identify credit memo by a unique number, but still relate the credit memo back to a specific invoice number.
- Ability to apply cash, without knowing specific invoice numbers.
- Ability for invoices to be considered current at a future time period (future aging).

**INVENTORY MANAGEMENT (5714-M45)**

The Inventory Management application processes all transactions affecting the status of the inventory balances. It is a central application which can interface with Order Entry and Invoicing, Sales Analysis, Product Data Management, and Data Collection System Support applications. Inventory Management is a prerequisite for installing Material Requirements Planning, Production Control and Costing, or Capacity Requirements Planning.

The basic functions of this application provide the 'in's and out's' of inventory accounting plus the ability to cycle count the physical inventory. The reporting functions include calculating current inventory investment and the annual inventory turns as well as valuation techniques for tax reporting. And finally, you have the ability to release purchase and manufacturing orders and track their progress until each order is closed out.

The application provides for inventory valuation based on average, last, or standard costs as well as LIFO and FIFO options. Physical inventory checklists can be generated for multiple or selected warehouses, with or without cycle count options. In addition to printing a stock transaction register for audit control, a stock status report can be printed for all items or on an exception basis, and a stock status review can be had by item or by item within vendor.

A component's 'availability check' is performed during the release phase, and items and orders with shortages are identified on special exception reports. At order release time, component allocation for manufacturing orders can be done to ensure that component inventory needs are accounted for between order release time and the actual withdrawal from stock.

**S/38 MAPICS (cont'd)**

Transactions can be entered from diskette or workstations. Transactions entered from diskette go through a batch edit and batch update. Transactions entered through a workstation are edited immediately, and can update balances either immediately, or later (based on a System Tailoring Option). In either case, an audit trail of all transactions is produced.

**PRODUCT DATA MANAGEMENT (5714-M46)**

The Product Data Management application maintains bills of material, product options, routing, and work center data bases and provides for costed retrievals and cost simulation. In interfacing with Inventory Management, Order Entry and Invoicing, Material Requirements Planning, Capacity Requirements Planning, and Production Control and Costing, this application is an information point for bills of material and routings.

The ability to perform inquiry into the product structure and routing files is provided. Application highlights include the capability for multiple screen displays, mass replace, mass delete, and same-as-except functions which facilitate maintenance to the product structure file. In addition to option handling techniques, use of engineering effectivity dates simplifies engineering change control procedures. Labor and overhead rate tables can be used for costing in lieu of routing and work center files.

Several reports can be printed:

- Listings of item master, products and their associated features and options and work center master
- Retrievals of product structures and routings
- Cost reports including management cost summary and cost variations

**GENERAL LEDGER (5714-M47)**

The General Ledger application is the terminal point of all accounting entries; it integrates completely with Accounts Payable and Payroll and accepts cash receipts and adjustment entries from Accounts Receivable. Though it can be installed apart from the other applications, a larger number of ledger entries result from the distribution of expenses incurred through Accounts Payable. Therefore, a majority of General Ledger users will likely install Accounts Payable and/or Payroll.

Each transaction entered is assigned a journal number and a unique line number within that journal. This journal reference number is kept with the transaction until it is posted to the master record during period-end closing. Transactions coming from other interfacing applications also use this reference numbering scheme. This makes auditability easier throughout the application. Thorough editing of all data at entry time plus the fact that a double-entry bookkeeping system is used ensures that all credit entries are offset by an equal value of debit entries, and provides for smooth period closings. Diskettes can be used for processing recurring entries. The application gives the user support for up to 20 companies and a choice of either a 12-month or 13-period fiscal year. The general ledger listing displays (by account number) the transaction original journal reference number, providing a clear and easily used audit trail of all transactions.

The balance sheet and income statement can be formatted to the user's particular requirements by use of a format file which permits special spacing, user-specified columnar printing, user-specified totaling, and up to 73 accounts to be totaled and printed with one line of description. By exploiting the capabilities of the format file, the user can produce departmentalized and/or combined (not consolidated) statements for multiple companies. Both the balance sheet and income statement can be comparative to last year and the income statement can also be comparative to budget figures.

**SALES ANALYSIS (5714-M48)**

The Sales Analysis application consolidates all sales and credit memo transactions affecting customers, salespersons, and items that have been entered into the system. Input can come from Order Entry and Invoicing, Inventory Management, or Accounts Receivable; at least one of these applications must be installed as a prerequisite.

Data is passed to Sales Analysis via interface files as shown:

Customer-related data can come from	Salesperson-related data can come from	Item-related data can come from
OE & I A/R	OE & I A/R	OE & I IM

In addition to these interfaces, Order Entry and Invoicing can provide customers order data for detailed analysis if the user desires. Either 12-month or 13-period reporting can be selected by the user. These transactions are posted to summary files which provide a historical data base for management reports. Summary files may also be corrected by file maintenance with an entry list providing an audit control.

The application provides multicompny support for up to 20 companies for customer summary analysis, for flagging specific items for inclusion in sales analysis, and for inquiry into the summary files from the

workstation. The reports included in the application are sales by customer, salesperson, and item, with the option to display comparative data as well.

The System/38 MAPICS Sales Analysis application requires the use of at least one of the following MAPICS applications:

- Order Entry and Invoicing (5714-M49)
- Accounts Receivable (5714-M44)
- Inventory Management (5714-M45)

**ORDER ENTRY AND INVOICING (5714-M49)**

The order entry function is a key starting point for activity in a manufacturing organization. For make-to-order products, this function describes the item to be manufactured and when the item is required. For products shipped from inventory, it streamlines the order processing so items can be shipped promptly. It interfaces with Inventory Management by directly updating quantity-on-hand data, with Accounts Receivable by providing invoice summary information, and with Sales Analysis by providing item, customer and salesperson data. The data stored in the open order files can also be analyzed by Material Requirements Planning and Capacity Requirements Planning.

As orders are entered, customer data is validated and a credit check is performed, initial ship dates may be established based on inventory availability or manufacturing orders, and item pricing data is checked for validity and completeness. A blanket order specifies a single item with multiple ship dates and specific quantities. Both order types may be entered in a similar manner. Invoicing may be accomplished by either direct entry or from orders previously entered into the system. Invoicing encompasses the computation of prices, taxes, and invoice totals. Pricing can be based on established contract prices, quantity breaks, markup from cost, or discounting from list price. Order acknowledgments, picking lists, invoices, and bills of lading, can be printed.

If Product Data Management is installed, orders can be entered for end items which have standard options associated with them. Since these options may be required, they are checked at entry time to make sure all required options are specified.

As soon as the Open Order files have been updated, the user has immediate access to current information such as:

- All orders for a particular item
- All orders for a particular customer
- Details for a particular order
- Blanket order status
- Customer status

The application also handles credit memo printing and the posting of back orders to the open order files. Support for up to 20 companies is provided as well as the generation of worksheets for general ledger input, commission accounting and taxing body reporting.

**DATA COLLECTION SYSTEM SUPPORT (5714-M4A)**

The Data Collection System Support application provides an interface between a 5230 Data Collection System and the Payroll, Inventory Management and Production Control and Costing applications. Inventory and labor transactions can be entered at conveniently located terminals, so information can be entered as it occurs, thereby eliminating many manual steps before this data can be processed on the System/38. Therefore, it provides a link between shop floor reporting and the System/38 MAPICS applications and an integrated labor reporting payroll production control system.

The Data Collection System Support application allows the definition of unique shop floor actions which are suited to individual customer requirements. The output from this definition phase is used by the 5231 Contoller. Data from the 5230 is recorded on diskettes or cards which can be carried to the System/38. Elapsed time is then calculated (based on user options regarding shift start/stop times, lunch breaks, and other paid/unpaid breaks) and prepared for payroll processing as attendance records or job records. The application will also apportion the employee's time if that employee has worked on overlapping jobs.

The application produces attendance, absentee and labor reports, which provide a complete audit trail. Labor transactions may also be entered on the 5251 Display Station, as well as 5230 stations, to utilize the elapsed time calculations for payroll processing prior to installing a 5230 system.

**MATERIAL REQUIREMENTS PLANNING (5714-M4B)**

The Material Requirements Planning application is divided into three parts: Master Production Schedule Planning (MPSP), Material Requirements Planning (MRP), and Order Release Planning (ORP). This application interfaces with and requires installation of Inventory Management and Product Data Management. It also interfaces with Order Entry and Invoicing to the extent that it can compare a master production schedule against customer orders. Firm planned and planned orders can be passed to Capacity Requirements Planning.

## S/38 MAPICS (cont'd)

MPSP determines the production schedule for master-level items (designated by a code in the item master record). Master level requirements can be compared to forecast and/or customer orders to evaluate the manufacturing plan. Typically, planning requirements for master level items is an interactive process. This process is simplified by various reports and workstation inquiries. The Material Requirements Planning reports include requirements planning, purchase planning, order recommendation, and cash analysis reports. A shortage report can be generated in the order release cycle if the user chooses to do an availability check. In addition, order release/review and requirements by item inquiries are supported.

Material Requirements Planning will take the approved output of MPSP and generate a total material plan to meet this schedule. This new plan can either be rebuilt (generation) or it can consist of differences from a previous plan (net change). Order recommendations produced from MRP become input to order release. The planner can review changes and approve orders scheduled for release.

System/38 MAPICS Material Requirements Planning requires the use of both the MAPICS Inventory Management (5714-M45) and MAPICS Product Data Management (5714-M46) applications.

### CAPACITY REQUIREMENTS PLANNING (5714-M4G)

The Capacity Requirements Planning Application is designed to analyze a company's production plan in terms of its plant capacity. This is a very useful tool for a company that wishes to identify those work centers and time periods when over or underload conditions may be expected to develop. The application allows the production manager to meet the short term over or underload condition by entering a temporary increase or decrease in work center capacity for a specified time period in the future.

Medium term analysis using the capacity planning run can help a company distinguish between scheduling problems and capacity problems that require changes to the base capacity of a work center.

The production plan used by the application is based on capacity requirements from several sources: Open orders, firm planned orders, planned orders, and under some restrictions, customer orders. Accurate start dates and operation durations are imperative for each manufacturing operation whether these operations come from Production Control and Costing or from Product Data Management's standard routings.

When the production plan and plant capacity have both been defined, capacity planning is ready to schedule and accumulate the workload by user-defined time periods. This process will produce analysis files for workstation inquiry or report printing and may be repeated to help users tune their plant capacity to the current production plan.

Capacity Requirements Planning is a dependent application. It requires orders (customer, open, firm planned and/or planned) and specifications (routing and/or open operations). The minimum requirement to support Capacity Requirements Planning is:

Inventory Management (5714-M45) and Product Data Management (5714-M46)

or

Inventory Management (5714-M45) and Production Control and Costing (5714-M41).

### CUSTOMER RESPONSIBILITIES

Installation of System/38 application programs is a customer responsibility. IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, and continued day-to-day operation lies solely with the customer.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for these licensed programs when they are operated in the following specified environment:

#### HARDWARE REQUIREMENTS

Each of these licensed programs will execute on all models of the IBM System/38 with a minimum of:

- 768K bytes of main memory
- 128 megabytes of auxiliary storage
- One line printer
- One IBM 5251 display station with a 1920-character display screen

The minimum system configuration stated above is intended to define the licensing requirements for these licensing programs in order for the customer to obtain Program Services. The minimum configuration is intended to define the System/38 requirements for a single application customer environment.

Although there is nothing inherent in the design of the IBM System/38 MAPICS applications which prevents the use of the minimum system

configurations stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data files, and operating requirements.

The amount of disk storage required is influenced by the:

- Number of applications installed
- Volume of daily transactions
- Number of records in the required master files

Additionally, a main storage capacity greater than the stated minimum required will often provide improved performance. For example, performance is affected by:

- Number of applications operating concurrently
- Number of workstations operating concurrently within the same or different applications

System/38 MAPICS is intended to be an independent yet interrelated set of applications. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Design features have been incorporated into the IBM System/38 MAPICS applications to allow for co-residency of other applications and/or user-written programs with minimum restrictions. Consult the IBM System/38 MAPICS logic manual for further explanation of these restrictions.

### SOFTWARE REQUIREMENTS

The IBM System/38 MAPICS application programs are written in System/38 RPG III programming language and executed under control of the IBM System/38 System Control Facility (5714-SS1). The IBM System/38 Conversion Format Utility (5714-CV2) must be ordered for use with the system. The IBM System/38 RPG III Compiler (5714-RG1) is required if modifications to the source code are desired.

The IBM System/38 MAPICS Material Requirements Planning, Capacity Requirements Planning, Production Control and Costing, and Sales Analysis applications require the use of other MAPICS applications as prerequisites. Refer to the descriptions of these four MAPICS applications for the specific requirements.

### DOCUMENTATION (available from Mechanicsburg)

*Application Guides: ... Ordering Processing and Accounting Applications (G580-0229) ... Financial Applications (G580-0231) ... Manufacturing Applications (G580-0228) ... Distributed Data Processing (G580-0230) ... General Information Manuals: ... Order Processing and Accounting Applications (GH30-0708) ... Financial Applications (GH30-0710) ... Manufacturing Applications (GH30-0709).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/38 MANUFACTURING ACCOUNTING AND  
PRODUCTION INFORMATION CONTROL SYSTEM  
(SYSTEM/38 MAPICS)  
SPANISH LANGUAGE VERSION**

**MATERIAL REQUIREMENTS PLANNING ... 5714-MSB  
CAPACITY REQUIREMENTS PLANNING ... 5714-MSG  
PRODUCTION CONTROL AND COSTING ... 5714-MS1  
INVENTORY MANAGEMENT ... 5714-MS5  
PRODUCT DATA MANAGEMENT ... 5714-MS6  
ORDER ENTRY AND INVOICING ... 5714-MS9**

**PURPOSE**

The IBM System/38 Manufacturing Accounting and Production Information Control System (System/38 MAPICS) is based on System/34 MAPICS and is enhanced by utilizing the advanced systems and programming facilities of the System/38. It provides an integrated and comprehensive workstation-oriented manufacturing control system for the manufacturing industry and some of the like process industries.

**Note:** These programs have been written primarily to U.S. requirements, but in many cases they also satisfy AFE and EMEA country requirements.

**HIGHLIGHTS**

- The System/38 hardware and system software functions of the Control Program Facility are integral parts of the System/38 MAPICS application design.
- Workstation data entry is designed for simplicity and ease-of-use. Screen displays provide guidance for mandatory input and for fields that may be overridden. Error messages signal errors which can then be corrected interactively by the operator.
- Interactive data entry, concurrent edit and correction for multiple applications and multiple workstations is provided while batch programs operate in the background.
- Inquiry into master files concurrent with data entry.
- System tailoring procedures permit the user to select optional functions and reports. Selections may be modified as the customer environment changes by re-executing the tailoring procedures.
- Source code, ready-to-execute procedures, and object code are provided. Although no additional systems design, programming, or compiling is required, the systems design incorporates features to assist the user in the modification of source code.
- Online file maintenance of most master files with file maintenance reports.
- Optional system procedures for master file backup and restart.
- Password security deters unauthorized use of applications, and functions within applications. A second level of security protects selected master file data.
- File load programs for master files are provided.
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- Sample documents are provided for both data collection and data entry.
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**DESCRIPTION**

System/38 MAPICS is a set of six independent, but interrelated, ready-to-execute applications for the small-to-medium manufacturer consisting of:

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Inventory Management

Manufacturing Applications  
Product Data Management  
Material Requirements Planning  
Production Control and Costing  
Capacity Requirements Planning

These applications are designed for marketing in any combination and installing in any sequence, with the following exceptions:

- Material Requirements Planning requires both Inventory Management and Product Data Management.
- Production Control and Costing requires the Inventory Management application. (Although Product Data Management is not an absolute requirement, its use is highly recommended.)

- Capacity Requirements Planning requires the Inventory Management application and either Product Data Management or Production Control and Costing.

Each application has certain required records within a cross-application control file which contain questionnaire responses. These records allow the selection of report formats and functions to suit the user's needs. The questionnaire responses are entered during initial installation and may be changed as needed. The System Tailoring Procedures allow these responses to be entered or modified. It provides the following:

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Similarly, one operations guide is provided for the systems console operator and individual application operation guides for the workstation operators. The console operations guide contains detailed step-by-step instructions for operating System/38 MAPICS at the console. Included are an overview of the system and application flow, system considerations, hints on troubleshooting, and all of the error messages that can be generated by any of the applications in the offering. The individual application operation guides provide a summary of the application and workstation operations, application and screen flow, application messages, and a detailed description of how to run each procedure in the application.

The System/38 MAPICS logic manual is provided as licensed material for use by the self-sufficient customer, and for the Systems Engineer in maintaining and modifying System/38 MAPICS. Information on system architecture, naming conventions, system controls, system program functions and specifications, relationship among system files, and other information applicable to all applications is presented in this system manual. In addition, logic manuals for maintaining and modifying each application are available. Information relevant only to the subject application, such as program descriptions, cross-reference lists, and data dictionary, is presented.

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**MATERIAL REQUIREMENTS PLANNING (5714-MSB)**

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**S/38 MAPICS Spanish Language Version (cont'd)**

planning, order recommendation, and cash analysis reports. A shortage report can be generated in the order release cycle if the user chooses to do an availability check. In addition, order release/review and requirements by item inquiries are supported.

Material Requirements Planning will take the approved output of MPSP and generate a total material plan to meet this schedule. This new plan can either be rebuilt (generation) or it can consist of differences from a previous plan (net change). Order recommendations produced from MRP become input to order release. The planner can review changes and approve orders scheduled for release.

**CAPACITY REQUIREMENTS PLANNING (5714-MSG)**

Capacity Requirements Planning is designed to analyze a company's production plan in terms of its plant capacity. This is a very useful tool for a company that wishes to identify those work centers and time periods when over or underload conditions may be expected to develop. The application allows the production manager to meet the short term over or underload condition by entering a temporary increase or decrease in work center capacity for a specified time period in the future.

Medium term analysis using the capacity planning run can help a company distinguish between scheduling problems and capacity problems that require changes to the base capacity of a work center.

The production plan used by the application is based on capacity requirements from several sources: Open orders, firm planned orders, and planned orders. Accurate start dates and operation durations are imperative for each manufacturing operation whether these operations come from Production Control and Costing or from Product Data Management's standard routings.

When the production plan and plant capacity have both been defined, capacity planning is ready to schedule and accumulate the workload by user-defined time periods. This process will produce analysis files for workstation inquiry or report printing and may be repeated to help users tune their plant capacity to the current production plan.

**PRODUCTION CONTROL AND COSTING (5714-MS1)**

The Production Control and Costing application provides for shop packet creation and for the tracking and costing of an ordered item as it is manufactured; it also measures work center utilization and efficiency plus queue analysis and control functions, similar to the IPICS FDPs. The application also creates, maintains, and updates the operation and miscellaneous charge information associated with jobs within the user's shop. It requires the installation of Inventory Management and has optional interfaces with Product Data Management. (Product Data Management is highly recommended.) Open operation information may also be passed on to Capacity Requirements Planning.

This application uses information which Inventory Management creates and maintains in conjunction with its own information to produce all necessary reports to track and cost an order. In addition, it produces a prioritized worklist by work center to assist production control in moving work through the shop in the most efficient manner.

Additional functions include inquiry of order status, item status, and work center status, as well as report printing of order status and open order exceptions.

**INVENTORY MANAGEMENT (5714-MS5)**

The Inventory Management application processes all transactions affecting the status of the inventory balances. It is a central application which can interface with Order Entry and Invoicing, Capacity Requirements Planning and Product Data Management applications. Inventory Management is a prerequisite for installing Material Requirements Planning or Production Control and Costing.

The basic functions of this application provide the 'in's and out's' of inventory accounting plus the ability to cycle count the physical inventory. The reporting functions include calculating current inventory investment and the annual inventory turns as well as valuation techniques for tax reporting. And finally, you have the ability to release purchase and manufacturing orders and track their progress until each order is closed out.

The application provides for inventory valuation based on average, last, or standard costs as well as LIFO and FIFO options. Physical inventory checklists can be generated for multiple or selected warehouses, with or without cycle count options. In addition to printing a stock transaction register for audit control, a stock status report can be printed for all items, or on an exception basis, and a stock status review can be had by item or by item within vendor.

A component's 'availability check' is performed during the release phase, and items and orders with shortages are identified on special exception reports. At order release time, component allocation for manufacturing orders can be done to ensure that component inventory needs are accounted for between order release time and the actual withdrawal from stock.

Transactions can be entered from diskette or workstations. Transactions entered from diskette go through a batch edit and batch update.

Transactions entered through a workstation are edited immediately, and can update balances either immediately, or later (based on a System Tailoring Option). In either case, an audit trail of all transactions is produced.

**PRODUCT DATA MANAGEMENT (5714-MS6)**

The Product Data Management application maintains bills of material, product options, routing, and work center data bases, and provides for costed retrievals and cost simulation. In interfacing with Inventory Management, Material Requirements Planning, Capacity Requirements Planning, and Production Control and Costing, this application is an information point for bills of material and routings.

The ability to perform inquiry into the product structure and routing files is provided. Application highlights include the capability for multiple screen displays, mass replace, mass delete, and same-as-except functions which facilitate maintenance to the product structure file. In addition to option handling techniques, use of engineering effectivity dates simplifies engineering change control procedures. Labor and overhead rate tables can be used for costing in lieu of routing and work center files.

Several reports can be printed:

- Listings of item master, feature/option table and work center master
- Retrievals of product structures and routings
- Cost reports including management cost summary and cost variations

**ORDER ENTRY AND INVOICING (5714-MS9)**

The order entry function is a key starting point for activity in a manufacturing organization. For make-to-order products, this function describes the item to be manufactured and when the item is required. For products shipped from inventory, it streamlines the order processing so items can be shipped promptly. It interfaces with Inventory Management by directly updating quantity-on-hand data. The data stored in the open order files can also be analyzed by Material Requirements Planning and Capacity Requirements Planning.

As orders are entered, customer data is validated and a credit check is performed, initial ship dates may be established based on inventory availability or manufacturing orders, and item pricing data is checked for validity and completeness. A blanket order specifies a single item with multiple ship dates and specific quantities. Both order types may be entered in a similar manner. Invoicing may be accomplished by either direct entry or from orders previously entered into the system. Invoicing encompasses the computation of prices, taxes, and invoice totals. Pricing can be based on established contract prices, quantity breaks, markup from cost, or discounting from list price. Order acknowledgments, picking lists, invoices, and bills of lading, can be printed.

If Product Data Management is installed, orders can be entered for end items which have standard options associated with them. Since these options may be required, they are checked at entry time to make sure all required options are specified.

As soon as the Open Order files have been updated, the user has immediate access to current information such as:

- All orders for a particular item
- All orders for a particular customer
- Details for a particular order
- Blanket order status
- Customer status

The application also handles credit memo printing and the posting of back orders to the open order files. Support for up to 20 companies is provided as well as the generation of worksheets for general ledger input, commission accounting and taxing body reporting.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support, as described under "Program Services", will be provided for these licensed programs when they are operated in the following specified environment:

**HARDWARE REQUIREMENTS**

Each of these licensed programs will execute on all models of the IBM System/38 with a minimum of:

- 768K bytes of main memory
- 129.5 megabytes of auxiliary storage
- One system printer with print speed of 160 lines-per-minute



PROGRAM PRODUCTS

**S/38 MAPICS Spanish Language Version (cont'd)**

- One 1920-character display station

The minimum system configuration stated above is intended to define the licensing requirements for these licensed programs in order for the customer to obtain Program Services. The minimum configuration is intended to define the System/38 requirements for a single application customer environment.

System/38 MAPICS is intended to be an independent yet interrelated set of applications. Many functions have been included to protect the integrity of the master files, programs, procedures and libraries. Design features have been incorporated into the System/38 MAPICS applications to allow for co-residency of other applications and/or user-written programs with minimum restrictions. Consult the System/38 MAPICS logic manual for further explanation of these restrictions.

**SOFTWARE REQUIREMENTS**

The IBM System/38 MAPICS application programs are written in System/38 RPG III programming language and executed under control of the IBM System/38 System Control Program Facility (5714-SS1). The IBM System/38 Conversion Format Utility (5714-CV2) must be ordered for use with the system. The IBM System/38 RPG III Compiler (5714-RG1) is required if modifications to the application programs are made.

**TERMS and CONDITIONS**

**Program Services:** Central Service and Local Service ... **Testing Period:** 30 days ... **Installation License Applies:** Yes ... **Warranted:** Yes



## SYSTEM/38 REMOTE JOB ENTRY FACILITY (RJEF) 5714-RC1

### PURPOSE

The IBM System/38 Remote Job Entry Facility (RJEF) licensed program provides support for the IBM System/38 to function as a remote job entry (RJE) workstation for submission of jobs to a host IBM System/370, 30XX, or 43XX using Binary Synchronous Communications (BSC) and/or Synchronous Data Link Control under Systems Network Architecture (SNA/SDLC).

### HIGHLIGHTS

#### BSC Support

- Multi-leaving support concurrent with other System/38 programs and device operations.
- Up to seven readers operating concurrently.
- Up to seven printers operating concurrently.
- Up to seven punches operating concurrently.

The maximum number of readers, printers or punches is dictated by the host system.

**Note:** The total number of printers and punches operating concurrently cannot exceed eight.

#### SNA/SDLC Support

- Multi-session support concurrent with other SNA/SDLC activity on the line and with other System/38 program and device operations.
- Up to 15 readers operating concurrently.
- Up to 15 printers operating concurrently.
- Up to 15 punches operating concurrently.

The maximum number of readers, printers and punches is dictated by the host system.

#### General Support

- Reader input from data base.
- Reader input from workstation.
- Reader input from MFCU.
- Printer output to data base.
- Printer output to printer device file.
- Punch output to data base.
- Punch output to MFCU.
- Print or punch output directed to user program.
- Concurrent multiple RJE console interfaces to input host commands and view host and RJEF messages.
- Reader input may be queued for later transmission if RJE is not running.
- Standard System/38 command interface used for RJE commands except for READFILE and EOF control statements which are consistent with System/34.
- READFILE nesting supported.
- Capability of having operational messages sent to separate user message queues for:
  - Writer special forms handling.
  - Writer standard forms handling.
  - Reader READFILE processing.
- Forms control table supported to provide for special forms handling.
- Automatic creation/addition of new members to existing data base files.
- Automatic reblocking of user data for both reader data sent and writer (Printer/Punch) data received.
- Utility function to convert data written to data base in compressed format to decompressed data written to another data base file, a printer device file, or a card device file.
- RJEF data security operates under the system security mechanisms.
- RJEF SNA support allows RJEF operations concurrent with other SNA operations on the same line.

### DESCRIPTION

RJEF communicates with the host system over a point-to-point (switched or nonswitched) communications line via BSC. Host system RJE programming support should be generated specifying System/3 with console support.

RJEF communicates with the host system over a point-to-point (switched or nonswitched) or multipoint (as a tributary) communications line via SNA/SDLC. Host system RJE programming support should be generated specifying LUTYPE1 (3770 with multiple logical attachment).

System/38 RJEF communicates with the currently available releases of host processing subsystems OS/VS1 RES, OS/VS2 JES2, and OS/VS2 JES3, or VM/370 Remote Spooling Communications Subsystem (RSCS) networking program product as a System/3 RJE workstation when using BSC line protocol. When using the SNA/SDLC protocol, RJEF communicates with the host processing subsystems OS/VS1 RES, OS/VS2 JES2, and OS/VS2 JES3, or DOS/VSE POWER/VSE as a 3770 RJE workstation. When support for more than three readers or writers is desired, the host system RJE programming support for BSC should be generated specifying the System/38 as a System/360 Model 25 or greater.

#### Input

Commands to submit a remote job stream may be entered from a workstation or a batch job. Multiple submit requests may be queued regardless of the active status of the RJE Facility. When RJEF is started, it will accept those queued requests and transmit the specified remote job stream files on a FIFO basis.

#### Output

Output from the host system can be directed optionally to:

- A printer device file (spooled or nonspooled).
- User pre-specified data base file members, based on data contained in the central system forms mount message.
- A data base file member optionally created by the RJEF communications process.
- A user program.

Default responses may be selected for messages issued by RJEF to permit unattended execution.

In addition to the immediate and controlled termination of the RJEF session, an IDLETIME termination is available to hold the communications line open for a user-defined time following the last transmission. This supports the unattended RJEF communications execution and also allows waiting to ensure all input or output has been processed.

### CUSTOMER RESPONSIBILITIES

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

This licensed program runs on all models of IBM System/38.

#### SOFTWARE REQUIREMENTS

IBM System/38 RJEF licensed program is designed to operate under control of the IBM System/38 CPF (5714-SS1) Release 5.0.

#### DOCUMENTATION (available from Mechanicsburg)

The following documents are scheduled to be updated and available in June 1983:

*S/38 Remote Job Entry Facility (RJEF) Licensed Program Specifications (GC21-7916) ... S/38 Remote Job Entry Planning and Installation Guide (SC21-7924) ... S/38 Remote Job Entry Facility User's Guide (SC21-7914).*

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## SYSTEM/38 RPG III 5714-RG1

### PURPOSE

IBM System/38 RPG III is an upward compatible (with source changes) extension of the proven RPG II programming language available on IBM System/3, System/34, and other IBM Systems. New capabilities have been added to support System/38 Data Base Data Management, integrated work station support, user controlled logic flow, improved interprogram communications, and increased productivity.

Major features of RPG III are in the areas of program design flexibility, additional operation codes for increased function, and documentation.

### HIGHLIGHTS

- The IBM RPG III licensed program includes:
  - Compiler
  - Command for Invoking the Compiler
  - Source File for RPG Source Statements
  - Message File
  - Syntax Checker (for Source Entry Utility)
  - Auto Report
  - Command for Invoking Auto Report
- Design Flexibility
  - Externally Described Files
  - Full Procedural File Capability
  - Programmer File Control
  - 'CALL' to Another Program with Parameter Passing
  - Data Structures
  - Multiple Occurrence Data Structures
  - Logic Flow Control
  - Optional User Error Handling
  - User-Defined Edit Codes
  - Dynamic Space/Skip Function
- Operation Code Enhancements
  - New File Processing Operation Codes
  - Direct Control of Workstation Files
  - Subfiles
  - Parameter Passing
  - DOWHILE, DOUNTIL, and IFTHENELSE
  - Compare and Branch
  - Short Form of Calculation Statement
  - Indicators as Data
  - Array Sorting
  - Composite Key Definition
- Documentation
  - Cross-Reference List
  - Text Description from DDS
  - SEU Sequence Number (if SEU used)
  - Source Diagnostic Error
  - Nested Level Indication

### DESCRIPTION

**Enhanced Design Flexibility:** For design approach flexibility, System/38 RPG III permits traditional I/O coding, includes the Auto Report feature, and also allows the incorporation of externally-described files. The file description specification is used to indicate an externally described file. Descriptions of records and fields are stored with the file not in the source program.

System/38 RPG III allows the user to process the same file in both a random and sequential manner in the same program (full procedural file specification). It also permits the user to write a program without a 'primary' file (programmer I/O control).

System/38 allows any RPG III program to call any other program, including CL programs.

System/38 RPG III provides the capability to redefine (one or more times) fields (data structures) and the processing of either the entire field or any of the subfields.

- Data structure support lets the programmer:
  - Divide a field into subfields (without using MOVE and MOVE).
  - Define a data structure with multiple occurrences.
  - Operate on a subfield and change the contents.
  - Redefine an internal area more than once using different data formats.
  - Define a data structure in the same manner as records are defined, using Input Specifications.
  - Process character fields with length up to 9999.

The user is permitted more logic flow control via support of 'DO', 'DO WHILE', 'DO UNTIL', and 'IFTHENELSE' functions.

- The DO WHILE (DOWXX) operation tests the relationship between FACTOR 1 and FACTOR 2, and if true, executes the instructions until the END operation code, and loops back to the DO WHILE instruction. The relationships tested are indicated in the last two digits of the operation code, such as LT (less than), GT (greater

than), and EQ (equal to). The DO UNTIL operation works in a similar manner.

- The IF/ELSE structure also provides user control of logic flow. The operation code IFXX tests the relationship between FACTOR 1 and FACTOR 2 in the same manner as DO WHILE and DO UNTIL. If the result of the test is true, the instructions between the IFXX operation and the associated END code are executed. If the test is false, the instruction following the END is executed.
- The COMPARE AND BRANCH (CABXX) operation relieves the programmer to a great extent, from indicator-conditioned logic in the calculations. The CABXX operation code indicates a relationship between FACTOR 1 and FACTOR 2 in the XX position (like DO WHILE, DO UNTIL, and IF/ELSE). If the relationship is true, control is passed to the TAG specified in the result field; otherwise, the program executes the next instruction immediately following the CABXX operation. Interaction with the system is permitted by allowing a program to receive feedback and error information from CPF (the system support program product). The programmer can provide subroutines to handle program and file exceptions/errors.

A program can also receive time, date, and shutdown requests from the system.

In addition to system-defined edit codes, five user-defined edit codes are supported as defined to CPF.

Additional space/skip function lets the user dynamically specify space/skip operations of the compiler listing.

Current line number is made available to the program for better control of overflow.

**Increased Function:** Enhancements for data base data files include new operation codes to allow data base record read, write, update, and delete, as well as file open and close capability.

- Subsequent to an indication on the file description specification, the following operation codes are valid:
  - WRITE - Creates new records in the file.
  - UPDAT - Modifies existing records.
  - DELET - Removes a record from a file.
- The READE (read equal) operation code determines if the next record read from the specified file has a key equal to a specified field or literal.
- The READP (read prior) operation is the same as the current RPG II READ operation, except that the prior record is read instead of the next record.
- The programmer can explicitly open or close a file with the following operations:
  - OPEN - The file named in FACTOR 2 is opened when the instruction is executed.
  - CLOSE - The file named in FACTOR 2 or \*ALL files are closed when the instruction is executed. The file or device is disconnected from the program.
  - FEOD - Provides a logical end of data for the file named in FACTOR 2. The file or device is not disconnected from the program.

RPG III coding for display device files is greatly simplified so that it is now similar to that for other directly attached I/O devices. On the file description specification, the programmer specifies a file name that references a file containing formats created by DDS that describes the input or output, or both, for the display device.

The display screen formatting provided through DDS allows indicator usage for conditioning of display functions in conjunction with the associated RPG III program. DDS also permits definition of command keys. The programmer writes the program without being aware of whether workstation devices are local or remote, or the number of workstations that will call the program.

System/38 RPG III also provides easier coding for subfiles (multiple, like records processed in groups).

Operation codes exist to permit parameter (data) accessing among programs.

A conditional compare and branch operation code based on 'greater than', 'less than', etc., is provided.

Factor 1 is no longer required for ADD, SUB, MULT, and DIV operations. If blank, Factor 1 is assumed to be the same as the result field.

The RPG indicators (except 1P) can be referenced and manipulated as data.

A new operation code SORTA can be used to sort an array into the sequence specified on the Extension Specification for the array.

Description of a key field comprised of multiple fields is also supported. The composite key is defined by a KLIST operation code, followed by

**S/38 RPG III (cont'd)**

one or more KFLD operation codes to designate those fields comprising the composite key.

**Documentation Aids:** Documentation enhancements include a cross-reference allowing easy access to determine where fields, files, and indicators are used.

DDS text descriptions are available to source documentation.

The SEU (or source file) sequence number is used as the default number method for statements and diagnostics and is carried into the object code to assist in execution time debugging. In addition, for any statement found in error, Position 1 of the compiler listing will show an asterisk. Asterisks will also appear under each field in error in the listing of the source.

Nested level indication shows each statement level in a nest of DO loops and IF/ELSE processing.

**RELEASE 5.0 ENHANCEMENTS**

System/38 RPG III is being enhanced in Release 5.0 to include support for CPF commitment control, local data area, and for multiple devices in a display or mixed file. CPF commitment control is a mechanism for the user to code restart into interactive programs to assure the integrity of changes made to one or more files. Multiple device and local data area support provides functions similar to System/34.

**HIGHLIGHTS**

- New operation codes and commitment file designation are being added to support CPF commitment control.
- New operation codes and file specification continuation options have been added to provide multiple device support of display and mixed files.
- Access to the CPF Local Data Area provides function similar to that provided for the System/34.

**DESCRIPTION**

Definition of files under CPF commitment control and operation codes to cause commitment or return to the prior commitment boundary are being added to RPG III. This support provides the programmer with greater flexibility in designing interactive sessions and greater ease in backing out undesired transactions.

The operation codes (ACQ, REL, POST and NEXT) and file specification continuation options (NUM, IND, SAVDS and ID) are being added for display and mixed file support of multiple devices. These additions will provide functions similar to those provided by the System/34.

The CPF Local Data Area can be read in at the start of an RPG III program and written back at program termination. In addition, the IN and OUT operation codes can be used with other data areas. This support will provide a function similar to that provided by System/34.

**CUSTOMER EDUCATION**

System/38 RPG III Education is available as follows:

Title	Course	Code
Fundamentals of RPG II Programming	D2005*	
RPG II Programming Workshop	Q1005*	
RPG III Structured Programming Workshop	A2004	

\* Not required for the experienced RPG II Programmer

**COMPATIBILITY**

Usually with minor source changes, batch System/32, System/34, and System/3 RPG II programs can be compiled and executed on System/38. The changes principally involve the Header (H) specification and File Description (F) specification.

**CONVERSION REQUIREMENTS**

Conversion requirements appear in the *S/38 Installation Manual - Conversion Planning* (GC21-7732).

**PLANNING INFORMATION**

For existing users, Release 4.1 must be installed prior to installing Release 5.0.

**Program Use During Customer Preinstallation Testing:** The System/38 RPG III licensed program (5714-RG1) is available to customers for preinstallation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

**CUSTOMER RESPONSIBILITIES**

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

IBM System/38 RPG III runs on all models of IBM System/38.

**SOFTWARE REQUIREMENTS**

IBM System/38 RPG III and/or System/38 COBOL is designed to operate with the IBM System/38 CPF (5714-SS1).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/38 RPG III Licensed Program Design Objectives* (GC21-7760).

The following documents are scheduled to be updated and available in June 1983:

*S/38 Guide to Publications, Glossary and Master Index* (GC21-7726)  
... *S/38 RPG III Reference Manual and Programmer's Guide* (SC21-7725).

**RPGs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## 5714-SS1 - SYSTEM/38 CONTROL PROGRAM FACILITY

### PURPOSE

The System/38 Control Program Facility (CPF) program, used with System/38 machine functions, provides these major capabilities: Work Management ... Data Management ... Control Language (CL) ... Security ... Message Facilities ... Spooling ... Communications ... Installation (System Specialization) ... System Services.

### HIGHLIGHTS

- Work Management
- Data Management
  - Data Base Data Management (DBDM)
  - Device Support (DS)
  - Data Description Specifications (DDS)
- Control Language (CL)
  - Control Language Programming
  - Single Consistent Interface
- Security
- Message Facilities
- Spooling
- Communications
  - System/38 as a terminal to S/370 IMS/V5 or CICS/V5 (SNA/SDLC)
  - System/38 as a host for remote 5250 Information Display System devices
  - System/38 Binary Synchronous Communications (BSC) facilities
  - Point-to-point
  - Multipoint tributary
- System/38 as a Peer to CICS OS/V5 and CICS/DOS/V5 Version 1 Release 6 and another System/38 using New SNA (LU6.2 and PU2.1).
- Installation (System Specialization)
- System Services
  - Test and Debug Facilities
  - Library Facility
  - Journal Facility
  - Save/Restore Facility
  - Service Facilities
  - File Reference Facility
  - Copy Facility
  - Power Warning Feature

### DESCRIPTION

**Work Management:** The primary functions of the System/38 CPF Work Management are to:

- Accept and process, concurrently, work from multiple users of the system.
- Support batch, interactive, and spooling functions.
- Allocate and control the usage of system resources in a multitasking environment.

Users from any 5250 System display device (or the system console) may initiate work, either interactive or batch. Work Management processes the job requests, acquires the system resources required for the jobs, executes, and terminates the jobs. Work Management supports transaction processing functions.

Work Management handles the contention resulting from multiple jobs competing concurrently for system resources. In order to accomplish this, it manages the scheduling and queuing necessary to share the system resources among all jobs. The user may control the job processing requirements and priorities through the Control Language.

All work is managed concurrently in subsystems (a defined operating environment such as batch, interactive, and spool), and jobs may be allocated to pools (a logical division of main storage) within a subsystem. These features permit the user to establish special operating environments, and control the execution of high priority jobs.

### Data Management

- Data Management access methods support sequential, indexed, and direct (relative record number) file organization, and permit multiple user-defined indices per file.
- Data Management provides the support for disk data file handling such as create, add, delete, and traditional data I/O operations like read and write.
- Data Management provides the I/O management for all I/O devices. (Note that disk storage is not considered I/O on System/38.)
- Data Management provides support enabling the user to describe data and device files external to the application programs.

- Data Management includes support for:

- Data Base Data Management
- Device Support
- Data Description Specifications (DDS)

**Data Base Data Management:** Data Base Data Management support is integrated within the System/38. The relationship between physical data files is independent. Each file may be created, modified, or deleted without effect on other physical files.

The primary features of Data Base Data Management (DBDM) are:

- Data Independence
- Journal Facility
- Data Security
- Data Maintenance
- Data Sharing

System/38 Data Base Data Management is designed to simplify operations and increase user productivity. The user need only describe, create, and store the data once in a physical data file. System/38 Data Base Data Management provides the capability for multiple users to concurrently access that data logically in various organizations, sequences, and formats (logical file), regardless of the actual physical structure of that data. This provides a high degree of data independence to individual programs and users. Options are available to specify the type of maintenance to be performed to the sequencing of data including immediate, delayed, and rebuild.

A journal facility exists to allow for forward or backout recovery. Once a file is specified to be journaled, all changes are implicitly captured by the system. The journal may also be of benefit for such functions as faster daily backup, security, audit trail, activity reporting, and debugging. Commands are provided for recovery, display, and management of the journal objects.

Data security is provided by controlling ownership, authorization to use the data, and is actually a function of System/38 Security. (See "Security" for more information on Security features.)

With physical data only residing in one place and in one physical structure, it is easier to maintain. When data is altered in the physical file, the same program or any other program which subsequently retrieves that data, receives the updated version. Records added to the files are available to users when they are written to the file.

Data Base Data Management permits multiple users to access data. For updates, it will lock the record being updated until the update is done, to assure that all update requests are serially handled. It also provides the capability to lock data files for exclusive use until relinquished.

**Device Support:** System/38 Device Support will support the following devices:

- System Console
- 5250 Information Display System devices including local and remote displays and printers (5256/5224/5225)
- Diskette Magazine Drive
- 5424 MFCU
- 5211 mdl 2 Printer
- 5219, 5224, 5225 Printers
- 3262 Printer
- 3203 model 5 Printer
- 3370 Direct Access Storage Device
- 3410/3411 Magnetic Tape

System/38 Device Support is similar to data management and I/O supervisor routines for devices on other IBM systems, but with enhanced capability.

System/38 provides device independence by permitting the user to define device files (via DDS) external to the program. The user then has increased flexibility to direct and control device I/O through Control Language overrides independent of program instruction. For example, a program may have output coded for a workstation printer but selection of a specific printer could be made upon program execution. Also, devices may be dynamically allocated, or deallocated, to active processes. System/38 Device Support will support device file definitions whether coded in the program or defined to the device data management, and relieve the programmer of device attachment method (local or remote).

Subfile capability is provided for display devices. This reduces the programming effort for the user to group records of like format, for concurrent display, modification, or input. For example, a display device operator may enter an entire screen of order entry line items

## System/38 Control Program Facility (CPF) (cont'd)

before submitting them to the system for processing by the program one record at a time.

Also extensive data manipulating functions such as screen formatting, editing, and validity checking are supported for display devices.

**Data Description Specification:** The Data Description support in System/38 Data Management is the user's means to describe files for the data base and devices independent of application programs.

The files may be described once external to the application program. The external description is automatically added to the program at compile time. This reduces redundant I/O coding for programs using the same data. It also gives a consistent view of the structure of the data to each using program, thus reducing transcription, and associated errors in repetitious I/O coding.

Display device formats for display I/O are entered via DDS. During format description, data base field definitions can be used, and editing and validity checking features are available. These capabilities greatly simplify the application programming.

The user enters source description information on a Data Description Specification Form, similar in approach to RPG coding. For syntax checking while entering the source description, the user may optionally use the Source Entry Utility on the System/38.

Data records are stored in online auxiliary disk devices in the order they are received by the system. These physical files may be accessed in arrival sequence or by field(s) defined to produce a composite key. All records in a physical file have the same format.

A logical file is the vehicle to allow the user to change the presentation of the data in a physical file. For example, with logical files the user may:

- Specify a different format than the physical file. These formats can specify field reordering, omission, concatenation, and different field attributes.
- Select or omit records from the physical file.
- Specify a different ordering (key) than the physical file.
- Specify records from multiple physical files sequenced together by a composite key (similar to RPG matching record logic).
- DDS supports SNA/SDLC LU-1, SNA/SDLC LU6.2 and BSC communications device file record formats similar to the method used for data base files. Functional control of communication operation is managed through use of communications-specific DDS keywords.

**Control Language:** To request system function, the user enters CL commands, which are abbreviations of words for each command. Parameters are also entered to tailor the functions performed by the command.

The System/38 Control Program Facility through the Control Language (CL) provides:

- An easy-to-learn and use, consistent interface for the user to request and control system and application function.
- Commands executable from console, workstation, or batch job stream.
- CL programs callable by RPG III, COBOL, or other CL programs.
- A tailorable interface, with user-created commands to meet varying requirements.
- Compilable control language capability.

Control Language for the System/38 is described in three sections:

- **Ease-of-Use Facilities**
  - User command selection from menus
  - Prompting by the system for parameters
  - Free form syntax
- **Control Language Programs**
  - Compiled commands
  - Manipulation of variables
  - Call command with parameter capability
  - User-defined logic flow
  - Access to DDS (for display formats)
  - System program testing support
  - Interprogram communication (via message queues and data areas)
- **User-Created Commands**
  - To fulfill special needs
  - To control parameter selection

**Ease-of-Use Facilities:** System/38 supports both the inexperienced and the experienced Control Language user. CL supports the inexperienced user in the learn-as-you-go mode. Authorized users unfamiliar with the Control Language can be guided through command

entry by the system. Commands may be selected from a menu and then displayed, along with the parameter options, from which the user can enter, select, or default.

The experienced user may learn and enter the commands to execute a job. There is ease-of-use for the experienced user also. Command statement structure is free form, no fixed position requirements for parameters. Parameters may be positional or keyword form, and most of the parameters have default values.

Special menus are provided for the system operator and the programmer. These menus are designed to simplify the typical requests and also allow the entry of any command.

Workstation users without data processing experience can work from application menu displays (user-coded). This means reduced need for them to have detailed knowledge of the Control Language or the system, and their access to the system can be easily limited and controlled.

Another aid permits the user to get additional description of an error message by depressing the 'HELP' key on the keyboard.

**Control Language Programs:** A CL program is a group of CL commands converted to an executable program by the CL compiler. CL programs allow the user to group CL commands and application programs together. CL programs permit the definition of data as variables (fields), and can pass data (parameters) to other programs. The 'IF' command allows conditional execution of commands based on the result of logical expressions. Branching is also supported.

The user can define screens (menus and prompts) and display them under control of a CL program.

Values for parameters for commands in CL programs can be supplied at execution time via a prompt to the user. Most commands are valid within CL programs.

The system's program debug support is available for CL programs.

**User-Created Commands:** The System/38 users can define their own commands to invoke system function or a user program. Associated parameters can be defined and validity checked during execution. This feature is useful for those users who need a specialized operating environment, or those who wish to reduce or restrict the parameter entry choices for users of the system.

The character set used for the Control Language is EBCDIC (Extended Binary Coded Decimal Interchange Code). All 256 EBCDIC characters can be used within comments and quoted character strings (literals), but only the following subset of EBCDIC characters can be used to code CL commands:

- 26 letters (A through Z)
- 10 numbers (0 through 9)
- 3 alphabetic extenders (\$, #, @)
- Special characters

(For the special characters and their function, see the *IBM System/38 CPF Reference Manual - Control Language*, SC21-7731.)

**Message Facilities:** Message facilities can be used to exchange information among users of the system or among programs (system and application) and users.

Message Handling on System/38 provides for creation, storage, queuing, routing, and authorizing messages for:

- Information
- Broadcast
- Reply

Message Handling provides support for establishing a message, providing a path for it to travel, controlling traffic on the path, and getting it to its destination. Messages can be displayed immediately or queued for display when requested.

Specific system level messages are placed in the system history file. All entries are logged with date and time, identify the source of the message, and have an identification number. The user may process the system history file.

Users of message facilities can create impromptu or predefined messages. Impromptu messages will usually be simple text strings created to handle specific situations, such as messages between workstation users. Predefined messages are created as message descriptions, with a unique identification number, and stored in a message file for subsequent retrieval. They will usually be error messages sent by programs encountering certain defined conditions.

**SNA-ALERT Facility:** The System/38 alert function notifies an SNA remote S/370, 30XX, or 43XX host network operator of conditions detected by the System/38. The alert support provides significant function to be used for centralized remote host problem determination. The following support includes:

PROGRAM PRODUCTS

**System/38 Control Program Facility (CPF) (cont'd)**

- Alert generation by the System/38 upon certain failing conditions.
- The alert and associated information are sent via SNA/SDLC to the remote host system.
- The companion host programs support processing of the alert data to enable the user to centralize network problem determination.

The required host programs that support the System/38 alert consist of the Network Communications Control Facility (NCCF) and Network Problem Determination Application (NPDA). Also required is one SNA communications line to the host system.

**Spooling:** Spooling enhances device I/O by controlling device contention, decreasing process execution time, and increasing user control of jobs in the system. Since programs get their input from, and direct their output to, spool queues (instead of directly interacting with the I/O device), multiple concurrently executing programs can appear to be using the same device. This also means that program execution time is not restricted to the speed of the I/O device.

The significant features of System/38 Spooling are:

- Multiple input/output queues
- Multiple output copies
- One program can output to multiple files
- Workstation control of queues
- Display of spooled output
- Output spool queues can be directed to any device

Input job streams from external devices (card, diskette) or from the data base can be processed by spool readers or entered directly onto an input queue. Output to printers, punches, and diskettes is processed by spool writers. Multiple spool queues can be established, and spooling provides the capability for the system or workstation operators to display or modify their spool queue attributes.

Spool support permits interleaving of output from multiple jobs to a spool queue, and from a single job to multiple spool files.

**Communications**

**SNA/SDLC as a terminal:** System/38 communicates as a terminal to System/370 CICS/VS and IMS/VS using Synchronous Data Link Control (SDLC) as a part of Systems Network Architecture (SNA).

System/38 communicates to IMS/VS applications executing under OS/VS1 or OS/VS2 (MVS), or CICS/VS applications executing under DOS/VSE, OS/VS1, or OS/VS2 (MVS) in S/370 mds 145 to 168 for IMS/VS, and models 135 to 168 for CICS/VS, and 3031, 3032, 3033, 4331, 4341, 4361 and 4381 Processors. Communication to any of these operating systems when running under VM/370 is also supported. Communication is via the levels of VTAM, ACF/VTAM, ACF/VTAME, TCAM or ACF/TCAM supported by IMS/VS or CICS/VS at the time of shipment. NCP/VS or ACF/NCP/VS will be required as appropriate.

**Binary Synchronous Communications (BSC):** System/38 Release 4 CPF Binary Synchronous Communications (BSC) support provides the facilities which allow the user to write application programs to communicate with other systems and devices which are compatible with 3780 BSC implementation.

For all devices listed below, it is the user's responsibility to provide the application program which uses the System/38 BSC support, and to ensure compatibility with supported protocols and/or unique data formats required by the attached devices.

**System/38 Binary Synchronous Communications (BSC) program-to-program over point-to-point switched or point-to-point nonswitched facilities**

Communications to the following systems and devices are supported:

System/3	3741
System/32	5110/5120
System/34	5230
System/38	5260
Series/1	5280
System/370, 30XX, 43XX	
DOS/VSE	BTAM-ES
OS/VS1	BTAM/TCAM
OS/VS2	BTAM/TCAM
CICS/VS (Version 1.5.0)	OS/VS or DOS/VSE BTAM

**System/38 Binary Synchronous Communications (BSC) As A Multipoint Tributary are:**

- Multipoint Tributary - The System/38 will act as one, or several, terminals (or tributaries) on a nonswitched multipoint BSC line. The BSC line is scheduled by a BSC control station or host. The host may be a System/3 with CCP, a Series/1, or a System/370, 30XX, or 43XX. The System/38 can recognize up to 32 poll and selection addresses for each line.

- Multiple Session Support - The System/38 will support up to 32 sessions per line when attached as a multipoint tributary station. This is accomplished by assigning one of the 32 polling and selection addresses to each session. The support will provide for multiple logical sessions to occur concurrently over a single link. A maximum of 256 logical sessions per system is allowed.

- Additional Systems/Devices Supported - The System/38 acting as a multipoint tributary supports BSC attachment of the following systems and devices:

- 3776/3777 Batch Terminals
- 5520 Administrative System
- 6240 Communicating Mag Card Typewriter
- 6580 Displaywriter System
- 6640 Document Printer
- 6670 Information Distributor
- OS/6 Office System
- CMCII Communicating Mag Card Typewriter II

**Other BSC Features**

- Component Selection - Some BSC terminals have several attached I/O devices or components. System/38 provides support through DDS and Function Management for the user to select the device or component to which the data is to be transmitted. This function is accomplished by inserting the component selection characters inside of the outbound text. The component selection function is a program-to-terminal protocol which operates only on point-to-point lines and only on WRITE operations.

- Compression/Decompression - This constitutes a technique for utilizing line time more efficiently.

- Compression: Sequence of three or more blanks, X'40', are replaced by a two-character sequence for transmission.

- Decompression: Data that has been received from the BSC line is scanned for controls in the data stream that define how to reconstruct the original data.

**Note:** Compression and Decompression are mutually exclusive with transparent data, user-blocked data, and ASCII.

- Trailing Blank Truncation - This permits the System/38 to utilize communications line time more efficiently. In some applications, the fixed length record has a variable amount of data at the beginning of each record and the end is filled with blanks. The trailing blank truncation facility removes the trailing blanks when creating a transmission block. The trailing blanks are replaced with a blocking character such as IRS or ITB or a BSC ending character, ETX or ETB, as appropriate.

**Note:** Trailing blank truncation is mutually exclusive with transparency, user-blocked data, and blocked data with \*NOSEP.

**System/38 as a 3270 Information Display System to a Remote Host:** System/38 3270 Device Emulation support provided in CPF allows the System/38 to appear as a 3270 Information Display System to a remote host computer. The System/38 will appear to the host system as a 3274 (SNA/SDLC) or 3271 (BSC) Control Unit.

System/38 3270 Device Emulation consists of two offerings:

- The System/38 5250, 5291 and 5292 displays and printers will emulate the functions of a 3270. No System/38 user programming is required (SNA/SDLC and BSC).
- A 3270 program interface is provided which allows a System/38 application program to communicate with application programs operating on a remote host system (BSC only).

**Note:** See M5381 pages for hardware prerequisites.

**System/38 as a Host for Remote 5250 Information Display System Devices:** The System/38 CPF also provides remote communication support for the 5250 System family of terminals. (As described in the M5381 pages), the 5250 system is supported locally by the workstation controller.)

The 5250 System is supported as an SNA device. Although the remote communication attachment of the 5250 System devices may be by switched or leased line, the devices have the same capabilities as local directly-attached devices.

When featured for nonswitched multipoint communications facilities, the System/38 Communications Attachment feature provides hardware Autopoll for up to eight (8) control units (5251 mds 2 and 12) per TP line. Anytime a TP line has more than eight (8) control units varied online, polling is automatically transferred to system microcode. The system microcode supports a maximum of fifty (50) control units varied online (being polled) per line.

**System/38 as a Peer to CICS/OS/VS and CICS/DOS/VS Version 1 Release 6 and to another System/38.** The System/38 Peer support is based on new SNA definitions (SNA LU6.2 and PU2.1).

Attachment to a S/370 is as an SDLC secondary. Attachment to another System/38 requires SDLC primary on one System/38 and

## System/38 Control Program Facility (CPF) (cont'd)

SDLC secondary on the other System/38(s). The link configuration can be either point-to-point nonswitched, point-to-point switched, or multipoint nonswitched. The link speeds supported are all of the standard speeds, up to 57.6K bps.

These SNA extensions are designed to provide common session protocols for both document interchange and distributed data processing. This provides the base by which users can establish a single network definition for distributed processing.

These new SNA extensions now allow System/38 to participate in a transaction processing environment as well as in the batch and interactive environment. Within a network, the System/38 can serve as either the front-end processor or the back-end processor.

System/38 display station pass-through when interconnecting multiple System/38s: Display station pass-through support allows interactive users at a System/38 (source) to request that their device be connected to another System/38 (target). The connection is made via an Advanced Program-to-Program Communications (APPC) link. The user signs on to the target systems as if the display station was directly attached to the target system. System request key options can be used to switch back to the source system and to switch jobs on the target system.

This support provides a convenient way for customers to increase System/38 processing capacity through horizontal growth, that is, by using multiple System/38s connected via APPC.

**Communications Error Recovery Procedure (ERP):** The enhanced ERP will enable users to recover from many communication errors with little or no operator intervention. When the recovery process begins after an error is encountered, jobs will not need to be canceled, nor will the communications objects need to be varied off. The application will need to either release the device or close the file. If communications are to be resumed, the applications will acquire the device (if it was released) or open the file (if it was closed). All communications (BSC and SDLC) devices, local workstations, and multidropping of 5250 and Advanced Program-to-Program Communications (APPC) devices on the same line will be supported.

**Installation (System Specialization):** The Installation facility of System/38 CPF provides the means for the user to install the Control Program Facility. This substitutes for the traditional system generation which is not required on the System/38.

To install, the user loads CPF through the diskette device or a tape device attached to the system. This establishes default libraries, user profile definitions, basic I/O definitions, etc. The system is ready to use, but the user may want to do some additional system specialization such as:

- Describe additional I/O devices.
- Define additional subsystems.
- Define additional user profiles.
- Modification of the supplied definitions.

System specialization can be done anytime and does not require a system generation function.

### System Services

**Test And Debug Facilities:** The Test and Debug Facilities offer System/38 users significant productivity in the testing and training area.

The user can copy production files and programs to a 'test' library to create a test environment nearly identical to the production environment. The user still has the full range of system function and can observe and control operation of the program, but the user is prevented from updating production files. This also permits testing to occur concurrent to other operations.

For complete protection of the production environment, the security features of the system can be used to prevent any access of the production objects by the development planner.

This test environment is also useful for training operators because:

- It duplicates the real environment.
- It protects production files.

Debug support provides error diagnosis tools for the programmer. Debug requires no special statements in the source program. Through CL commands the user may:

- Halt execution at a specified statement number (source listing).
- Trace the sequence of statement execution.
- Display and modify program variables (fields).
- Obtain a printed copy of the interactive dialog with the system.

The CL command for program debug places programs in debug mode. In debug mode, breakpoints to halt execution (source program statement numbers) may be specified. For trace, ranges of statement

numbers may be entered to determine the sequence of statement execution. Commands for breakpoint or trace do not affect any other concurrent operation of that same program.

**Library Facility:** Library support on the System/38 provides the user the means to operationally group related objects. Objects are programs, file definitions, data files, etc. Libraries are used to logically (not physically) group objects in any division meaningful to the user, such as by application or by ownership. An object is an item of a library and no two objects of the same name and type may be a member of the same library. Although a system library is installed with the system, multiple user-defined libraries are permitted. The user controls object maintenance in the libraries.

**Save/Restore Facility:** The Save/Restore Facility on System/38 supports the 3410/3411 tape drive and the diskette magazine drive and the magnetic tape drives in the following functions:

- Back-up of user libraries and objects
- Keeping seldom used or sensitive information offline
- Data interchange between System/38s
- Back-up of the system library

The SAVE commands are used to write a copy of a library, all libraries, an object, or a group of objects in a library to the save device. The RESTORE commands are used to restore to the system saved objects and libraries. The system maintains a directory of saved objects and can identify the most recent copy of a saved object. The system can identify by date and time when an object was last changed. To provide for faster daily backup, a command is provided to save only those objects which have changed after a specific date.

**Service Facilities:** CPF supports servicing of CPF, the System/38, and workstations. Many service functions can be done concurrent to other system operations enhancing productivity for IBM and our customers. (Note: Concurrent servicing is accomplished through the Concurrent Service Monitor (CSM) which is a part of CPF.)

Some of the service facilities available, through Control Language commands, to support CPF and the System/38 are:

- For CPF
  - Problem analysis and diagnosis through dumps of internal job information and traces of processing flow.
  - Problem reporting by producing diagnostic documentation on a diskette for IBM service use.
  - Problem resolution by installing IBM-supplied program changes.
- For the System/38
  - Providing the machine error log for print or display.
  - Production of a trace of internal machine activities.

The CPF provides support through which workstation device operation can be checked and workstation printer operation can be verified.

**File Reference Facility:** The File Reference facility provides the user with information about the definition, organization and usage of the data base. It also provides information about the definition and usage of device files. It will provide significant aid in two areas:

- Documentation of the system.
- Supplying information to help determine the effect of planned changes.

Some functions providing information on file and field usage throughout the system can be output to a disk file for subsequent access and manipulation by the user. The following information is available:

- Files currently using a specified format.
- Files dependent on a specified file and type of dependency.
- File members dependent on a specified file member and type of dependency.
- Field descriptions by file.
- Data file usage by compiled program.

File Reference Facility functions can be invoked in interactive or batch mode. Output can be directed to a display or a printer, and in most cases to a data base file.

**Copy Facility:** The System/38 copy function provides some enhancements to the traditional file copying capabilities. The copy support can:

- Copy data from diskette, card, magnetic tape, or data base files to diskette, card, printer, magnetic tape, or data base files.
- Provide selection of records to be copied by the value of:
  - Fields within records
  - Characters within fields
  - Record formats
- Provide for adding records to an existing file member.
- Provide for the copying of an output spool file to a data base file to allow conversion of these files to microfiche applications, transmission to other systems, or processing of spooled output.

## PROGRAM PRODUCTS

**System/38 Control Program Facility (CPF) (cont'd)**

- Provide for the selection of a record format when a multiformat (logical file) is being copied.
- Provide for reorganization of a data base file.
- Provide for a high speed copy of data base files which reads and writes disk sectors as opposed to individual records.

**Power Warning Feature:** CPF provides programming support for user-supplied Uninterruptable Power Supply devices. A system value will control which message queue will be sent a message if normal power is lost or restored. This allows user program logic to control termination/continuation of the System/38 operation.

**Program Use During Customer Pre-installation Testing:** The System/38 Control Program Facility (5714-SS1) is available to customers for pre-installation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

**CUSTOMER RESPONSIBILITIES**

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/38 CPF runs on all models of the IBM System/38.

All IBM licensed programs for System/38 are designed to operate in an environment that includes the System/38 CPF (5714-SS1) or its equivalent. The licensed program order should be entered via AAS at the same time as the system order. IBM's ability to provide concurrent hardware maintenance is dependent upon functions provided by the CPF or its full equivalent support.

**SOFTWARE REQUIREMENTS:** None

**CPF Main Storage Usage:** All Control Program Facility instructions are pageable, and therefore, invoked by the system as needed. The amount of main storage occupied at any given time is greatly dependent upon system functions concurrently and dynamically invoked by multiple system users.

**SECURITY**

Security on System/38 provides the user a selectable degree of protection of the system and data that can be increased by stages. Its major features are:

- User-controlled level of security
- Security Officer to provide security control
- Ownership/Authorization of objects (such as data files and programs) is user-controlled.

The degree of security exercised on the system can range from minimal security, to authorization for use to each individual data file, program, and device. The security officer 'owns' the system objects, has full rights of access across the system, and controls enrollment of users of the system. All users of the system are enrolled and have a user profile which controls their access to system and data resources. Security is based on ownership and authorization of objects in the system. Objects are data files, programs, formats, device descriptions, etc. All objects in the system have an owner. The owner has all rights to the object and may authorize various classes of access and usage of these objects to other enrolled users of the system.

Security support is divided into two types of functions - the definition and the enforcement of security procedures. Definition functions of Security are:

- The Security Officer - This person has full authority across the system and controls the installation security procedures.
- The User Profile - All users enrolled on the system have a user profile. It is a collection point for all security information related to each user.
- User Identification - All users of the system must identify themselves to the system.
- Object Authorization - Specifies the individual user's rights of use of the system resources.

Enforcement functions of Security are:

- User Verification - Verifies a user's identity to control access to the system.
- Object Verification - Assures user's right to access system devices, programs, and data objects.

- Security Information Displays - Provides security status displays to the security officer to aid controlling security.

Security may be controlled by library and/or the objects within a library. A special function exists to allow the owner of a program to allow authorized users of the program to use their authorizations. This can be used to minimize the number of detail specifications and ensure that certain functions and file accesses are performed only under the control of specific application programs. Data Base allows specific file formats to be created to provide a form of field level security.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/38 Control Program Facility Licensed Program Specifications (GC21-7763).*

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**5714-SS1 - SYSTEM/38 CONTROL PROGRAM FACILITY  
RELEASE 5.0 ENHANCEMENTS**

**PURPOSE**

System/38 CPF is enhanced in Release 5.0 to include: Support for additional devices, communication enhancements, a commitment control (recovery/restart) function and many other functional improvements.

**Release 5.0 HIGHLIGHTS**

- Communications Support
  - Advanced Program-to-Program Communications (APPC)
  - SNA-Alert Support
  - Mixed file and High-Level Language (HLL) Multiple Device Support
  - Error Recovery Procedure Enhancements
  - High-Speed Line Enhancements
  - 3270 Device Emulation
- Device Support
  - Existence check on media (diskette, tape)
  - Diskette command improvements
- Commitment Control
  - A commitment boundary restart aid, which assists in restarting following abnormal job or system termination.
- Spool Enhancements
  - DSPOUTQ identification of forms type and number of copies
  - Start a writer to a forms type
  - Support of change writer
- Save/Restore
  - Save/Restore of logical file access paths
  - Save/Restore of message, job and output queue descriptions
  - Option to prevent incomplete saves
  - Optional listing for restore objects
  - Improved allocation of source members
  - Improved tape error recovery
- Journal
  - Protection against deletion of unsaved journal receiver
  - New default for Apply Journal Change command
  - Retrieve Journal Entry command
  - Compare Journal Images command
  - Enhanced journal displays
- Work Management
  - Local data area
  - Change of a job's execution attributes
  - Option to control job log creation
  - DSPJOB enhancements
  - Job start/completion message enhancements
  - Display Active Job (DSPACTJOB) and Display System Status (DSPSYSSTS) enhancements
  - Job description parameter in user profile
  - Retaining once active batch jobs on job queues
- Security
  - Operations from the DSPOBJAUT display
  - Generic grant/revoke of authority
  - Revoke object authority feedback
  - Display user profile option for changes
  - Authority checking from system menus/displays
- Library Support
  - Add and remove from library list commands
  - Delete by generic name
  - Library display command enhancements
- CL/Prompter
  - Inquiry message capability on unmonitored messages
  - Send user message command
  - Data base sequential input in CL programs
  - Retrieve job attributes command enhancements
  - Selective prompting
  - Noninteractive commands used with the prompter
  - Return resulting command from prompter without executing
- Data Base
  - Rename member command
  - User notification of access path rebuild at open
  - Access path rebuild options at IMPL
  - Option to force access paths more frequently
  - Freeing of space with CLRPFM
- Other Enhancements
  - Conditional defaults for inquiry messages
  - Copy file enhancements and new copy commands

- Most create commands will use source text as a default
- Display file description command option for outfile
- Increase in number of values for the DDS VALUES keyword
- Messages used as constants in DDS
- Command selection menu enhancements
- Programmer and systems operator menu prompting for SBMJOB option
- Option to preserve edit codes and system values at install
- Multidimension array support in debug functions
- RPG auto report added to programmer menu
- Forty-eight character names in debug functions
- Ease of conversion from System/34
  - Several of the previously described native functions will provide a simpler conversion from System/34.

**DESCRIPTION**

**Communications**

- Advanced Program to Program Communications (APPC)
 

APPC is a CPF enhancement that provides a program-to-program protocol between two applications in different products. APPC is based on SNA architecture and provides a peer relationship between the interconnected products. This support allows System/38 to function as a departmental node with the ability to duplicate systems between departments. Additionally, it provides horizontal growth capability.
- SNA-Alert Support
 

This enhancement allows the remote host network operator to be notified of certain system conditions to assist in problem determination.
- Mixed File and High Level Language (HLL) Multiple Device Support
 

This enhancement provides new function and an improved interface for multiple device applications.
- Communications Error Recovery Procedures (ERP)
 

This function enables users to recover from many communication errors with little or no operator intervention.
- High-speed Lines Enhancement
 

Allows high-speed (57.6K bps) local attachment of System/38 to 3705.

Allows high-speed (56.0K bps) remote communication to 3705, 4331 Communications Adapter, and System/38.
- 3270 Device Emulation
 

This enhancement allows the System/38 and locally or remotely attached 5250 Information Display System devices to appear as a 3270 control unit and devices.

For more information on the Communications Enhancements for Release 5.0, see Programming Announcement Letter dated January 14, 1983.

**DEVICE SUPPORT**

- Existence Check on Media Commands
 

The new commands CHKDKT and CHKTAP are provided to allow the user to check for the existence of a specific volume (or file) label on a diskette or tape. For example, this allows a program to precheck the existence of the correct media before proceeding on a specific function using that media.
- Diskette Command Improvements
 

The SUFFIX parameter has been added to the CLRDKT, INZDKT, RNMDKT, and DLTDKTLBL commands. The RNMDKT command now supports a range of diskettes within a magazine thus allowing an entire magazine to be renamed.

**Commitment Control**

Commitment control is a function designed to assist the user in recovery/restart of applications. The most difficult aspect of restart in a complex transaction environment is ensuring that restart will occur when all files are at a specific point. Commitment control ensures that a job is at a specific point (called a commitment boundary) in the event of a system or job abnormal termination.

The user defines his commitment control environment in CL statements and specifies the files to be under commitment control in RPG or COBOL. New operations are supported in RPG, COBOL, and CL to allow the user to request a group of data base changes to be committed or rolled back. The rollback function allows the user to easily cancel a group of data base changes when the application program senses a need to cancel the effect of a transaction. Through commitment control, the system will implicitly roll back any uncommitted changes in case of a system or job failure.

## System/38 CPF R5.0 (cont'd)

Restart can normally be provided by user coding which would access the last transaction record entered by an operator or by using a commitment control notify object. The notify object allows the program to store information about the last transaction before a failure in a data base file, a message queue, or a data area.

Data base files used in a commitment control environment must be journaled to the same journal.

All data base changes which are part of a commitment boundary will be locked until either a commit or rollback occurs. Optionally, records can also be locked in read-only files where the contents of a record should remain static until a commit or rollback occurs.

Commitment control functions will also allow the user to retain locks on multiple records in a single file.

Because the commitment control function will cause data base records to be locked until a commit or rollback occurs, the user must consider the frequency of issuing a commit or rollback. A commitment boundary which can span multiple enter keys can cause other users to wait until the commitment boundary is reached. In the event of a record lock timeout, the message which occurs will be enhanced to include the job name which has caused the record to be locked. The DSPJOB menu will provide an option to show the commitment control status.

### SPOOL

- DSPORTQ support of Forms Types and Copies

The DSPORTQ display will add columns for forms type and number of copies. This information will be truncated if displayed at the 64-character console device.

- Start a Writer to a Forms Type

A new parameter will be added to STRPRTWTR to allow the user to control what form types in an output queue should be output. A CHGWTR command will also be available to allow formtype and output queue to be changed for an active printer writer without ending the writer. These functions should allow better control when dealing with special form types and help minimize the overhead associated with canceling and starting a writer multiple times to the same device.

- Support of Change Writer

A CHGWTR command will be available to allow form type and output queue to be changed for an active printer writer without ending the writer.

### SAVE/RESTORE

- Save/Restore of Logical File Access Paths

An option on the save commands will allow associated logical file access paths to be saved. An access path will only be saved or restored when all related physical files are saved or restored. This option will cause an increase in the amount of save time and media usage, but will decrease the amount of time necessary to complete a restore operation since the associated access paths will not have to be rebuilt.

- Save/Restore of Message, Job and Output Queue Descriptions

The object types of \*MSGQ, \*JOBQ, and \*OUTQ may be saved and restored. Only the description (not the contents) will be saved and restored. This facilitates the transfer and recovery of libraries. All object types are now supported by Save/Restore.

- Option to Prevent Incomplete Saves

An option will be added to the SAVOBJ/SAVCHGOBJ/ SAVLIB commands to ensure that all objects can be saved prior to saving them. This precheck function will allow the user to easily determine that all objects requested to be saved are available before any media is written. This can eliminate situations where a file is bypassed by the save function because the file is open for update by another user.

- Optional Listing of Restored Objects

An option will be provided on the restore commands to list each object that is being restored and its associated security-related information. The existing low level messages for a successful restore of each object will be removed to improve the performance when a large number of objects are being restored. The listing should allow a better means of security control when new objects are restored to the system.

- Improved Allocation of Source Members

An internal option will be supported by SEU and Text Management to determine the exact number of records to be written to the member after creation or maintenance is performed. This will allow the system to tailor the allocation needed for the specific member instead of using a default allocation method. This should benefit save operations since each member will have only a single disk allocation.

- Improved Tape Error Recovery

Tape error recovery has been improved to allow the user to mount a new tape when media errors occur during a save operation. This will eliminate most situations where the save function must be aborted due to media errors, by allowing the user to continue on a new tape.

### JOURNAL

- Delete Journal Receiver Protection

If an attempt is made to delete a journal receiver that has never been saved, an inquiry message will be sent to the user allowing the option to cancel or ignore. The message should assist in preventing the user from destroying his means of backup or audit trail.

- New Default for Apply Journal Change Command

The default for the TOENT parameter will be changed to \*LASTRST. This will allow the defaults of the command to be used in a normal recovery environment where the user restores his last backup and reapplies the entries in the journal from the last save up to the restore.

- Retrieve Journal Entry Command

A RTVJRNE command will be provided to retrieve a specific journal entry and return the entry into CL variables. Similar selection criteria as with the current DSPJRN command may be used. This simplifies determining the journal sequence number of journal entries which may be used to automate certain recovery or backup functions.

- Compare Journal Images Command

A command will be available to compare the before and after images for record level changes recorded in a journal and highlight the differences. A listing form of output is provided. This can assist in problem determination.

- Enhanced Journal Displays

The journal displays will be enhanced to include such things as an explanation of the code and type of journal entries and the ability to switch from a character to hex display.

### WORK MANAGEMENT

- Local Data Area

Each job will have an implicitly defined 512-byte character data area. This can be used for intrajob communication and it is also implicitly submitted to any batch jobs when SBMJOB is used. The local data area will have a name of \*LDA and may be accessed by CHG/RTV/DSPDTAARA commands. The DSPDTAARA command is enhanced to support hex values. The local data area is an alternative means of passing variables within a job and can also be used to pass variables to batch jobs.

- Changing of a Job's Execution Attributes

New options on the CHGJOB command will allow a change to the execution attributes of EXCPTY, TIMESLICE, PURGE, and DFTWAIT. The user making the change may change any job on the system, but must have the special \*JOBCTL authority defined in his user profile. This allows improved control over execution attributes.

- Option to Control Job Log Creations

A new job attribute will exist to control whether a job log should be produced if the job completes in a normal manner. This allows the user to eliminate the output of job logs except when a problem occurs.

- DSPJOB Enhancements

A new DSPJOB option will allow the display of the current library list. This output will also be supplied in the DSPJOB dump described later.

- Job Start/Completion Message Enhancements

The job start message (CPF 1124) will be enhanced to include the subsystem and the time the job entered the system (e.g., the submitted time for batch jobs). The job completion message (CPF 1164) will be enhanced to include such things as total response time, the number of interactions, the number of disk I/O operations and the type of job. Both of these messages appear in the job log and in the QHST log. This information can be useful in analyzing system workload, providing job analysis statistics, and problem determination data.

- Display Active Job (DSPACTJOB) and Display System Status (DSPSYSSTS) Enhancements

The DSPACTJOB display will provide an improved description of certain wait conditions and an indication of whether a job's

PROGRAM PRODUCTS

**System/38 CPF R5.0 (cont'd)**

execution priority has been downgraded because the time-slice has been exceeded. The DSPSYSSTS internal fields, which are used to calculate page fault rates, have been increased in size to greatly reduce wrapping.

- Job Description Parameter in User Profile

A job description parameter will be added to the user profile and \*USRPRF may be specified on ADDWSE/CHGWSE to assign job attributes to communications jobs. This also allows job attributes to be specified for work station users (instead of the current approach, by device).

- Retaining Once Active Batch Jobs on Job Queues

A new command (similar to TFRJOB) will allow a currently executing batch job to be placed on a job queue. Unlike the TFRJOB command, the new command will allow the job to remain on the job queue in the event of an IMPL.

**SECURITY**

- Operations from the DSPOBJAUT Display

If the user has appropriate authority, a CF key option will appear on the DSPOBJAUT display to allow the user to redisplay the information as input capable fields. This allows the simple changing of authorization rights, as well as allowing new users to be added and existing users to be totally removed.

- Generic Grant and Revoke of Authority

The GRT/RVK commands will allow a generic function or will allow all objects in a library to be specified. This will simplify the specifying of security authorizations.

- Revoke Object Authority Feedback

The RVKOBJAUT command will provide a diagnostic message when the user whose authority is being revoked does not have the specific authority being revoked.

- Display User Profile Option for Changes

A CF key option will be added to the DSPUSRPRF command to allow the user to display the CHGUSRPRF prompt for the same user with the current values displayed. This simplifies changing the values for the various parameters.

- Authority Checking from System Menus/Displays

Authority checking will be performed on all command functions attempted from CPF menus/displays. This will allow better security control when utilizing system menus/displays.

**LIBRARY SUPPORT**

- Add and Remove from Library List Commands

ADDLIBL/RMVLIBLE commands will be provided to allow the user to add a library before or after the existing libraries on the user portion of the library list, or remove a library from the user portion of the library list. This will offer a simple means of adding specific user libraries to the existing library list without having to know what the current list is.

- Delete by Generic Name

Most of the DLT commands are enhanced to allow use of a generic name. This will simplify operations when generic object types must be deleted.

- Library Display Command Enhancements

When the DSPLIB command is used without specifying a library, the user will be presented with a list of library names to select from. Both the DSPLIB and DSPOBJD displays will provide an entry per object to allow access to the full or service attributes provided by the DETAIL parameter of the DSPOBJD command. The DSPLIBL command has been enhanced to include the text description of the libraries.

**CL/PROMPTER**

- Inquiry Message Capability on Unmonitored Messages

CL programs will now issue an inquiry message on an unmonitored escape and let the user request ignore and retry, in addition to the cancel and dump options already supported for the CPA 0701 message. CL programs can now report errors similar to RPG or COBOL programs where inquiry messages are sent to the interactive user or system operator (depending on the type of job) when an unexpected condition occurs.

- Send User Message Command

A command will be provided for use in communicating from CL programs to users or the system operator. This will provide for simple inquiry messages to be handled in one command. A pause function is also provided. A VALUES keyword is supported to allow checking of responses and a translate table option is provided to allow conversion from lowercase to uppercase. This command

should simplify the applications where a CL program needs a minimal amount of dialog with a user.

- Data Base Sequential Input in CL Programs

CL programs will support data base sequential input files. This simplifies working with files created by functions such as DSPOBJD. The support uses the existing DCLF and RCVF commands. MONMSG may be used for the end of file condition. Only one DCLF is allowed per CL program.

- Retrieve Job Attributes Command Enhancements

The RTVJOBA command will support new parameters to allow retrieval of additional job attributes such as EXCPTY, OUTQ, LOGLVL, and USRLIBL. This will simplify the changing of these job attributes and storing/ replacing them when a subprogram with unique requirements is called.

- Selective Prompting

Selective prompting allows a CL program to use the prompter facility at execution time to prompt for a command, and control:

- Which parameters are prompted
- Which defaults appear
- If the user is allowed to change specific parameters

This allows use of the prompter to directly invoke command functions, while allowing the programmer to control what is prompted and what may be changed by the user.

- Noninteractive Commands used with the Prompter

Noninteractive commands (e.g., JOB, ENDJOB, etc.) will be prompted when PF4 is pressed. A warning message will be sent, but the user will be allowed to see the prompts for these commands.

- Return Resulting Command from Prompter Without Executing

New Program QCACHEK (similar to QCAEXEC), may be called to either syntax check or prompt a command, and have the results returned without executing the command. This may be used in prompting for commands to be submitted or logged.

**DATA BASE**

- Rename Member Command

A RNMM command will be provided to simplify operations when a member must be renamed.

- User Notification of Access Path Rebuild At Open

When the user opens a file, causing an access path to be rebuilt, a message will be sent to the external message queue stating the cause for the delay in proceeding to the function. This should minimize the need for problem determination in this circumstance.

- Access Path Rebuild Options at IMPL

Following an abnormal IMPL in which access paths have been invalidated, a display will be available to the operator. This will describe each access path which must be rebuilt, show the number of records which must be read to rebuild the access path, and allow the operator to temporarily change the value of the RECOVER option that was specified for the file. The operator will have better control over whether the system should be brought up quickly or not brought up until certain access paths are rebuilt.

- Option to Force Access Paths More Frequently

An option will be provided on CRT/CHG data base file commands to cause the access paths and underlying data to be forced to disk on every access path update. This will minimize (but will not eliminate) the exposure to an access path rebuild in case of an abnormal termination. This function can be of value in certain large file/low activity environments, but performance should be carefully considered.

- Freeing of Space with CLRPFM

When the CLRPFM command is issued, any space associated with the physical access path is reset and the file allocation is reset to its initial value. This will help provide better allocation of storage on the system.

**OTHER ENHANCEMENTS**

- Conditional Defaults for Inquiry Messages

A job attribute will be added to the JOB, CHGJOB, and SBMJOB commands, and may be placed in a job description to determine automatic action when an inquiry message is sent by a program such as CL, RPG, or COBOL. The user may choose to:

- Send the inquiry message
- Send a default reply
- Use a new system-defined object for system reply values

PROGRAM PRODUCTS

System/38 CPF R5.0 (cont'd)

Commands exist to maintain the system reply list which allows entries for specific or generic messages. An option exists to allow a DSPJOB dump prior to replying to the message. This may be used for many functions such as:

- Automatically taking a DSPJOB dump and a program dump, and cancelling the program when an inquiry occurs. This can be used to eliminate operator intervention and ensure that problem determination information exists.
- Automatically responding to some messages which are sent to the system operator (messages relative to mounting the proper print belt, for example).

• Copy File Enhancements and New Copy Commands

Enhancements to the CPYF command support have been made to allow such functions as creating the TOMBR when it does not exist, copying zero records, better handling of packed keys, and generic FROMMBR support. A new CPYSRCF command is provided which is designed to work with source members and provide a formatted listing. Four new commands (CPYFRMDKT, CPYTODKT, CPYFRMTAP, and CPYTOTAP) are available to simplify use of copy functions using diskette or tape. These commands support most of the device parameters found on the corresponding OVRDKTF and OVRTAPF commands.

• Most Create Commands Which Use Source Will Default TEXT

Most of the CRT commands which use source members will change the default of the TEXT parameter to default to the text description of the source member. This will simplify the creation and retention of text descriptions on various objects.

• Display File Description Outfile Option

The DSPFD command will provide an OUTFILE option which will allow the attributes of the various file types to be placed in a data base file. A new parameter will control the subtype of file output. This output file option will allow many applications to take advantage of the attributes and statistics stored in the file descriptions to create reports and control various functions.

• Increase in Number of Values of DDS VALUES Keyword

The DDS keyword VALUES will accept up to 100 entries instead of the current limit of 20. This should simplify the validity checking of certain fields.

• Messages Used as Constants in DDS

A new DDS keyword (MSGCON) will allow the contents of a message description to be compiled into a device file. This can be used to simplify certain standard text functions used in multiple files.

• Command Selection Menu Enhancements

A new command will be supported and will be an option on the programmer and system operator's menus to allow the user direct access to an enhanced version of the command selection menu. This will allow the user who knows a verb (e.g., CNL), or an object (e.g., SBSDD), or a common abbreviation (e.g., JOB) to access all the commands with the same letter combinations. Over 175 additional menus will exist to simplify the process of selecting the proper command.

• Programmer and System Operator Menu Prompting for SMBJOB Option

The programmer and system operator menus will allow access to the prompter for the entry of RQSDTA when Option 6 is requested. In addition, the value in the RQSDTA field will be syntax checked as if it is a command. This will allow the full use of the prompter when submitting jobs from these menus.

• Install Options for Edit Codes and System Values

Additional options will appear on the install prompt to allow retention of installed edit codes or system values. This will simplify the installation of a new release.

• Multidimension Array Support in Debug Functions

The debug commands will allow changing and displaying of variables with up to three dimensions. This is specifically designed for COBOL support.

EASE-OF-CONVERSION From System/34

The release includes general enhancements which can make it easier to convert from System/34. This includes such functions previously discussed as:

- Messages used as constants in DDS.
- CHKDKT command to check for the existence of a volume ID or file label on diskette.
- Display output queue of a forms type.
- Start a writer to a forms type.
- Local data area.

- Delete by generic name.
- Inquiry messages on unmonitored escape messages in CL programs.
- Send user message command.
- Rename member command.
- Copy file enhancements and new commands.
- Mixed file and HLL multiple device support.

**Customer Education:** System/38 CPF education is available as follows:

Title	Course Code
System/38 Concepts	A2510
System/38 Application Analysis	A2003
System/38 Application Programming Workshop	A2004
System/38 Implementation I	A2001
System/38 Implementation II	A2501

These courses will be updated to reflect the Release 5.0 enhancements.

PLANNING INFORMATION

For existing users, Release 4.1 must be installed prior to installing Release 5.0.

CUSTOMER RESPONSIBILITIES

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The IBM System/38 CPF runs on all models of the IBM System/38.

All IBM licensed programs for System/38 are designed to operate in an environment that includes the System/38 CPF (5714-SS1) or its equivalent. The licensed program order should be entered via AAS at the same time as the system order. IBM's ability to provide concurrent hardware maintenance is dependent upon functions provided by the CPF or its full equivalent support.

SOFTWARE REQUIREMENTS: None

DOCUMENTATION

(available from Mechanicsburg)

The following documents are scheduled to be updated and available in June 1983:

- S/38 Guide to Publications, Glossary and Master Index (GC21-7726)*
- ... S/38 Installation Manual - Conversion Planning (GC21-7732) ...*
- S/38 Guide to Program Product Installation and Device Configuration (GC21-7775) ... S/38 Operator's Guide (SC21-7735) ... S/38 Programming Reference Summary (SC21-7734) ... S/38 Messages Guide: CPF, RPG III and IDU (SC21-7736) ... S/38 Problem Determination Guide (SC21-7876) ... S/38 Control Language Reference Manual (SC21-7731) ... S/38 Control Program Facility Licensed Program Specifications (GC21-7763) ... S/38 Control Program Facility Programmer's Guide (SC21-7730) ... S/38 Control Program Facility Reference Manual - Data Description Specifications (SC21-7806) ... S/38 Programmer's/User's Work Station Guide (SC21-7744) ... S/38 Data Communications Programmer's Guide (SC21-7825) ... S/38 3270 Emulation Utility Reference Manual and User's Guide (SC21-7961).*

RPQs ACCEPTED: No

## SYSTEM/38 INTERACTIVE DATA BASE UTILITIES (IDU) 5714-UT1

### PURPOSE

The IBM System/38 Interactive Data Base Utilities (IDU) licensed program is a package of data handling utilities. The utilities can be invoked by multiple users, concurrent with other system operation.

### HIGHLIGHTS

The following utilities are provided with the System/38 Interactive Data Base Utilities:

- Source Entry Utility (SEU)
- Screen Design Aid (SDA)
- Data File Utility (DFU)
- Query Utility

**Source Entry Utility:** Source Entry Utility (SEU) is the means by which the user enters and maintains source statements for Control Language (CL), RPG III, COBOL, Data Description Specifications (DDS), and Utility Definition Statements (UDS).

Predefined formats are provided for RPG III, COBOL, CL, DDS, Reformat Utility, and UDS entry and update. Syntax checking is provided for source entry and update of CL, RPG III (if RPG III compiler available), COBOL (if COBOL compiler available), DDS, and UDS. Syntax checking may be turned off or on and various formats may be selected during SEU execution. The System/38 CPF Prompter may be optionally invoked during entry and modification of CL source statements.

SEU can be used to:

- Create a new source file member and enter statements into it
- Add statements to an existing source member
- Modify statements in a source member
- Delete a single statement or a group of statements from a source member
- Move a single statement or a group of statements from one location to another within a source member
- Copy a single statement or a group of statements at another location within a source member
- Include a single statement or a group of statements into a source member from another member in the same or a different source file
- Locate a statement by scanning for a specified character or string of characters and, optionally, substitute another character or string of characters
- Scan and substitute forward or backward through a member
- Shift right or left a single statement or a group of statements a specified number of spaces
- Insert a record format line between statements as a keying aid
- Do user-controlled record positioning
- Slide displayed statements left or right (windowing) for viewing
- Do intermixed functions concurrently (adds, deletes, changes, move/copy, etc.)
- Insert (add) a specified number or an infinite number of statements
- Syntax check a limited portion or entire source member at any time
- Optionally change from one syntax checker to another without exiting from SEU
- Select any record format at any time
- Do user-controlled compress/expand substitution
- Optionally display member selection list on entry into SEU
- Delete members from a source file
- Optionally display member selection list for a browse file
- Display both the member being edited and the member being browsed on a split screen
- Browse a spooled output file
- Scan for errors in the member being browsed
- Locate a statement in a browse member by scanning for a specified character or string of characters
- Update the member being edited while browsing another member on the split screen
- Exit without updating the source member
- Create a new source member from the exit menu
- Optionally return to the member selection list from the exit menu

- Do optional recovery if abnormally terminated (the recovery option is automatically displayed the next time SEU (EDTSRC) is requested to edit the member)
- Display comprehensive HELP text available during SEU execution

### DESCRIPTION

**Screen Design Aid:** The Screen Design Aid (SDA) is an interactive utility which is used by the programmer to design and maintain display formats, application menus, and the Control Language (CL) programs to execute the menus.

The following are some of the ways in which SDA assists the programmer in the design and maintenance of display formats and menus:

- Makes available the comprehensive display file description capabilities of DDS without the need to have detailed knowledge of the DDS coding form, keywords, or syntax.
- Provides a graphic representation of the display format being created or changed as it is being designed or changed, thus avoiding the tedious trial and error traditionally associated with designing an acceptable display format.
- Provides the capability to display and select fields from a field reference file.
- Provides the capability to create a new display format or menu based on an existing version.
- Facilitates extended field definition by presenting selectable keyword values in functional groups.
- Provides comprehensive testing of displays, allowing user selection of the data to be shown and the status of each conditioning indicator for each test.
- Provides the facility to create application menus and the CL programs required to drive them.
- Provides immediate diagnostic messages for most errors.
- Provides comprehensive online HELP text to assist in the selection and use of SDA and DDS function.

SDA can be executed on any model of the System/38 having at least one IBM 5251 Display Station mdl 11 or 12 attached. SDA cannot be executed from a 960-character screen display station or the system console. SDA can be used to design and maintain display formats which will be used on small display stations or the system console.

SDA can be executed concurrently with other system functions. Also, multiple users may be using SDA concurrently.

**Data File Utility:** DFU permits users to establish their own data entry application, optimized for their use, and unique to their requirements.

DFU operates on keyed data base files. Arrival sequence (nonkeyed) physical data base files can be operated upon in DFU through a keyed logical file based on the nonkeyed physical file.

The Data File Utility supports the following for externally described data base files:

- Data Entry
- Data Verify
- Inquiry (Display Data)
- File Maintenance

During DFU application definition, some of the major features of DFU permit the user to:

- Review Data Description Specifications for the file in order to select records and fields.
- Default to DDS-specified attributes.
- Define the displays to be presented during execution of the utility application.
- Define the validation to be done on any entered data.
- Specify automatic duplication of field values.
- Specify automatic field increments.
- Specify detection and correction of records containing invalid data.

During DFU application execution, some of the major capabilities of DFU permit the user to:

- Add, change, and/or delete data records.
- Print currently displayed record.
- Print totals accumulated during entry or change.
- Review descriptions of fields to aid in error correction and data entry.

**S/38 Interactive Data Base Utilities (cont'd)**

- Select Automatic Record Advance in add, verify, and change modes.
- Detect and correct records containing invalid data.
- Automatically duplicates data from a previous record.
- Search next on format allows the user to key all or part of a key on the key prompt, and request that the record with the next higher key be retrieved and displayed.

The application designer specifies an existing DDS-created data base file to begin. With that existing file format and field definitions, the application designer may:

- Default to the DDS field attributes and sequence.
- Reorder the sequence in which fields would be presented to the operator.
- Specify if record keys are to be generated by DFU.
- Specify validity checking.
- Specify verifying.
- Specify auditing.

During DFU application execution, users are presented with displays tailored to their job requirements. The user controls the interactive entry, modification, or deletion of records via DFU command keys and system function control keys.

**Query Utility:** The Query Utility enables the System/38 user to create a report from information in a data base file. This can be a logical file having up to 32 record formats based on up to 32 different physical files. Using the query file chaining facility, a second file can be associated with this file, allowing query to process two associated records as one logical record. The second file must be a keyed (physical or logical) data base file. The Query Utility provides significant capability for record selection, field selection, sequencing, summing, averaging, and tabulating, as well as major/minor table presentation.

A report of the results can be presented via a display or printer. (Note: Query supports both keyed and arrival sequenced DDS-defined data base files only.)

A series of display prompts are presented to the Query application designer. The responses to those prompts determine the report to be generated during application execution.

The application designer then, via a sequence of displays:

- Designates output format information. For printing, title and header information is specified, line width is specified, and whether the entire subset of data or just a sample is to be printed.
- Selects the record formats and fields to be used.
- Identifies the particular records to be selected. Record selection is determined by the relationship of a field in the record to a constant or to another field in the record.
- Selects the fields to be processed. Also designates for each field, its sequence for output, if it is a sort field, if it will be summed or averaged, and if it will be tabulated. The user may define result fields derived from computations on one or more fields in the same record and/or constant. A computed field can be used to add, select, sort, or build a table.

Throughout the definition process the user may:

- Review the status of the application development.
- Modify the application definition.
- Obtain a description of the prompt by depressing the Help key.

The resulting report can be detailed; summary only, or both. Tables either single or two-dimensional, allow class computation each time the field value changes. They also allow grouping of field values at specified intervals. Data printed for each table value may be a sum, accumulated sum, average, count, accumulated count, and rank.

When Query definition is complete, the user may save the definition for repeated use.

**Data File Utility (DFU) and Query Utility**

- DFU and Query Application menu interface: Both DFU and Query provide a series of menus and prompts through which the user can create, maintain, change, delete, and manage DFU and Query applications. The menu interface is an integral part of each utility. The menu interface will permit the user to easily perform the following tasks:
  - Define and create a new application.
  - Change and recreate an existing application.
  - Define and create a new application using an existing application as a base.

- Execute an existing application.
- Display the output from a query at the workstation.
- Inquire into the status of submitted queries.
- Delete an existing application.
- Change the descriptive text of an existing application.
- Rename an existing application.
- Move an existing application to another library.
- Grant/revoke the authority of other users to owned applications.
- Transfer the ownership of an owned application to another user.
- Review the names of and pertinent information about existing applications and data base files to which the user is explicitly authorized.

- The commands which invoke the DFU and Query Application Management Menus support an 'answer ahead' capability which will allow quick entry into a particular functional area of the menus or, when invoked from a CL program, can be used to restrict the activities of the user to a particular functional area, for example, execution only.

- Complete online HELP text for each prompt is provided.
- Command Function Key 1 (CF1) can be used on any prompt display to exit DFU or Query interactive definition, except the exit prompt (which requires the selection of an option and ENTER). Depression of CF1 while displaying a management menu prompt will return the user to the main menu.
- Command Function Key 2 (CF2) can be used while displaying a management menu prompt to back up to the previous display. This function is available for most displays in DFU and Query interactive definition.
- The cursor will be initially positioned in the input field most likely to be used on a prompt. This is not necessarily the first input field on the prompt.
- A fast path option is provided in the form of a question on the Output Specifications prompt in Query and the Application Control prompt in DFU.

**Program Use During Customer Pre-installation Testing:** The System/38 Interactive Data Base Utilities (5714-UT1) is available to customers for pre-installation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

**RELEASE 5 ENHANCEMENTS**

This release offers enhancements to: IDU commands, query file support, SEU source type support, and Screen Design Aid (SDA) support.

**HIGHLIGHTS**

- Concatenation expressions allowed for IDU commands.
- Query will offer a file chaining capability between a primary file and a secondary keyed access file.
- SEU will support a new source type.
- SDA will support a new keyword and mixed files.

**DESCRIPTION**

Concatenation expressions will now be allowed for parameter values on all IDU commands when used within a CL program.

Query will offer a file chaining capability to the query user. Query File Chaining will allow one or more fields from a primary file record to be used as a key to retrieve a corresponding secondary file record. This chained data can then be treated in the query application as one data record so that the query user can now print fields from it on the same line, do calculations between fields to create a result field, and specify all query functions (such as sort, select/omit, etc.) against any of the fields.

Source Entry Utility (SEU) will support a new source type for entering, editing and prompting of mixed file source statements. Syntax checking will be provided.

The Screen Design Aid (SDA) will support the INVITE keyword, the design of display record formats within mixed file source members, the creation of mixed files, and the testing of display record formats of a mixed file.



PROGRAM PRODUCTS

**S/38 Interactive Data Base Utilities (cont'd)**

**CUSTOMER RESPONSIBILITIES**

Installation of System/38 Licensed Programs is a customer responsibility.

IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

IBM System/38 Interactive Data Base Utilities run on all models of the IBM System/38. SEU (EDTSRC) and SDA require an IBM 5251 mdl 11 or 12 for execution.

**SOFTWARE REQUIREMENTS**

IBM System/38 Interactive Data Base Utilities are designed to operate with the IBM System/38 CPF (5714-SS1).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/38 Interactive Data Base Utilities Licensed Program Specifications (GC21-7761).*

The following documents are scheduled to be updated for Release 5 and available in June 1983:

*IBM System/38 Interactive Data Base Utilities Licensed Program Specifications (GC21-7761). ... S/38 Guide to Publications, Glossary and Master Index (GC21-7726) ... S/38 Screen Design Aid Reference Manual and User's Guide (GC21-7755) ... S/38 Source Entry Utility Reference Manual and User's Guide (SC21-7722) ... S/38 Data File Utility Reference Manual and User's Guide (SC21-7714) ... S/38 Query Utility Reference Manual and User's Guide (SC21-7724)*

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index



## PROGRAM PRODUCTS

**SYSTEM/38 ADVANCED PRINTER FUNCTION UTILITY  
5714-UT2****PURPOSE**

The System/38 Advanced Printer Function licensed program is a utility that provides users with a method of accessing the addressable matrix printing functions available on the 5224 Printer mdls 1 and 2 and the 5225 Printer mdls 1, 2, 3 and 4. With this utility, the user may design a form layout, design logos and special characters, and merge this data with a predefined form.

**HIGHLIGHTS**

The Advanced Printer Function Utility can be used separately or in conjunction with application programs to allow the user to:

- Design alternate character sets and symbols. These could include bold font styles, attractive character sets, special symbols, and foreign language characters.
- Design logos, emblems, signatures, and large characters.
- Design 'boxes' and boundaries on a form (i.e., organization charts and column separators on invoices).
- Design forms which could include previously defined symbols (i.e., logos).
- Print blank forms.
- Perform character highlighting and underlining.
- Merge spooled data with a forms description.
- Create simple bar charts.
- Print bar codes in various sizes and types - UPC (versions A & E), Code 39, EAN (8 and 13 digit), and modified Plessey (MSI) code.
- Print some fields at 10 characters per inch (cpi) and others at 15 cpi on the same line.

**DESCRIPTION**

The Advanced Printer Function Utility is an interactive tool designed to allow a user to create special characters and forms, and then print them using the dot matrix capability of the 5224/5225 Printers.

Menu and prompt displays guide the user through the functions. Comprehensive HELP text is available for messages and functions.

In creating special characters or symbols, the user can design the new character, using a blank area on the screen, or can modify an existing character or symbol. If a symbol or character is too large to view on the screen, a windowing option is available to allow a portion of the already created character to be displayed on the screen.

Two methods are available to facilitate the creation of large characters and symbols. One method extends the lines to the end of the display or to the end of the character by using command function keys and predefined characters. The other method requires the user to originally design the character or symbol on a small scale and then have the utility expand it by a certain factor.

To design a form and specify where the special characters, symbols, bar codes, bar charts, or boxes are located, the user is presented with a blank area on a screen to position the special features. Column numbers across the top and line numbers along the side serve as reference points for the user. Various windowing options are available to quickly display to the user any part of the form.

Highlighting and underlining of fields and different character-per-inch settings for fields on a line are included as options available with Advanced Printer Function to make certain items stand out on a form. Highlighting is done by automatically reprinting a field over itself twice. Underlining can either be specified for all data in a field or only nonblank data. Two character-per-inch options - 10 cpi or 15 cpi - are available.

Predefined bar codes and bar chart symbols are provided by the Advanced Printer Function. The bar codes are Code 39, UPC (versions A & E), EAN (8 and 13 digit), and modified Plessey (MSI) code. Six bar chart symbols are provided which can be used in various combinations on the same chart. The 5224 and 5225 Printers produce a representation of bar codes and machine-readable characters, as specified by national standards, industry standards, or manufacturer's specifications for wand and scanning mechanisms. Customers should test all bar codes or machine-readable characters printed by the 5224 and 5225 to ensure that their wand or scanning device will adequately read the printed information.

The ability to draw boxes or boundaries on a form is also provided. Boxes, for example, can be used as axes on a graph, to lay out the columns of an invoice, or provide a map of an office.

Copies of blank forms can be printed at any time via a menu option. This can be especially helpful during forms design.

Merging the user application spooled data with the form description can be done either interactively or from a batch job.

Three multinational character sets are available: One wide by one tall, one wide by two tall, and two wide by two tall characters.

**CUSTOMER RESPONSIBILITIES**

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance. However, the responsibility for providing accurate ordering information, selecting and training personnel, installing licensed programs, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment.

**HARDWARE REQUIREMENTS**

The minimum configuration for which this program has been designed to operate is an IBM System/38 with:

- IBM 5381 System Unit (any model).
- One 1920-character display from the IBM 5250 Information Display System.
- One IBM 5224 Printer mdl 1 or 2 or IBM 5225 Printer mdl 1, 2, 3 or 4.

**SOFTWARE REQUIREMENTS**

The IBM Advanced Printer Function Utility is designed to operate under control of the IBM System/38 Control Program Facility (5714-SS1) Release 5.0.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/38 Advanced Function Printer Utility Licensed Program Design Objectives* (GC21-7971).

RPOs ACCEPTED: No

## PROGRAM PRODUCTS

**5714-WP1 -SYSTEM/38 ADMINISTRATIVE MANAGEMENT****PURPOSE**

The System/38 Administrative Management program consists of a set of applications designed to improve the productivity of an organization's personnel in the operation of some of their business, clerical and professional tasks. Any System/38 user familiar with the operation of the 5250 Administrative Display System (1,920-character displays) may use the Administrative Management program which consists of: Calendar Management ... Correspondence Control ... Message Facility ... Directory Management ... Link to Text Management.

**HIGHLIGHTS**

From a single display station, users may accomplish multiple tasks which will help them improve their productivity in meeting their business, clerical and professional responsibilities.

The Calendar Management application may be used to schedule and maintain appointments, meetings and conferences for individuals, and facilities such as conference rooms. The application provides for:

- ADD, CHANGE, DELETE, DISPLAY appointments and reminders.
- Security levels to control calendar access.
- Display calendar in 5-day weekly format.
- Display a listing of appointments.
- Display MORNING, BUSINESS DAY, EVENING calendar.
- Shift calendar LEFT or RIGHT a number of days.
- Schedule 'tentative' appointments on other calendars.
- Schedule 'personal' appointments which no one else can display.
- Schedule 'group' appointments with a single entry.
- Display group meeting status to check confirmed attendees.
- Schedule repeated meetings with one entry (for example, each Monday at 10:00 AM).
- Schedule repeated days with one entry.
- Display a 'composite' or group calendar to determine common available times.
- Menu-selected print options.

The Correspondence Control application may be used to:

- Log all daily incoming correspondence for ease in tracking.
- Inquire into correspondence files to assist in locating and tracking all logged correspondence.
- Directly browse online text documents.
- Provide information on ACTION items, through display station and printed reports.

The Message Facility may be used to enter and send brief, informal messages to other users, and request an answer. Messages may be 'broadcast' to more than one user or all users. Administrative Management allows users to review messages received at their display station as well.

Directory Management allows the user to define phone directory-like lists of information tailored to their needs. Support includes:

- Menu definition of directory fields.
- Tools for directory maintenance.
- Interactive retrieval by up to six search arguments.

Link to Text Management allows the Administrative Management main menu to provide a direct link to Text Management if the user is authorized to the EDTTXX command and Text Management is installed.

Administrative Management has been designed for ease-of-use by personnel in an organization who are familiar with the operation of the 5250 Information Display System. The applications are selected from a menu. Comprehensive 'HELP' text is available at the touch of a key. The Administrative Management publications contain many helpful examples and illustrations.

**DESCRIPTION****CALENDAR MANAGEMENT**

Calendar Management is designed to easily maintain schedules with the application. Scheduled appointments may be entered, changed and deleted. Personal appointments (not displayable by others) may be entered. The users may view their personal calendars in either a weekly format, or a list format. Reminders and extensive notes are also available with the calendar.

When the calendar is displayed in list form, the user may 'roll' forward or backward through the list of appointments. When the calendar is displayed in weekly form, the user may 'roll' the display vertically through the 24 hours of the day, or 'roll' the display horizontally through the days of the year.

A user may view another calendar, and schedule tentative appointments on that calendar. Calendar users may be grouped in the system so that multiple calendars may be displayed concurrently by simply entering a group identification. Displaying multiple calendars provides an easy way to find 'common available times' for multiple users.

A group scheduling facility is available with which the user can schedule a meeting and invite all the individuals from a defined group. If no group is defined, the user can select people from a selection list. Once scheduled, the status of a group meeting can be checked on a consolidated status display to see who has confirmed their appointment or removed it from their calendar.

With the repetitive scheduling function, if an appointment is desired each week at the same time for several weeks, they can all be scheduled with one entry. If several continuous days have a repeated schedule (for example, vacation from August 1-10), all the days can be scheduled with one entry.

Multiple print formats are available to offer variety in the appearance of the printed calendar.

**CORRESPONDENCE CONTROL**

Many organizations have a requirement to log correspondence. This application facilitates this function by making online information available in the user environment. For ease in locating printed material, each item of incoming correspondence may be logged into the system and is given a unique identification. Special fields are provided to assist the user in routing a document through a department or organization.

Reports of items requiring action, their due dates and responsible individuals, may be procured.

With Correspondence Control, there is less likelihood of missing key file information, thus improving the quality of work. Inquiries may be made into the file, to assist with tracking and retrieving correspondence, by author, keyword, recipient, subject, date written or date due.

**MESSAGE FACILITY**

Message Facility may be used to send brief, informal messages to other users. A 'group' message capability allows one entry to send a message to a predefined group of individuals or broadcast it to all users. If the right 'group' has not been defined, message recipients can be selected from a list of enrolled users. Messages up to 132 characters in length may be sent and received at your display station. Information in excess of 132 characters may be handled by sending multiple messages.

**DIRECTORY MANAGEMENT**

The directory management facility gives the user the ability to create, maintain, and print personalized lists, such as phone directories. The directory information can then be retrieved in several ways. For example, an installation could create a directory of all its employees (or customers) with their name, phone number, and department. The typical use would be to enter a name and retrieve the other information. However, the directory could be defined so a department number would retrieve all department personnel, or a phone number will return the person's name. The Administrative Management directory support will allow up to nine fields, with up to six being 'retrieval' fields. The user can also specify how the directory is labeled and how long fields are.

**LINK TO TEXT MANAGEMENT**

The Administrative Management main menu provides a direct link to Text Management if the user is authorized to the EDTTXX command and Text Management is installed.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance and guidance. The responsibility for personnel training, installation and continued day-to-day operation lies solely with the customer. The customer is responsible for error detection and analysis, and submission of APARs.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for this licensed program when it is operated in the following specified environments:

**HARDWARE REQUIREMENTS**

The minimum configuration is:

- IBM 5381 System Unit (any model).
- One Printer.
- One 1,920-character display from the IBM 5250 Information Display System.

**SOFTWARE REQUIREMENTS**

This program is written in IBM System/38 RPG III and CL programming languages, and executes under the control of the IBM System/38 Control Program Facility (5714-SS1), Release 5.0.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/38 Administrative Management Licensed Program Design Objectives (GC21-7951) ... IBM System/38 OFFICE/38 -Administrative Management User's Guide and Reference.*

## SYSTEM/38 TEXT MANAGEMENT 5714-WP2

### PURPOSE

The System/38 Office/38 Text Management licensed program provides the capability for System/38 users to create, store, retrieve, revise and print documents. The user may access the System/38 data base from the Text Management program interactively at edit time or at print time. This provides the capability to selectively include data base information within a text document. Forms may be created and filled-in on the display or stored in the system for later use.

The functions of Text Management are utilized interactively through a 1,920-character display of the 5250 Information Display System (including the following displays: 5251 mdls 11 and 999, 5291 mdl 001, and 5292), concurrent with data processing operations. The text program was designed with the same ease-of-installation and use as the other System/38 utilities. After installation, it is ready for use. Any user who has experience with the 5250 Information Display System on the System/38 should be able to perform the basic functions of the program with minimum learning time. Prompts and HELP text are available during program execution to assist the user, and examples of the basic functions are available in the program publications.

Documents are stored as members in files, allowing maximum flexibility for organization of documents. For example, a file can represent a folder in which all documents pertaining to a subject or job can be stored. In addition, each user can have one or more libraries for storage of document files.

Up to 21 lines of the display can be used to enter or revise text. Line commands, similar to the System/38 Source Entry Utility (SEU), as well as command keys and print controls, are used to invoke the function of the Text Management program.

### HIGHLIGHTS

- Create text
  - File by user-provided document name
  - Key new text
  - Copy in from a stored document
- Revise text
  - Retrieve document by:
    - Keying document name
    - Selecting from a list of documents in a file
    - Searching document description for character string
    - Searching for creation date (from/to)
    - Searching for document name (including partial name)
    - Any combination of searches
  - Line commands to:
    - Move
    - Copy
    - Insert
    - Delete
    - Shift
  - Text string manipulation by command key and cursor to:
    - Insert text in a paragraph
    - Move text strings
    - Copy text strings
    - Delete text strings
    - Move columns
  - Copy in from a stored document
  - Scan for character string
  - Replace character string
- Print Documents with Formatting Options For:
  - Headers/footers per page
  - Number of copies
  - Length of printer form
  - Line spacing
  - Printing review copy with line numbers
  - Printing part of document (from/to page number)
  - Flagging changes
  - Capability to utilize the following advanced print functions of the 5219 Printer:
    - Type style support
    - Alternate cut sheet feed
    - Lines per inch
    - Ribbon saver under program control
  - Sending documents to Displaywriter for printing
  - Sending documents to 6670 Information Distributor for printing
  - Font (type style) downloading capability on 6670 model II with Font Storage feature installed
- Data base access
  - Form letters with data base field insertion at print time
  - Copy data base directly into document interactively
  - Simple conditional selection by field
- Create, store, retrieve forms
- Table of contents

- Column total for numeric data

### DESCRIPTION

The user invokes the text program by entering the command or by selection from a user-created menu.

Text Management functions are selected from menus. For example, on the initial program menu, the user chooses to either create or revise, browse, print a document, or fill in a form. The user may key the document, file and library name, or key only the library name and select the file and document from displayed lists. From a document list, the user can: Select a document to revise, select a document to copy to a new document, remove a document from the file or print a list of documents. In the case of large document files, subsets of the document list can be presented as a result of user-specified searches of the list by document name or description (including partial description), and creation date (including from/to ranges).

During document creation or revision, the user can manipulate text by keying simple line commands. These line commands allow the user to:

- Insert one or more blank lines
- Copy one or more lines anywhere in the document
- Move one or more lines anywhere in the document
- Delete one or more lines
- Shift text right or left on a line

The user can manipulate text strings, such as sentences, by cursor placement (to frame the text string) and command keys to execute the function. There are command key functions for:

- Inserting text string in the document
- Moving a text string in the document
- Copying a text string in the document
- Deleting a text string
- Moving columns of text

For example, to insert text in the middle of a paragraph, the user would position the cursor at the point where the new text is to be inserted. Pressing the insert text command key would present a series of blank lines in which to key. The user would key the new text and, when finished, press the ENTER key. The paragraph would 'close up', adjusting line endings. While inserting text the user can also specify a new paragraph.

Text from another stored document can be copied into the document being created or revised. The document to be copied can be reviewed on the lower part of a split display while the document being edited remains displayed on the upper part of the screen.

The text program user can scan through a document to search for a specified character string and can also specify replacement of the character string.

The user may print interactively or utilize the batch print capability. The batch print capability will allow the user to perform other tasks while the text product is creating documents which have a large number of pages, or producing multiple copies of a document. This capability is designed to increase user productivity and enhance Text Management performance.

The user can store print format instructions with each document. Page header and footer information can be specified. Format options for: 1) line spacing, 2) positions to the left of margin, and 3) printing line numbers for review copies can be specified. The user can further indicate first and last print line, form length, number of copies, and partial document printing (from/to page number). Specification of character(s) to flag changes, when to print the flag, and whether or not to print the date of last modification can also be made.

The user can utilize some of the advanced functions of the 5219 Printer via Text Management. Supported functions include: Paper feed attachment support (which automatically feeds a cut sheet from one of two source drawers into the printer), type style selection capability, the support of lines-per-inch spacing, and the ribbon saver feature for printing draft copies of documents.

Text Management offers additional print capability via Binary Synchronous Communications (BSC) to the Displaywriter or 6670 Information Distributor. The user may direct documents to the 6670 Information Distributor or Displaywriter, for print only, using the software capability in Text Management. The System/38 is also supporting the font availability function of the 6670 model II with the Font Storage feature installed, to the extent of communicating fonts (font styles) from the System/38 to the 6670 RAM Font Storage. A corequisite for this capability is the 5799-BGN font diskette for the System/38.

The user may request that a document be produced on a 6670 Information Distributor or on a printer attached to the Displaywriter by using selections from the print options screens. On the 6670 Information Distributor, the user may utilize many of the advanced functions provided by that system, by means of System/38 Text Management prompting. No user programming is required.

**System/38 Text Management (cont'd)**

Forms can be created and stored in the system for later use. In forms mode, the user can define fields anywhere in the document which can be filled in later. There are options to define characteristics of fields defined in forms. The user can specify:

- Initial values
- Data base fields
- Numeric only
- Highlighting
- Underlining
- Centering
- Right adjust (with zero or blank fill)
- Decimal alignment

To fill in a form, the user simply retrieves it from storage and can then key into defined fields in the form. Pressing the field advance keys after keying into a form field will advance the cursor to the next field.

Text Management users can access the system data base in multiple ways. During editing of a document, the user can 'copy in' data base information in the same way that information is copied from other documents. The user can access a data base file (with options for field selection and ordering) that can be displayed on the lower portion of a split screen. Then, the data can be copied to the document being edited (displayed in the top portion of the screen).

Multiple copies of documents that require insertion of data base variables can be produced. Examples of these are: 'Past due' accounts receivable reminder to customers, order acknowledgments, and advertising to customers or categories of customers. The user creates a document and specifies the name of the data base field in the document at the location the variable is to print. Field and record selection options are supported to specify the total number of documents printed. Once the document is set up, normal print procedures are used.

A Table of Contents can be created for any document. The user specifies section headings and subheadings. As an option, the program will sequentially number the headings and subheadings and identify the page numbers. The Table of Contents can be printed anywhere in the document.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration for this program is an IBM System/38 with:

- IBM 5381 System Unit (any model).
- 1,920-character display of the IBM 5250 Information Display System.
- One IBM Printer.

**SOFTWARE REQUIREMENTS**

The IBM System/38 Text Management program is designed to operate under the control of the IBM System/38 Control Program Facility (CPF) (5714-SS1), Release 5.0.

**Other Requirements:**

- Appropriate Binary Synchronous Communications (BSC) support is necessary for the use of the IBM 6670 and Displaywriter printing capability.
- Font diskette (5799-BGN) is a System/38 prerequisite for the font availability function on the IBM 6670 model II.
- For use of the font function, the Font Storage feature is a prerequisite on the IBM 6670 model II.

**Program Use During Customer Pre-installation Testing:** System/38 Office/38 Text Management (5714-WP2) is available to customers for pre-installation testing on IBM test center systems in accordance with IBM's program testing policy.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM System/38 Office/38 Text Management Licensed Program Specifications (GC21-7964).*

**RPQs ACCEPTED:** No

## SYSTEM/38 WORK STATION SEARCH FACILITY 5714-WS1

### PURPOSE

The IBM System/38 Work Station Search Facility provides the workstation user with a powerful, yet easy-to-use tool to display records from disk files based on terminal user-selected search criteria. This IBM System/38 product is based on the proven IBM System/34 Work Station Search Facility. It includes enhancements that provide online assistance to the user during operation.

### HIGHLIGHTS

- Ease-of-operation allows non-DP personnel within the organization to search their files for information.
- Reduces the need for alphabetically sorted master file listings.
- Keyword in Context (KWIC) technique for searching alphabetic fields without requiring data base changes by the user. Blanks and special characters (if preceded or followed by a blank position) are considered delimiters.
- User-defined literals are excluded during the index creation process (for example: the, and, co, Inc . . . )
- Use of up to an eight-character search argument with null characters anywhere within the argument. This facility may be used in those cases where the exact spelling of the search criteria is unknown.
- Use any combination of six logical search operators (equal, less than, less than or equal, greater than, greater than or equal, or not equal).
- AND/OR logic to define the relationship between the primary, secondary and tertiary searches.
- Supports both the 960 and 1920-character screen versions on the 5251 and 5252 Display Stations.
- Supports System/38 physical files in either keyed sequence or arrival sequence.
- Optional user-defined security passwords to prevent unauthorized use of searches. This is in addition to the System/38 integrated security.
- Creation of up to 13 cross-reference indices per master file for fast searching of high-use data fields.
- Supports all data field formats with the exception of binary fields.
- Displays up to 20 matches at a time.
- Allows forward and backward paging, termination of a search or start of a new search at any time.
- Second level display on a selected line provides additional data from the selected master record. This screen displays unformatted data directly from the record.
- User-oriented tailoring procedure that will allow the user to easily define the required searches, and then will generate the required RPG III source programs and Control Language (CL) and evoke the required creation and execution of the index-build program.
- Online Assistance:
  - Describes features of online assistance to user.
  - Gives user the capability to review prior tailoring options and make modifications.
  - Gives user additional information about error messages.
  - Provides clarification to user during data entry about the nature and description of a field.
  - Provides tailoring option information to workstation operator when using generated search program.

### DESCRIPTION

This product (5714-WS1) is designed to process System/38 disk records. It is a cross-industry offering and will execute in conjunction with most licensed programs.

The operator will define through an interactive workstation session the search required, with up to 75 characters of information to be displayed on matching master records. Additionally, information about library and file name will be required. The *Application Installation Guide Reference Manual/Runbook* will provide the operator with an explanation of the required and optional fields to be entered during this session. Each response will be edited as the information is entered.

By displaying up to 20 records at a time that meet search criteria, the offering can reduce the need for referencing voluminous printed reports. If more than 20 records meet the criteria, the screen display can be paged forward or backward to allow a review of all matched records. Also, when the desired record is displayed, the entire contents of the record can be selected, as it appears on disk, to be further displayed.

The product application consists of four RPG programs: An interactive entry/edit program, a tailoring program, and two skeletal programs

which, when copied and modified by the tailoring program, provide user unique Index-build and Search programs.

The first segment consists of two programs. The first is an interactive entry/edit program in which unique tailoring answers to three or more displays are supplied. The second is a tailoring program that uses these answers to modify the two skeleton source programs in the other segments, and also creates operational procedures that are self-initiating. The first and second segments will be run sequentially as one session if the user does not want to modify the source prior to compilation. The sequential operations of this session would be:

1. Answers to displays are temporarily stored on disk.
2. Answers are used to tailor two skeleton RPG source programs and create tailored CL programs.
  - a. Index-build RPG program
  - b. Search RPG program
  - c. CL programs to run the Index-build and Search RPG programs
3. Creation of Index-build and Search programs.
4. Run the Index-build program which creates unique search pointer files.

If the user wants to modify the source code before compilation, only operation steps 1 and 2 will be performed. The user will need to be familiar with the source entry utility (SEU) to be able to modify either the Index-build or Search program source code. They will also need to know how to create the source programs because step 3 will not be executed.

The second segment consists of the tailored Index-build program. This program determines which data fields of a particular master file are to have pointer files created, as specified by the answers created during the running of the interactive entry/edit program. The Index-build program then creates one or more pointer records per master record for each search. If the user chooses not to modify the Index-build program before compiling, it will run automatically when both the interactive and tailoring programs are finished.

The index-build program can also run as a standalone program. The index files should be re-created after records are added or changed in the master file. The index-build program can be run any time.

The third segment of the application consists of the tailored search program. A workstation user initiates a particular search program by entering the name that was assigned during the running of the interactive entry/edit tailoring session. The search program returns a display allowing the user to key in the search request parameters. Records that match the search criteria are then displayed to the workstation user.

During the tailoring process, control logs are filled out that will aid the user in maintaining the search and index data base. Copies of these control logs, along with data entry forms, are provided to facilitate the actual entry during the tailoring process.

The *Application Installation Guide Reference Manual/Runbook* provides the user with the information necessary to install the product, execute tailoring of searches, and defines how the user would approach special situations. This document provides step-by-step instructions for operating the application.

Instructional information regarding the execution of the sample problem is provided in this manual. The sample problem will include a master file and tailoring instructions so that a user becomes self-educated on the tailoring and search programs and procedures.

The *Application Logic Manual* is provided as licensed documentation for use by the self-sufficient user and for the systems engineer in maintaining and modifying the product. Information on naming conventions, application program functions and specifications and other information pertaining to the application is presented in this manual.

### CUSTOMER RESPONSIBILITIES

Installation of IBM licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The minimum configuration for this application is an IBM System/38.

- IBM 5381 System Unit mdl 332 (128 megabytes of disk storage and 768K bytes of main storage)
- One IBM 5211 printer mdl 2 (300 lpm)

**S/38 Workstation Search Facility (cont'd)**

- One IBM 5251 or 5252 Display Station - all models

**SOFTWARE REQUIREMENTS**

The programs are written in IBM System/38 RPG III programming language and executed under control of the IBM System/38 Control Program Facility (5714-SS1). The IBM System/38 RPG III Compiler (5714-RG1) is also required.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/38 DATA PREPARATION  
5714-XA4****PURPOSE**

The IBM System/38 Data Preparation licensed program (5714-XA4) for the retail industry accepts transaction log data written on diskettes at IBM 5265 Point-of-Sale Terminals and hand-carried to the IBM System/38 host system. Data Preparation restructures IBM 5265 and 5266 Point-of-Sale Terminal transaction log records into logical records, routes them to appropriate files, and establishes initial transaction controls. The user is then able to access the logical records written by Data Preparation in the data base of the System/38.

**HIGHLIGHTS**

- Accepts point-of-sale terminal diskette transaction log records from the diskette reader.
- Restructures transaction log records into logical transaction records and writes them into the data base.
- Analyzes transaction log records to:
  - Eliminate true duplicate records.
  - Renumber different transactions having duplicate keys.
  - Recognize and automatically rectify out-of-sequence submission of diskettes.
  - Insert into logical transaction records personalization data required by subsequent processing.
- Validates store and register identification.
- Uses the Installation/Maintenance Support Facility (IMSF) as an aid in installing and maintaining the Data Preparation licensed program.

**CUSTOMER RESPONSIBILITIES**

Installation of the System/38 Data Preparation licensed program is a customer responsibility. IBM may provide marketing assistance in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration is an IBM System/38 consisting of:

- IBM 5381 System Unit, mdl 332 (768K bytes of main storage, 128MB of disk storage).
- One IBM printer.

Input will be accepted from the store-and-forward 5265 Point-of-Sale Terminals. This input may be either Diskette 1 (Basic Exchange format) or Diskette 2D (E-format only). The diskettes are read by the System/38 diskette magazine drive.

Although there is nothing inherent in the design of the application to prevent the use of the minimum system configuration stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size and operating requirements.

The amount of disk storage is influenced by:

- The volume of daily transactions.
- The frequency of processing.
- Other applications installed.

**SOFTWARE REQUIREMENTS**

The IBM System/38 Data Preparation licensed program is written in IBM System/38 RPG III and System/38 Control Language, and executes under control of the IBM System/38 Control Program Facility (5714-SS1). The IBM System/38 RPG III Compiler (5714-RG1) is required if modification of the source code is desired. The IBM System/38 Interactive Data Base Utilities (5714-UT1) is required.

**Publications:** The *RMAS General Information Manual* contains a description of the system and its application features and functions as they may be used by a typical customer. It contains three sections. The first introduces IBM's retail offering, as it pertains to the IBM 5260 Retail System terminals, with special attention to the licensed programs, of which Data Preparation is the only one for System/38. The second provides more detailed information on the major functions and operations associated with the licensed programs. The last section reviews installation and planning tasks, and customer responsibilities.

A *User's Guide* provides the planning, reference, education, and operational information needed to understand, install, manage, and use Retail Data Preparation.

A *Logic Manual* is provided as licensed material, for use by the self-sufficient customer and for the systems engineer in maintaining and modifying Retail Data Preparation.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM 5260 Retail System Introduction* (GA21-9284) ... *RMAS General Information Manual* (GH30-0136) ... *Executive Brochure* (G580-0201) ... *Product Brochure* (G580-0202) ... *Industry Segment Brochures:* ... *Department/Discount Stores* (G580-0203) ... *Speciality Stores* (G580-0204) ... *Drug Stores* (G580-0205) ... *Apparel/Shoe Stores* (G580-0206) ... *Hardgoods Stores* (G580-0207) ... *Home Furnishing Stores* (G580-0208)

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**SYSTEM/38 OFFICE/38 - APPLICATIONS MADE EASY  
5714-XE1**

**PURPOSE**

The Applications Made Easy program is one of a series of programs within IBM System/38 OFFICE/38, all of which are designed to help improve the productivity of the professional and administrative employee in the modern office environment.

With Applications Made Easy from IBM, it's not necessary to understand computers to get productive work from someone. All that's needed is an understanding of the job to be done, and an understanding of English. Without learning computer languages, or memorizing complicated codes or abbreviations, the user may readily store and retrieve business information, and has the ability to use the System/38 to:

- Enter and change information
- Format new reports
- Do calculations
- Process daily transactions

**HIGHLIGHTS**

- One-day user training through the *Learning Guide* (SB30-3006) used in conjunction with computer-assisted training.
- Easy-to-use computer interface with menus, selections from lists, and the answering of questions posed in clear English.
- HELP text in cordial English
- Error messages in clear English.
- Both the control and storage of application and data files created while using Applications Made Easy is done automatically by the program.
- Automatic documentation of applications created by this program.
- Maintenance programs and screens, and a report program, are automatically generated for each data file created with the Applications Made Easy program.
- Ability to create a new application by using a previously created similar application. (Selection from a menu option copies the existing application's definitions, requests the name for the new application, and then allows the user to change the display answers and definitions to suit the new application, without disturbing the existing one.)
- Control of application and data file security can be by department and user names, rather than codes and abbreviations.
- Messages may be sent and received by user names, rather than workstation address.
- Physical and logical files may be defined and created without coding Data Description Specifications.
- Screens and reports may be obtained without coding RPG III or Control language, or using the Data File or Query Utilities.
- Capability to create screens and reports against an externally described data base:
  - Reports with:
    - Record selection (at execution time)
    - Calculations (add, subtract, multiply, divide)
    - Average, standard deviation, and variance calculation
    - Field totals and sub-totals
  - Screens with:
    - Record selection (at execution time)
    - Calculations (add, subtract, multiply, divide)
    - Record update capability
  - Transaction Processing with:
    - Field update via replacement
    - Field totals and sub-totals
- File creation by combining fields from records of one, two or three files.

**DESCRIPTION**

Applications Made Easy is designed with major emphasis on the interface to the non-programmer user. The program is intended to help these users create and execute custom-tailored applications fundamental to their job and department, without requiring that they have knowledge of the components of the System/38, RPG III, Control Language, Physical/Logical Files, etc.).

**Application Creation:** The non-programmer user creates data files, reports, and inquiries via menus, selections from lists, and by answering clear, English-like questions. Normally required naming conventions have been eliminated so that the user should not have to use codes or abbreviations.

- Application names can be up to twenty-five (25) characters.

- File names can be up to fifteen (15) characters.
- Field names can be up to fifteen (15) characters.

**Example:**

Application Name:	CREATE EXPENSE RECORDS	not	CRTEXPRECS
File Name:	EXPENSE RECORDS	not	EXPRECS
Field Names:	EMPLOYEE NUMBER	not	EMPNUM
	EMPLOYEE NAME	not	EMPNAM
	EXPENSE DATE	not	EXPDATE
	EXPENSE AMOUNT	not	EXPAMT

Applications Made Easy retains the user's selections and answers to questions and, upon completion of the application definition, all necessary programs are generated and compiled by the licensed program.

Generation and compilation is performed in a batch mode so that the workstation and the user can continue defining other applications or executing previously defined applications. For each application, a completion report is automatically generated which details:

- The name of the application
- The owner's name
- The file(s) used
- How the information is selected from the file (key fields)
- The sequence of the file (ascending/descending)
- Whether duplicate key field records are allowed
- A listing of the fields, and
- A listing of all departments and user names authorized to use the application.

After the application has completed compilation and is available for use, a message is placed in the user's personal message queue. The user is notified to review personal messages through an information message displayed on the Main Menu.

**Installation Tasks:** The *Applications Made Easy Installation Guide* (GB30-3077), details installation procedures and contains a pre-installation planning section. The user is instructed on how to create user profiles, libraries, etc. Examples of all required commands are also given in the guide.

**SPECIFIED OPERATING ENVIRONMENT**

These programs were written to execute on the IBM System/38.

**HARDWARE REQUIREMENTS**

The minimum system configuration for this program is:

- An IBM 5381 System Unit - any model\*
  - One IBM 5251 mdl 11 or 12 Display Station (24 x 80-character screen)
  - One IBM System Printer - any model
- \* The memory and disk storage requirements will be a function of the user's particular volumes and requirements.

**SOFTWARE REQUIREMENTS**

The following IBM System/38 program functions are required:

- IBM System/38 Control Program Facility (CPF) (5714-SS1), at least Release 4.0
- IBM System/38 RPG III (5714-RG1), at least Release 4.0

**Program Services:** This program is distributed on an *as is* basis, without warranty either expressed or implied. Successful implementation depends solely on the customer's ability to integrate each program into the total inventory of 'in-house'-produced programs, including the acceptance of full maintenance responsibility. While each offering has been reviewed by IBM for its transferability and maintainability, no assurance of successful installation can be given.

As a part of this licensed program offering, telephone assistance, only for program defects, is provided by the Distribution Industry Support Center until November 30, 1983.

IBM will, without additional charge, respond to a reported defect in the current unaltered release of the licensed program, which is operated in the Specified Operating Environment, by issuing known defect correction information to the customer reporting the problem, and/or issuing corrected code or notice of availability of corrected code. However, IBM does not guarantee service results or represent or warrant that all defects will be corrected.

The Distribution Industry Support Center can be contacted on the following toll-free numbers:

1-800-227-8222 Outside California



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PP 5714-XE1.2  
Nov 83

PROGRAM PRODUCTS

**S/38 OFFICE/38 - Applications Made Easy (cont'd)**

1-800-982-5825 Inside California.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM System/38 Applications Made Easy Learning Guide (SB30-3006)*  
*... IBM System/38 Applications Made Easy Installation Guide*  
*(GB30-3077) ... IBM System/38 Applications Made Easy Reference*  
*Summary Card (SX60-0080).*

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SYSTEM/38 DISPLAY INFORMATION FACILITY  
5714-XR1****PURPOSE**

The IBM System/38 Display Information Facility provides the System/38 user with a powerful tool to build online information applications consisting of combinations of alpha search, inquiry, update, add, delete, list, and user programs. This facility is designed to be used to generate programs that will give the user online access to data files. A high degree of tailoring capability permits the users to incorporate their unique data base file formats, display formats, and report formats. These formats could be created, for example, using the System/38 Data Description Specifications (DDS) or the System/38 Screen Design Aid (SDA). The result is a user-designed online information application.

Display Information Facility is applicable to most industry classifications. Distributors and manufacturers can use the facility to create online information applications consisting of interrelated searches, inquiries, and lists for customer and receivables files; contractors can do searches, inquiries, and lists for their employees and jobs; hospitals can build patient and guarantor searches, inquiries, enter patient information, and maintain hospital files.

**HIGHLIGHTS**

- Powerful inquiry and alpha search capabilities
  - File inquiry on a unique key
  - File inquiry on a non-unique key
  - One argument alpha search-in-context (scan) on one key field (for example, customer last name)
  - Delimited search-in-context (for example, customer last name for customers located in a specific city)
- Linkage to user-written programs (for example, to allow calculations to be made on data retrieved by inquiry, with the results displayed to the user).
- Generated source RPG III and object modules.
- Ability to list files between key limit values.
- Ability to add/delete records and write to an audit file.
- Forward and backward paging among display formats.
- Display of sequential records by browsing.
- Ability to write update changes to an audit file.
- Use of System/38 (CPF) security facilities.
- A sample problem that can be used for learning and referencing.
- Online Information System (OLIS) provides HELPTTEXT when using the Display Information Facility.
- Installation/Management Support Facility (IMSF) - an aid in installing and maintaining the Display Information Facility.

**CUSTOMER RESPONSIBILITIES**

Installation of IBM System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance in the installation of IBM licensed programs, in accordance with the Marketing and Service Guidelines in the GI Section. However, the responsibility for providing accurate ordering information, personnel selection, and training, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration for the Display Information Facility is an IBM System/38 with:

IBM mdl 332 Processor with 768K bytes of Main Storage, 128MB of Disk Storage

IBM System Printer

IBM 5251 mdl 11 Display Station

Although there is nothing inherent in the design of the IBM Display Information Facility which prevents the use of the minimum system configuration stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size, and operating requirements, including the mix and types of applications.

**SOFTWARE REQUIREMENTS**

The IBM Display Information Facility licensed program is written in IBM System/38 RPG III (5714-RG1) programming language and executed under control of the IBM System/38 Control Program Facility (CPF) (5714-SS1). The IBM System/38 RPG III Compiler is required to compile the source programs generated by Display Information Facility.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual* (GH30-0145) ... *User's Guide* (SH30-0586) ... *Logic Manual* (LH30-0589) ... *Licensed Program Specifications* (GH30-0574) .

**RPGs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SYSTEM/23 ASYNCHRONOUS COMMUNICATIONS  
5715-AC1****PURPOSE**

The System/23 Asynchronous Communications licensed program consists of communications access method support, a set of communications customer support functions, and a facility for user-written communications programs using the System/23 BASIC language. In conjunction with the communications access method, the Asynchronous Communications Terminal customer support function provides the user with an interactive interface to perform asynchronous communications.

**HIGHLIGHTS**

- Provides a data transfer function which gives the System/23 Datamaster functional characteristics commonly referred to as TTY-compatible. This function uses start/stop discipline and permits the user to transfer data using the American Standard Code for Information Interchange (ASCII) translate table and the Asynchronous Communications terminal function of the licensed program.
- A code translation table is provided to convert the Datamaster internal EBCDIC code to/from ASCII code. Other tables may be built by the user.
- Provides the operator with an ease-of-use interactive function that leads the user through a step-by-step procedure using prompts and responses for defining and establishing communications and for performing other TTY functions.
- The input/output devices supported are the keyboard/display and printer.
- Provides a facility for the execution of BASIC language user-written programs to perform data transfers.

**DESCRIPTION****Communications Access Method**

A communications access method links a Datamaster communications program (either IBM-supplied or your own) with the communications network. It performs functions such as data handling, link protocol, and character set translations.

The line type can be point-to-point switched or point-to-point nonswitched on a full or half-duplex line. Only one asynchronous communications program can be executing in main storage at any given time.

**Asynchronous Data Transfer Support**

The System/23 Asynchronous Communications licensed program includes a data transfer function which gives the Datamaster characteristics commonly referred to as TTY-compatible. This function uses start/stop protocol and permits the user to transfer data using the American National Standard Code for Information Interchange (ASCII) translate table and the Asynchronous Communications Terminal function of the licensed program. This data transfer function performs batch data transfers in either manual or AUTO ANSWER mode.

This support can be used to communicate with the following IBM systems:

- S/370 mdls 135-168, 3031, 3032, 3033, 3081, 4331, 4341, 4361 and 4381 via 3704/3705-EP Release 3.0 to VM/370, using the American National Standard Code for Information Interchange (ASCII) translate table and the Asynchronous Communications Terminal function. The 3135 and 3138 attach via ICA to VM/370 and the 4331 attaches via CA to VM/370. Datamaster attachment to VM/370 is provided through VM/System Product, VM/Basic System Extensions and VM/System Extensions licensed programs with VM/370 Release 6 PLC 4 level or higher.
- Series/1 (Event Driven Executive, Realtime Programming System) (half-duplex, switched facilities).
- System/23 Datamaster (full and half duplex, switched and nonswitched).

For communications to VM/370, the facilities are full duplex, switched facilities up to 300 bps. Series/1 support is half duplex, switched facilities up to 300 bps. For communication to another Datamaster, the facilities are full or half duplex, switched or nonswitched, up to 1,200 bps.

This support uses the information created and maintained by the preparation function for program execution.

**Communications Customer Support Functions**

The communications support functions can be divided into three groups:

- A preparation function which is used to prepare for communications
- An execution function which transfers data over a communications line

- A diagnostic aid function.

The preparation function is interactive, requiring the user to respond to prompts using the keyboard/display. The prompts allow the user to describe a communications environment. Responses to the prompts are saved on diskette and are used each time the communications access method is loaded. The responses can also be updated.

The execution function transfers data to and from the Datamaster over the communications line.

The input/output devices supported by the execution function are the keyboard/display and printer.

A diagnostic aid function allows the user to list both communications statistics and trace information.

**User-Written Communications Programs**

The System/23 Asynchronous Communications licensed program provides a facility for user-written communications programs using the System/23 BASIC language. A user-written program can execute in conjunction with the communications access method to perform data transfers.

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer. The customer is responsible for error detection and analysis, and submission of APARs, but can obtain phone assistance from the Atlanta Customer Support Center (ACSC).

IBM Central Service develops and distributes program fixes, but the customer has the responsibility to apply fixes to the program. The customer can obtain phone assistance from the ACSC in applying PTFs to programs that are at the previous current levels.

IBM reserves the right to charge for any additional effort that results from providing program services for a licensed program that has been altered or is not at the proper program library release and program temporary fix level.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration required to support communications in an asynchronous network is:

- An IBM 5322 or 5324 Computer with minimum main storage size of 32K bytes.
- Communications Adapter feature #2550.
- One diskette drive or IBM 5247 Disk Storage Unit.

**SOFTWARE REQUIREMENTS**

The IBM System/23 Asynchronous Communications licensed program does not require any other system control program or licensed program for its execution.

The communications access method is distributed as machine language object code. The communications customer support functions are distributed as System/23 BASIC language BASIC format code.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM System/23 Communications Guide (SA34-0111).*

RPQs ACCEPTED: No

**SYSTEM/23  
BINARY SYNCHRONOUS COMMUNICATIONS  
5715-BC1**

**PURPOSE**

The IBM System/23 Binary Synchronous Communications licensed program consists of communications access method support, a set of communications customer support functions, and a facility for user-written communications programs using the System/23 BASIC language. In conjunction with the communications access method, the communications customer support functions can perform the following data transfer functions using Binary Synchronous Communications protocol:

- Transmit batch data
- Receive batch data
- Inquire into a host system and receive batch data

**HIGHLIGHTS**

- The System/23 Datamaster uses the line protocol of the 3741 to communicate with a variety of IBM systems.
- Includes a data transfer function which performs batch data transfers (both attended and unattended).
- The input/output devices supported are the keyboard/display, printers, and diskette.
- Provides a facility for BASIC language user-written programs to perform data transfers.
- Code translation tables are provided to convert to the Datamaster internal Multilingual Character Set to/from the National Language Version. Other tables may be built by the user.
- Provides an operator ease-of-use interactive function that leads the user through a step-by-step procedure using prompts and responses for defining and establishing communication and batch data transfer functions.

**Communications Access Method**

A communications access method links a Datamaster communications program (either IBM-supplied or customer-supplied) with the communications network. It performs functions such as data formatting, link protocol, and character set translation.

**Binary Synchronous Communications Support**

The Binary Synchronous Communications support on the Datamaster establishes the line connection, exchanges identification sequences, transmits and receives data, and executes the correct termination or disconnect procedures. The line type can be point-to-point switched or point-to-point nonswitched. Only one BSC program can be executing in main storage at any given time.

The Datamaster uses 3741 protocol to communicate with the following IBM systems at data transmission rates of up to 4,800 bps:

- System/3 mdl 15D
- System/23 Datamaster
- System/34
- System/38
- 5280 Distributed Data System
- 5265 Point-of-Sale Terminal
- 5110 Computing System
- 5120 Computing System
- Series/1 Event Driven Executive, Realtime Programming System

Datamaster is supported for attachment to System/370 mdls 115 through 168, 3031, 3032, 3033, 3081, 4331 and 4341 through CICS/VS using BTAM under VSE, VS1 or MVS. 3741 BSC protocol is provided for communications using point-to-point leased or switched facilities via ICA or CA (where applicable), or 3704/3705. In particular, support is provided for the following CICS/VS release/versions:

CICS/DOS/VS	Version 1.5	On VSE/AF	Release 2
CICS/OS/VS	Version 1.5	On VS/1	Release 7
CICS/OS/VS	Version 1.5	On MVS	Release 3.8

**Communications Customer Support Functions**

The communications customer support functions can be divided into three groups: Preparation functions which are used to prepare for communications, an execution function which transfers data over a communications line, and diagnostic aid functions.

The preparation functions are interactive, requiring the user to respond to prompts using the keyboard/display. The prompts allow the user to describe a communications environment or a communications job. A communications job is one or several data transfer functions (such as transmit, receive, or inquiry). Responses to the prompts are saved on

diskette and are used each time the job is executed. The responses can also be updated.

The execution functions transfer data to and from Datamaster over the communications line; they execute communications jobs.

The input/output devices supported by the execution functions are the diskette, keyboard/display, and printer.

Two diagnostic aid functions allow the user to run an online test of the communications link and also to list both statistics and trace information.

**Batch Data Transfer**

The System/23 Binary Synchronous Communications licensed program includes a data transfer function which performs batch data transfers in either MANUAL or AUTO ANSWER mode. This function uses Binary Synchronous Communications protocol and permits the user to transfer data with minimum operator involvement. Multiple transmit, receive, and inquiry operations, in varying combinations, can be chained together and executed as a single communications job. These functions use the information created and maintained by the preparation functions for program execution.

**User-Written Communications Programs**

The System/23 Binary Synchronous Communications licensed program provides a facility for user-written communications programs using the System/23 BASIC language. A user-written program can execute in conjunction with the communications access method to perform data transfers.

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer. The customer is responsible for error detection and analysis, and submission of APARs, but can obtain phone assistance from the Atlanta Customer Support Center (ACSC).

IBM Central Service develops and distributes program fixes, but the customer has the responsibility to apply fixes to the program. The customer can obtain phone assistance from the ACSC in applying PTFs to programs that are at the previous current levels.

IBM reserves the right to charge for any additional effort that results from providing program services for a licensed program that has been altered or is not at the proper program library release and program temporary fix level.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration required to support communications in a Binary Synchronous network is:

- IBM 5322 or 5324 Computer with minimum main storage size of 64K bytes
- Communications Adapter Feature #2550
- One diskette drive or 5247 Disk Storage Unit

**SOFTWARE REQUIREMENTS**

The IBM System/23 Binary Synchronous Communications licensed program does not require any other system control programs or licensed programs for its execution.

The communications access method is distributed as machine language code. The communications customer support functions are distributed as System/23 BASIC language BASIC format code.

**DOCUMENTATION  
(available from Mechanicsburg)**

*IBM System/23 Communications (SA34-0111).*

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## SYSTEM/23 CLIENT ACCOUNTING 5715-CA1

### PURPOSE

The IBM System/23 Client Accounting licensed program provides the accountant with powerful tools to perform client write-up activities in a more productive manner. The use of the computer for data entry, processing and report generation allows accountants to dedicate more time for the analysis and consulting functions of their profession.

The program design provides familiar accounting-based functions that are easy to implement and use. The application's functional richness and variety provide the accountant the ability to service a wide range of client businesses.

### HIGHLIGHTS

- Built-in auditability and control characteristics through the use of familiar 5-column journals, intra-application data integrity, and sequential journal numbering.
- Application documentation is designed to promote customer self-sufficiency during installation and operation.
- Ease-of-use is enhanced through:
  - Application library design
  - Menu-driven task selection
  - Consistent data entry programs and procedures for all application functions
  - Consistent file maintenance techniques including user-defined field defaults
  - Use of generally accepted accounting terminology
- Application error handling facilities
- Installation time tailoring options allow the user to select key functions and perform file sizing
- An improved program update (PTF) procedure is provided to aid the operator in applying program fixes provided by the Atlanta Customer Support Center (ACSC) or the Program Information Department (PID)
- BRADS III file definitions are provided for selected master files
- Optional security code
- Multiple-client installs on separate diskette(s)
- File sharing capability supporting concurrent operations when two 5322s are connected via a Shared Diskette Unit (5246 mdl 22)

There are two major functions in the application: After-the-fact payroll accounting, and general ledger processing and reporting. The payroll accounting function is designed to accept keyboard entries of pay period information, post that information to the employee file, print journals, registers and reports, and pass summary payroll distributions to the general ledger.

The general ledger function accepts keyboard entries, automatic (recurring) entries, payroll distribution entries, and posts them to the general ledger. The Client Accounting application will not co-reside with the System/23 Business Management Accounting System applications. However, Client Accounting will accept transferred journals from the Business Management Accounting System applications (Accounts Receivable, Accounts Payable, Billing, Payroll). Once journals are posted, general ledger reports and statements can be printed.

### DESCRIPTION

#### Features and Functions

- After-the-fact payroll recording
- Supports Earned Income Credit (EIC), non-taxable pay, and vacation/holiday pay and days
- FICA reporting for tips
- Up to three state and one local taxing bodies per client at any one time
- Up to four predefined deductions/benefits per client and one miscellaneous deduction per employee
- Automatic payroll distribution to general ledger
- Detailed journals, registers and reports for all earnings and deductions
- W-2s
- Calendar-driven general ledger - 1 to 13 user-defined accounting periods
- No 'hard close' - current and future year posting
- Automatic journal calculations and entry
- Up to five special journals
- Encumbrance and budget support

- Annual ledger capability
- Powerful and flexible statement formatting
- Quarterly spread statements
- Optional quality print for statements
- Whole dollar statement option
- Combined company general ledger capability
- Automatic year-end close
- History maintained for comparative reporting
- Default chart of accounts, statements and journals supplied
- Special file copy procedures for chart of accounts and statements

#### Auditability Features

- Balance control based on double-entry bookkeeping
- Execution control of logical posting sequence
- Audit trail fully documented in text and graphics
- Manual control logs supplied and fully documented
- Computer-numbered journals
- Posting additions list reports journals posted but not printed by the general ledger function
- Skeleton records added for posting to deleted accounts or employees

#### Program Documentation

The documentation provided is designed to help the user understand, install, and operate the application. The materials are consistent in size and format with the System/23 Datamaster publications and:

- Introduces new application users to automating typical accounting tasks in a way that invites use, reinforces efforts to learn and use, and builds confidence and willingness to re-use after learning.
- Are written in 'friendly', user-oriented language
- Are visually attractive with multicolor printing
- Are small in size to be usable in a work area with limited space
- Are presented in a step-by-step task fashion that guides the user through installation and operation
- Are designed to improve communication with the Atlanta Customer Support Center (ACSC)

The following materials are provided for this application:

**Introducing:** This book is intended for all users of the application. The owner executive, installer, operator, user department, programmer, and consultant can use this book as their first source of information about the application. The book is designed to be a general introduction to how the application fits within the user's business.

**Learning:** This learning package consists of a book, cassette, and a sample data files diskette. Separate exercises step the operator through application operations and are designed to be consistent with the system training.

**Installing:** This book details the steps to follow in installing and tailoring the application, collecting, preparing and entering the information, and scheduling operator training.

**Running:** This book contains information the operator needs in order to run the application. The learning package introduces and explains to the operator specific sections of the Running book. In addition to application training, the operator becomes familiar with the format of the Running book.

**Using:** This book is intended primarily for the user of the application information. It contains information the user needs to:

- Understand application concepts
- Prepare information for the application
- Analyze reports provided by the application
- Aid in using the reports for management of the business
- Understand alternative uses of the reports

The forms pack contains reproducible copies of all input forms needed to install and run the application as well as control logs for external (manual) controls.

**Messages:** Messages are printed as separate pages which are delivered with the application library. They are designed to be added as a section of the system message book so that the operator has one message book for the system and all installed applications.



## PROGRAM PRODUCTS

**S/23 Client Accounting (cont'd)**

**Application Logic Manual:** A separate application program manual is available as optional material. It contains record formats, logic flows, and other technical information to be used primarily by the experienced BASIC programmer interested in understanding the detail design of the application.

**Use of BRADS III (5715-RG2)**

BRADS III provides the facility for a non-programmer to define files, create and maintain the files, build file inquiries and generate reports from the file data. The System/23 Client Accounting program will support that capability by providing selected BRADS III file definitions. Thus, the task of file definition, creation, and maintenance is accomplished as part of the application. A user who has BRADS III can build inquiries and develop additional reports for the defined files to help meet requirements unique to the user and not contained in the application.

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer. The customer is responsible for error detection and analysis, and submission of APARS, but can obtain assistance from the Atlanta Customer Support Center (ACSC).

IBM Central Service is responsible for the development and distribution of program fixes, but the customer has the responsibility to apply fixes to the program and can obtain assistance in doing so from the ACSC.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/23 Client Accounting program is written in BASIC and operates on an IBM System/23 Datamaster with the following minimum configuration:

1 - IBM 5322 Computer, mdl 124 (64K, 2 MB)

1 - IBM 5241 or 5242 Printer (any mdl)\*

Diskette Sort feature (#6300)

For the user who desires dual workstation support, the minimum configuration is:

2 - IBM 5322 Computers mdl 123 (64K, 1 MB)

1 - IBM 5246 Diskette Unit mdl 21 (1 MB)

1 - IBM 5241 or 5242 Printer (any mdl)\*

Diskette Sort feature #6300

(This configuration allows for sharing of *only* 1 MB of data files.)

A typical dual work station configuration would provide sharing of up to 2 MB of master file information, and dedicated usage of the printer from either IBM 5322 Computer.

A typical dual station system would be:

2 - IBM 5322 Computers mdl 123 (64K, 1 MB)

1 - IBM 5246 Diskette Unit mdl 22 (2 MB)

1 - IBM 5241 or 5242 Printer (any mdl)\*

1 - feature #5600 printer switch cable assembly

Diskette Sort feature #6300

\* Quality print capability requires a 5242 mdl 2 Printer

**DOCUMENTATION**  
(available from Mechanicsburg)

*Client Accounting Reports Brochure (\*) ... IBM Datamaster for the Public Accountant (\*) ... Application Package (\*) ... Introducing Client Accounting (\*) ... Installing Client Accounting (\*) ... Client Accounting Messages (\*) ... Client Accounting Forms Pack (\*) ... Learning Client Accounting (\*) ... Cassettes (\*) ... Running Client Accounting (\*) ... Using Client Accounting Information (\*)*.

\* Form numbers will be announced at availability

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**5110/5120 BASIC TO SYSTEM/23  
CONVERSION AID (5715-CV1)****PURPOSE**

The IBM 5110/5120 BASIC to System/23 Conversion Aid licensed program consists of programs designed to assist in converting 5110/5120 application programs written in the BASIC language to System/23 BASIC.

**HIGHLIGHTS**

- Converts many 5110/5120 BASIC statements to System/23 BASIC
- Identifies 5110/5120 BASIC statements that require evaluation or re-coding
- Provides listings of converted programs for documentation and debugging purposes
- Initial conversion performed on 5110/5120 prior to System/23 Datamaster installation
- Multiple program conversion during one unattended job step.

**DESCRIPTION**

Successful conversion of an application is dependent upon user knowledge of:

- The internal logic of the application program
- 5110/5120 BASIC language
- System/23 BASIC language and operations

Control and data files are not converted by the 5110/5120 Conversion Aid and must be converted or manually produced on Datamaster by the user. See the conversion aid publication for an example.

The conversion aid requires that the 5110 BASIC programs being converted contain valid 5110 BASIC language syntax and that they run successfully on the 5110 or 5120 Computing System.

Converted programs may need additional manual recoding in addition to that indicated by the conversion aid in order to produce the desired results on Datamaster.

**Application Conversion**

The conversion aid programs provide assistance in each of the following four phases of application conversion:

- Preparation Phase
- Statement Listing Phase
- Conversion Phase
- Installation Phase

A 5110/5120 system is required for the first three phases and a Datamaster is required for the fourth phase.

**Preparation Phase**

Inputs to the preparation phase are a diskette containing 5110/5120 BASIC language application programs in internal format and an initialized work diskette. The conversion aid marks files on the work diskette to hold the application programs. It saves the programs in source format and writes necessary control files to the work diskette.

**Statement Listing Phase**

The conversion aid lists, by BASIC keyword category, the statements that need to be evaluated or manually recoded. The user may choose to recode these statements into other 5110/5120 BASIC statements which the conversion aid can convert, or may wait until installation on Datamaster and make the needed code changes manually. If the 5110/5120 BASIC code is changed, the conversion aid includes a procedure to store the updated programs back on the work diskette.

**Conversion Phase**

The conversion aid operates in unattended mode to convert statements and write the programs in System/23 BASIC on the work diskette in BASIC exchange or H exchange format. During the conversion, a listing is produced for each converted program. It contains:

- All original 5110/5120 BASIC statements
- The converted statement System/23 BASIC for all original messages
- Warning and caution messages, as appropriate
- Summary of message information for the converted program

**Installation Phase**

The conversion aid provides a program to transfer the converted programs from exchange format files to Datamaster source files. The transfer program is placed on a Datamaster diskette by a small, user-entered program from the conversion aid publication. During the installation phase, the listings from the conversion phase are utilized to evaluate and/or convert statements that the conversion aid could not convert.

Successful conversion of an application is dependent upon user knowledge of:

- The internal logic of the application program
- 5110/5120 BASIC language
- System/23 BASIC language and operations

Procedures, sort control, and data files are not converted by the 5110/5120 Conversion Aid and must be converted or manually produced on Datamaster by the user. See *Conversion Aid for 5110/5120* (SA34-0114) for an example.

Converted programs may need manual recoding in addition to that indicated by the Conversion Aid in order to produce the desired results on Datamaster.

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installing and continued day-to-day operation lies solely with the customer. The customer is responsible for error detection and analysis, and submission of APARs, but can obtain phone assistance from the Atlanta Customer Support Center (ACSC).

IBM Central Service develops and distributes program fixes, but the customer has the responsibility to apply fixes to the program. The customer can obtain phone assistance from the ACSC in applying PTFs to programs that are at the previous current levels.

IBM reserves the right to charge for any additional effort that results from providing program services for a licensed program that has been altered or is not at the proper program library release and program temporary fix level.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The conversion aid is designed to operate on an IBM 5110 or 5120 Computing System with the following minimum requirements:

5110	5120
5110 B22 Computer* (32K BASIC)	5110 B32 Computer* (32K BASIC)
5103 Printer	5103 Printer
5114 Diskette Unit Feature #3240 (Second Diskette Drive)	

\* Or enough memory to load the largest program being converted.

The final steps of the conversion process require the minimum IBM System/23 Datamaster system configured to support the converted application's functions and requirements. Two diskette drives and enough memory to load the largest program converted are required.

**SOFTWARE REQUIREMENTS**

The conversion aid uses the IBM 5110/5120 BASIC language and system commands. The 5110/5120 Customer Support Functions diskette initialization utility (INITIAL) is required, and the diskette copy utility (DDCOPY or IMAGCOPY) is recommended. The Datamaster Customer Support Function prepare diskette function (PREPARE) is also required. Other Datamaster functions (for example, PRESORT, SORT, INDEX) may be required for total installation of the converted programs, depending on the particular application.

The conversion aid requires that the 5110/5120 BASIC programs being converted contain valid 5110/5120 BASIC language syntax and that they run successfully on the 5110 or 5120 computing system.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5110/5120 Conversion Aid* (SA34-0114) ... *IBM 5110/5120 BASIC to System/23 Conversion Aid Licensed Program Specification* (GC34-1693).

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/23 BUSINESS REPORT/  
APPLICATION DEVELOPMENT SYSTEM III  
BRADS III (5715-RG2)****PURPOSE**

The IBM System/23 Business Report/Application Development System III (BRADS III) brings data base power to users of the IBM System/23 Datamaster. Using BRADS III, users can productively develop and install system-justifying applications, most likely without becoming or hiring programmers.

Users can also expand the value of the IBM System/23 Business Management Accounting System applications and applications written by third parties by querying the data bases and by developing new reports.

BRADS II on the 5120 has proven that non-programmers such as management, professionals, and clerical persons can and will effectively utilize the system without having to write their own programs.

BRADS III brings new, more powerful function which is even easier to learn and use.

**HIGHLIGHTS**

The BRADS III program will be made available in two separate releases. The first release of BRADS III may be used to:

- Create, maintain and update data files.
- Create screen-driven data entry programs.
- Retrieve information from the files using a simple query.
- Create formatted reports using prompted report generation screens.
- Develop complete applications through use as a:
  - Highly productive development tool. The BRADS III facilities, by themselves or in conjunction with BASIC, can be used to create a program that executes with BRADS III.
  - BASIC program generator for screens and reports. The standalone programs generated by BRADS III can be added to other BASIC programs to create applications that execute independently of BRADS III.
- Create additional queries and reports for both the System/23 Business Management and Accounting System applications through use of the BRADS III file definitions provided, and for third-party developed applications by creating BRADS III file definitions.
- Obtain extensive documentation, maintained and provided by BRADS III, that removes much or all of the requirement that the users manually document their applications.

BRADS III may be used for developing new applications, or it may be applied to existing information in record files that have been created for other System/23 Datamaster applications simply by defining those files with BRADS III file definitions.

Files resident on the 5246 Diskette Unit may be shared for input between two 5322 Computers while executing QUERY, REPORT, or COPY commands.

The second release of BRADS III adds the spread sheet generator function and may be used to:

- Produce forecasts showing expected revenues, operating costs, capital expenditures, taxes, and other expenditures
- Try a variety of 'what if' adjustments on the original spread sheet data to investigate alternative plans.
- Produce reports that examine the differences (variances) between plans or between plans and actual performance.
- Produce reports showing percentage relationships between rows or between columns (for example, growth from month-to-month).
- Consolidate or deconsolidate plans and evaluate performance of separate operating entities (for example, department, companies, products).
- Combine historical and predictive data together to produce many more reports of this nature.

The spread sheet generator facility adds a powerful set of operations to the existing BRADS III capabilities to provide the user flexibility in addressing spread sheet type applications such as:

- Balance Sheets
- Budget Planning and Forecasting
- Cash Requirements and Forecasting
- Commercial Loan Evaluation
- Common Sizing Analysis

- Comparative Analysis
- Consolidation and Deconsolidation
- Investment Analysis
- Material and Labor Requirements
- Manpower Projection
- Merger and Acquisition Analysis
- Product Planning
- Profit and Loss Statements
- Real Estate Investment

As a result of experience gained with the 5120 Spread Sheet Generator, the user interface has been enhanced and the user can see results earlier and repeat them.

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility of personnel selection and training, installation and continued day-to-day operation lies solely with the customer. The customer is responsible for error detection and analysis, and submission of APARS, but can obtain phone assistance from the Atlanta Customer Support Center.

IBM Central Service develops and distributes program fixes, but the customer has the responsibility to apply fixes to the program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/23 Business Report/Application Development System III (BRADS III) is designed to operate on an IBM System/23 Datamaster with the following minimum configuration:

- IBM 5322 mdl 123 (64K/1.0 MB)
- IBM 5241 Printer

IBM Type 2D Diskettes are required. An IBM 5322 mdl 124 (64K/2.0 MB) with an IBM 5242 Printer will significantly enhance usability and performance. Additional main storage may be required by users' programs generated by BRADS III.

**SOFTWARE REQUIREMENTS**

The BRADS III programs operate under the control of the IBM System/23 BASIC language processor. Datamaster customer support functions (specifically Diskette Prepare, Diskette Copy, Index File Generation, and SORT) are required.

**Customer Education:** First time BRADS III users should read self-study BRADS III manuals *Learning Books 1 and 2*. A similar publication, *BRADS III Learning-Spread*, should be read by those desiring to create spread sheet reports.

**DOCUMENTATION**

(available from Mechanicsburg)

*Cross Industry Brochure* (G580-0350) ... *Product Flyer* (G580-0353) ...  
... *BRADS III Reference* (SB30-2536) ... *BRADS III Learning Book 1*  
(SB30-2537) ... *BRADS III Learning Book 2* (SB30-2543) ... *BRADS III*  
*Messages* (SB30-2538) ... *BRADS III Licensed Program ...*  
*Specifications* (GB30-2539) ... *BRADS III Planning Guide* (GX60-  
0516) ... *Spread Sheet Generator Reference* (\*) ... *Learning Spread*  
*Sheet Generator* (\*) ... *Spread Sheet Generator Messages* (\*)

- \* Form numbers will be announced at Release 2 availability.

SB30-2544 contains a binder with one copy each of the following BRADS III manuals: *Reference, Messages and Codes, and Learning Books 1 and 2*.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/23 WORD PROCESSING  
5715-WP1****PURPOSE**

The IBM System/23 Word Processing licensed program (5715-WP1) provides the functions necessary for text processing and DP/WP merge processing.

Functions are selected by the operator of the IBM System/23 Datamaster through control keys, abbreviations typed on the request line, and menus. For menu-supported tasks, the operator selects the proper menu, chooses the appropriate options from that menu, and then proceeds with the task. For control key supported functions, the operator presses the proper key and then proceeds with the task.

**HIGHLIGHTS**

- Task Initiation and Control
  - Menu approach
  - Defaults for the more commonly used procedures and standards
- Text Processing
  - Display scale line showing margins, tabs, paper edges, center point, and shadow cursor
  - Vertical scrolling and horizontal segmenting to review all parts of a stored page
  - Functions to create, revise, delete, duplicate, print, store, retrieve, and change profile of documents
  - Text manipulation facilitated by:
    - Block movement of text
    - Stored formats
    - Auto carrier return
    - Line adjust and paginate functions
    - Find function
  - Interactive keying of variable information in stored letters or documents (with prompts)
- Data Processing/Word Processing
  - Completed documents assembled from letter descriptions and data processing file data
  - Format functions for data processing data
  - Optional pagination after merge

**Text Processing**

Text processing functions can be divided into these basic activities:

- Create documents
- Review or revise documents
- Store documents
- Paginate documents
- Print documents
- Personalize standard letters
- Delete documents
- Copy documents

**DP/WP Merge Processing**

DP/WP merge processing provides the functions for tailoring documents with DP file data. Merge processing aids include:

- Producing completed documents, assembled from letter descriptions and file data
- Editing formats for file data
- Optional pagination after merge

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer. The customer is responsible for error detection and analysis, and submission of APARs, but can obtain phone assistance from the Atlanta Customer Support Center (ACSC).

IBM Central Service develops and distributes program fixes, but the customer has the responsibility to apply fixes to the program. The customer can obtain phone assistance from the ACSC in applying PTFs to programs that are at the previous current levels.

IBM reserves the right to charge for any additional effort that results from providing program services for a licensed program that has been altered or is not at the proper program library release and program temporary fix level.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/23 Word Processing Program requires an IBM 5322 Computer with a minimum of 64K of user storage and .6 MB of diskette storage (mdls 420 through 444).

Any of the printers available on the IBM 5322 Computer (mdls 420 through 444) may be used for hard copy output depending on the print speed and print quality desired.

Specify code #9850 must be ordered on the IBM 5322 or 5324 to receive the proper publications for 5715-WP1.

**SOFTWARE REQUIREMENTS**

Only this licensed program is required for IBM System/23 Word Processing.

Customer Education: (self study)

*Learning to Use Word Processing* (SA34-0168 through 0171)

**DOCUMENTATION**

(available from Mechanicsburg)

*Learning to use Word Processing* (SA34-0168 through 0171) ... *Word Processing Operator's Reference* (SA34-0163) ... *Word Processing Operating Procedures* (SA34-0166) ... *Word Processing Messages* (SA34-0164) ... *Word Processing Quick Reference* (SA34-0165) ... *Word Processing Keyboard Aid* (SX34-0092) ... *Word Processing Update* (SA34-0167).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## PROGRAM PRODUCTS

**IBM SYSTEM/23 WORD PROCESSING II  
5715-WP2**

IBM System/23 Word Processing II (5715-WP2) has all of the functions of the previously announced IBM System/23 Word Processing (5715-WP1) and, in addition, the following functions have been added which enhance the capabilities for standalone Word Processing, combined Word Processing/Data Processing, and multi-page document preparation. In addition, many of these functions incorporate an additional operator ease-of-use capability.

**HIGHLIGHTS**

- Spelling verification and assistance with English language dictionary.
- Synonym assistance with English language thesaurus.
- Enriched Data Processing/Word Processing operations.
- Increased functional control of larger documents.
- Additional operator ease-of-use capabilities.

**DESCRIPTION**

**Spelling Verification and Assistance:** This function is used to check spelling and to assist in correcting words found to be in error. It can be applied to a single word or all of the words on a page or to a complete document. It uses an IBM-supplied dictionary comprised of approximately 130,000 English language words. The dictionary may be expanded by a user-supplied list of words. Approximately 7,500 characters are available for this addenda which will provide space for about 500 words. The actual number of words will depend upon the length of each word, the number of hyphenation points per word, and the number of control characters used.

When suspected spelling errors are detected, the word in question is highlighted and a list of possible correction words is displayed when the Assist function is utilized. Operators can either select one of the words on the list, key in their own correction, or indicate that the word is correct as entered.

**Automatic Hyphenation:** Automatic hyphenation can be specified by the user to insert hyphens in words that are found to cross the control zone at the right margins of the page. It starts at the top of the document and no operator interaction is required. Options are also available which permit hyphenation in interactive mode or manual mode.

This function employs the dictionary used for spelling verification and assistance. Standard dictionary hyphenation is used with the IBM-supplied dictionary. The user may also specify hyphenation for user-added words.

**Synonym Assistance:** The purpose of this function is to assist the operator in selecting alternate words with a meaning similar to the indicated word during document preparation. This function uses an IBM-supplied thesaurus\* of English language words that are organized by their use (i.e., noun, verb, adjective, etc.) and displayed to the operator in lists.

The operator may initiate the synonyms function during document creation or editing. The indicated word will then be highlighted and synonyms for the word will be displayed in lists by usage on the text screen in a graphically outlined window. Operators can then select one of the words on the displayed list for automatic insertion in the text, key in their own selected alternate word, or cancel the Synonyms operation, leaving the original word in the text.

**Enhanced WP Functions**

Clear/set all tabs  
Multiple save areas with append  
Decimal/center/right tabs  
Sub/superscript  
Page number increments  
Page GOTO  
Overstrike  
Phrase Glossary  
Prompted hyphenation during exit

**DP/WP Enhancements**

WP execution from a procedure file  
BASIC during Merge File/Text  
- Ability to write BASIC expression  
- Access to user-written BASIC function  
- Pass character strings from BASIC function to document

DP file record selection  
Get/include display file

**Document Assembly**

Get/include page  
Page split

Paginate  
Widow line control  
Keep  
Include page from document  
Auto search  
Auto replace

**Document Control**

Signon menu  
Recover document  
Operator profiles  
Document owner specified access restrictions

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer. The customer is responsible for error detection and analysis, and submission of APARs, but can obtain phone assistance from the Atlanta National Support Center (ANSC).

IBM Central Service develops and distributes program fixes, but the customer has the responsibility to apply fixes to the program. The customer can obtain assistance from the ANSC in applying PTFs to programs that are at the previous levels.

IBM reserves the right to charge for any additional effort that results from providing program services for a licensed program that has been altered or is not at the proper library release and program temporary fix level.

For program support purposes, a licensed program is considered current if it is the current release of the program and all PID-distributed refreshes/PTFs have been applied.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM System/23 Word Processing II program requires a Word Processing model of a 5322 or 5324 Computer with a minimum of 96K user storage (Models 430 through 444) and 1.1MB of diskette storage or a 5247 Disk Unit. Specify code #9851 must be ordered on the 5322 or 5324 to receive the proper publications for WP II.

**Note:** It is strongly recommended that a minimum of two diskette drives be configured for Word Processing II.

Any of the printers available on the 5322 or 5324 Computers may be used for hard copy output depending on the print speed and print quality desired.

**SOFTWARE REQUIREMENTS**

Only this licensed program is required for IBM System/23 Word Processing.

**COMPATIBILITY**

Any text previously processed by the IBM System/23 Word Processing (5715-WP1) licensed program and stored on diskette(s) may be utilized by the IBM System/23 Word Processing II (5715-WP2) licensed program for further processing or printing operations.

**DOCUMENTATION**

The following publications are available from Mechanicsburg.

*Learning to Use Word Processing* (SA34-0191 through 0195) ... *Word Processing Operator Reference* (SA34-0181) ... *Word Processing Operating Procedures* (SA34-0183) ... *Word Processing Messages* (SA34-0183) ... *Word Processing Quick Reference* (SA34-0189) ... *Word Processing Keyboard Aid* (SX34-0112) ... *Word Processing Programmer's Reference* (SA34-0201)

**TERMS and CONDITIONS:** See PP Index

\* Based upon the American Heritage Dictionaries published by Houghton Mifflin Company.

**SYSTEM/23 BUSINESS MANAGEMENT  
ACCOUNTING SYSTEM for DATAMASTER (Diskette)**

**GENERAL LEDGER for DATAMASTER (Diskette) ... 5715-XX2**  
**ACCOUNTS PAYABLE for DATAMASTER (Diskette) ... 5715-XX3**  
**ACCOUNTS RECEIVABLE for DATAMASTER (Diskette) ... 5715-XX4**  
**PAYROLL for DATAMASTER (Diskette) ... 5715-XX5**  
**INVENTORY ACCOUNTING for DATAMASTER (Diskette) ... 5715-XX6**  
**BILLING for DATAMASTER (Diskette) ... 5715-XX7**

**PURPOSE**

These multi-industry licensed programs for the IBM System/23 Datamaster (Diskette) provide the user with powerful tools to perform business accounting while providing additional management information. The programs contain functions applicable to a wide range of industry classifications.

The program design provides an accounting base of information and incorporates a flow of information in terms that are familiar to the user. This base of information is then available to improve user productivity through the managerial reporting provided by the programs.

**HIGHLIGHTS**

- Applications feature either standalone or co-resident installation with other System/23 Business Management Accounting System applications.
- Built-in auditability and control characteristics through the use of familiar 5-column journals, interapplication data integrity, and sequential journal numbering.
- Applications are interrelated through the passing of summarized transaction data between applications where appropriate and desired.
- Program documentation is designed to promote customer self-sufficiency during installation and operation.
- Ease-of-use is enhanced through:
  - Menu-driven task selection
  - Consistent data entry programs and procedures for all applications
  - Common file maintenance techniques including user-defined field defaults
  - Use of generally accepted accounting terminology
- Application error handling facilities
- Installation time tailoring options allow the user to select key functions and perform file sizing
- An improved program update (PTF) procedure is provided to aid the operator in applying program fixes provided by the Atlanta Customer Support Center (ACSC) or the Program Information Department (PID).
- BRADS III file definitions are provided with the applications for selected master files
- Optional security code by application
- Multiple-company installs on separate diskette(s)
- File sharing capability supporting concurrent operations when two 5322s are connected via a Shared Diskette Unit (5246 mdl 22)

**DESCRIPTION****GENERAL LEDGER (5715-XX2)**

The System/23 General Ledger (Diskette) application is a multi-industry application designed to accomplish the basic accounting functions of posting journal entries to the General Ledger, generating financial statements, and producing special journals. The programs are based on double-entry accounting principles in accordance with generally accepted accounting practices. Transactions may be directly entered as general journal entries and also received as summary entries from the System/23 Billing, Accounts Receivable, Payroll, and Accounts Payable applications, if installed.

**Features and Functions**

- Calendar-driven 1 to 13-period support
- User-defined fiscal year
- Optionally combined financial statements for multiple companies
- User-defined statement formatting
- Special journal capabilities which allow the users to tailor their journal's format
- Previous year history maintained for comparative statements
- Budget and encumbrance support
- Annual ledger capability
- Page width option allowing statements on 8-1/2 x 11" inch paper

- Future fiscal year posting

**ACCOUNTS PAYABLE (5715-XX3)**

The System/23 Accounts Payable (Diskette) application is a multi-industry offering designed to assist the user in controlling the outflow of cash and maintaining accurate records of liabilities to trade and other vendors. Payable items are handled on an accrual basis and vendor analysis reporting allows the user to determine key purchase volumes and discounts taken or lost for the current and previous year. Summarized journal information can be passed to the System/23 General Ledger application, if installed.

**Features and Functions**

- Allows one-time vendor checks
- Cash discount by percent or amount on invoice total or line items
- Supports multiple distributions per invoice
- Payment selection by due date and/or by vendor/invoice
- Partial payment support
- User-defined excessive check amount warning
- Debit memos available
- Vendor open-item inquiry
- Manual checks
- User-tailorable 5-column purchase and cash disbursement journals
- Default General Ledger distribution by vendor
- Default vendor cash discount percent
- Check reversals

**ACCOUNTS RECEIVABLE (5715-XX4)**

The System/23 Accounts Receivable (Diskette) application is designed to assist the user in managing one of the most important assets of a business - the money owed by its customers. This multi-industry offering provides timely information to help improve cash flow and reduce bad debt losses through control of accounts receivable. Invoice transactions can be entered directly into the Accounts Receivable application and also received from the System/23 Billing application. Cash Receipts and Adjustment transactions are entered through the Accounts Receivable data entry menu option. Accounts Receivable can also pass summarized accounting information to the System/23 General Ledger application, if installed.

**Features and Functions**

- Supports entry of non-Accounts Receivable cash such as vending machine receipts
- Open-item or balance forward account type selection by customer
- Cash and COD sales support
- Partial and overpayment of invoices
- Statement selection by customer
- Supports invoices with future due dates
- Current plus 4 past due periods
- Optional late charges by customer
- Consolidated statements for companies with multiple branches
- Interactive cash entry for open-item customers
- User-tailorable 5-column sales and cash receipts and adjustment journals

**PAYROLL (5715-XX5)**

The System/23 Payroll (Diskette) application is a multi-industry solution that performs basic payroll computations and produces payroll checks with earnings statements and supporting reports. Both hourly and salaried payroll processing is supported. Individual earnings may be taxed for up to three taxing jurisdictions per time and adjustment transaction. Summarized accounting information can be transferred to the System/23 General Ledger application, if installed.

**Features and Functions**

- Weekly, biweekly, semimonthly and monthly pay frequency
- Shift differentials as a percent of employees hourly rate or a fixed dollar amount per hour
- Hourly, exempt, and non-exempt salaried employees
- Payroll calculations provided for:
  - Gross pay
  - Federal Income Tax (FIT)
  - Federal Insurance Contributions Act (FICA)

### S/23 Business Management Accounting System (cont'd)

- State and Local Taxes
- State Disability Insurance (SDI)
- Federal Unemployment Tax Act (FUTA)
- Earned Income Credit (EIC)
- Net Pay
- Taxable and non-taxable adjustments
- Automatic deductions based on:
  - Percent of taxable gross
  - Rate per hour worked
  - Flat dollar amount per pay period
- Resetting deductions (that is, bonds)
- Automatic benefits (with optional maximums) can be calculated using the same algorithms used for automatic deductions
- Separate checks available for vacation and bonus payments
- Tip accounting with optional minimum hourly guarantee
- Workmen's compensation worksheet
- Detailed earnings and deductions shown on earnings statement

#### INVENTORY ACCOUNTING (5715-XX6)

The System/23 Inventory Accounting (Diskette) application offers management reports which aid the user in optimizing inventory levels. Up-to-date reports reflecting stock movement, on-hand positions, sales, and cost information enhance purchasing decisions. The Inventory Accounting application can receive summarized sales information from the System/23 Billing application.

#### Features and Functions

- Support for up to 3 warehouses per item
- Broken-case handling
- Pricing conversion
- Both returns and allowances supported
- Maintains both average and last cost for an item
- Both stock movement and financial information maintained
- Suggested reorder quantities based on user-supplied:
  - Minimum balance
  - Maximum balance
  - Lead time
  - Pack size
  - Vendor minimum
- Item inquiry including both item master and item balance information
- Inventory analysis based on sales, cost and profit amounts.

#### BILLING (5715-XX7)

The System/23 Billing (Diskette) application is a multi-industry billing application providing the user with the ability to create invoices for customer orders already picked and shipped. Customer and item names, prices, and tax information are automatically retrieved from the Billing Application master files during invoice entry. Summarized data is optionally available to the IBM System/23 Accounts Receivable, General Ledger, and Inventory Accounting applications, if installed.

#### Features and Functions

- Postbilling
- Selective printing of invoices
- 5 standard prices
- Pricing conversion
- Broken-case pricing
- Flexible terms and invoice discounts
- Federal Excise Tax (FET)
- Special charges and comments
- Credit memo support with returns and allowances
- Billing of non-inventory items
- Cash and COD sales
- Invoices for one-time customers
- Up to 3 sales taxes per invoice, maximum of 50 taxing bodies
- Optional profit tear strip on invoices
- User-tailorable 5-column sales journal
- Data entry overrides of master file data

#### Program Documentation

The documentation provided for each application is designed to help the user understand, install, and operate the application. The materials are consistent in size and format with the System/23 Datamaster publications and:

- Introduce new application users to automating typical business tasks in a way that invites use, reinforces efforts to learn and use, and builds confidence and willingness to reuse after learning
- Are written in "friendly", user-oriented language
- Are visually attractive with multicolor printing
- Are small in size to be usable in a work area with limited space
- Are presented in a step-by-step task fashion that guides the user through installation and operation
- Are designed to improve communication with the ACSC

The following materials are provided for each application:

**Introducing:** This book is intended for all users of the application. The owner/executive, installer, operator, user department, programmer, and consultant can use this book as their first source of information about the application. The book is designed to be a general introduction to how the application fits within the user's business.

**Learning:** This learning package consists of a book, cassette, and a sample data files diskette. Separate exercises step the operator through application operations and are designed to be consistent with the system training.

**Installing:** This package consists of a book and a forms pack. The book details the steps to follow in installing and tailoring the application, collecting, and recording the data, entering it, and scheduling operator training. The forms pack contains reproducible copies of all input forms needed to install and run the application as well as control logs pertinent to that application. Preprinted forms are documented in actual size for the user to provide to IBM SSD or to other forms vendors to minimize customer effort in forms layout.

**Running:** This book contains information the operator needs in order to run the application. The learning package introduces and explains to the operator specific sections of the Running book. In addition to application training, the operator becomes familiar with the format of the Running book.

**Using:** This book is intended primarily for the user of the application information. It contains information the user needs to:

- Understand application concepts
- Prepare input to the application
- Analyze reports provided by the application
- Aid in using the reports for management of the business
- Understand alternative uses of the reports

**Messages:** Messages for each application are printed as separate pages which are delivered with each application library. They are designed to be added as sections to the system message book so that the operator has one message book for the system and all installed accounting applications.

**Application Program Manual:** A separate application program manual is available as optional material (feature #7048). It contains record formats, logic flows, and other technical information to be used primarily by the experienced BASIC programmer interested in understanding the detail design of the application.

#### Use of BRADS III (5715-RG2)

BRADS III provides the facility for a non-programmer to define files, create and maintain the files, build file inquiries and generate reports from the file data. The System/23 Business Management Accounting System programs will support that capability by providing selected BRADS III file definitions with the applications. Thus, the task of definition, file creation, and maintenance is accomplished as part of the application. A user who has BRADS III can build inquiries and develop additional reports for the defined files to help meet requirements unique to the user, not contained in the applications.

#### CUSTOMER RESPONSIBILITIES

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

The customer is responsible for error detection and analysis, and submission of APARS, but can obtain assistance from the ACSC.

IBM Central Service is responsible for the development and distribution of program fixes, but the customer has the responsibility to apply fixes to the program and can obtain assistance in doing so from the ACSC.



PROGRAM PRODUCTS

S/23 Business Management Accounting System (cont'd)

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The IBM System/23 Business Management Accounting System programs (General Ledger, Accounts Payable, Accounts Receivable, Payroll, Inventory Accounting, and Billing) are written in BASIC and operate on an IBM System/23 Datamaster with the following minimum configurations:

- 1 - 5322 Computer, mdl 124 (64K, 2 MB)
- 1 - 5241 Printer (any mdl)
- Diskette Sort feature (#6300)

For the user who desires dual work station support, the minimum configuration is:

- 2 - 5322 Computers mdl 123 (64K, 1 MB)
- 1 - 5246 Diskette Unit mdl 21 (1 MB)
- 1 - 5241 Printer (any mdl)
- Diskette Sort feature #6300

This configuration allows for sharing of only 1 MB of data files.

A typical dual station system would be:

- 2 - 5322 Computers mdl 123 (64K, 1 MB)
- 1 - 5246 Diskette Unit mdl 22 (2 MB)
- 1 - 5241 Printer (any mdl)
- 1 - Feature #5600 printer switch cable assembly
- Diskette Sort feature #6300

This configuration would provide dual station sharing of up to 2 MB of master file information, and dedicated usage of the printer from either 5322 Computer.

DOCUMENTATION

(available from Mechanicsburg)

IBM Datamaster for Independent Business People (G580-0350) ... IBM Datamaster for Manufacturers (G580-0351) ... IBM Datamaster for Distributors (G580-0352) ... Billing Reports (G280-0229) ... Accounts Receivable Reports (G280-0230) ... Accounts Payable Reports (G280-0231) ... General Ledger Reports (G280-0232) ... Inventory Accounting Reports (G280-0233) ... Payroll Reports (G280-0234)

Unlicensed Documentation:

All publications for an application can be ordered via the application package number (SB30-2787 to 2792). If copies of individual publications are required, they can be ordered via the publication number.

	Billing	Inventory Accounting	Accounts Receivable
<b>Application Package Number</b>	<b>SB30-2790</b>	<b>SB30-2791</b>	<b>SB30-2792</b>
<b>Contains:</b>			
Introducing	GB30-2700	GB30-2711	GB30-2722
Installing	SB30-2701	SB30-2712	SB30-2723
Messages	SB30-2702	SB30-2713	SB30-2724
Forms Pack	SB30-2703	SB30-2714	SB30-2725
Learning	SB30-2704	SB30-2715	SB30-2726
Cassettes	SV30-0250	SV30-0251	SV30-0252
Running	SB30-2707	SB30-2718	SB30-2729
Using	SB30-2708	SB30-2719	SB30-2730
	<b>General Ledger</b>	<b>Accounts Payable</b>	<b>Payroll</b>
<b>Application Package Number</b>	<b>SB30-2789</b>	<b>SB30-2788</b>	<b>SB30-2787</b>
<b>Contains:</b>			
Introducing	GB30-2733	GB30-2744	GB30-2755
Installing	SB30-2734	SB30-2745	SB30-2756
Messages	SB30-2735	SB30-2746	SB30-2757
Forms Pack	SB30-2736	SB30-2747	SB30-2758
Learning	SB30-2737	SB30-2748	SB30-2759
Cassettes	SV30-0253	SV30-0254	SV30-0255
Running	SB30-2740	SB30-2751	SB30-2762
Using	SB30-2741	SB30-2752	SB30-2763

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/23 BUSINESS MANAGEMENT  
ACCOUNTING SYSTEM for DATAMASTER (Disk)**

**GENERAL LEDGER for DATAMASTER (Disk) ... 5715-XZ2**  
**ACCOUNTS PAYABLE for DATAMASTER (Disk) ... 5715-XZ3**  
**ACCOUNTS RECEIVABLE for DATAMASTER (Disk) ... 5715-XZ4**  
**PAYROLL FOR DATAMASTER (DISK) ... 5715-XZ5**  
**INVENTORY ACCOUNTING FOR DATAMASTER (DISK) ... 5715-XZ6**  
**BILLING FOR DATAMASTER (DISK) ... 5715-XZ7**

**PURPOSE**

These multi-industry licensed programs support the IBM System/23 with the IBM 5247 Disk Storage Unit attached. These programs are an extension of the IBM System/23 Business Management Accounting System for Datamaster (Diskette) in that both sets (Diskette and Disk) of licensed programs have identical accounting functions. These multi-workstation programs provide the user with powerful tools to perform business accounting while providing additional management information. The programs contain functions applicable to a wide range of industry classifications.

**HIGHLIGHTS (all programs)**

- Built-in auditability and control characteristics through the use of familiar 5-column journals, inter-application data integrity, and sequential journal numbering.
- Applications are interrelated through the passing of summarized transaction data between applications where appropriate and desired.
- Program documentation is designed to promote customer self-sufficiency during installation and operation.
- Ease-of-use is enhanced through:
  - Menu-driven task selection
  - Consistent data entry programs and procedures for all applications
  - Common file maintenance techniques including user-defined field defaults
  - Use of generally accepted accounting terminology
- Application error handling facilities
- Installation-time tailoring options allow the user to select key functions and perform file sizing
- A program update (PTF) procedure is provided to aid the operator in applying program fixes provided by the Atlanta National Market Support Center (ANMSC) or the Program Information Department (PID).
- BRADS III file definitions are provided with the applications for selected master files
- Optional security code by application within a company
- Online multi-company support
- File sharing capability supporting concurrent operations if more than one System/23 is attached to the 5247 disk storage unit
- Inquiry and data entry at any time except during file maintenance of the files being used
- A file load facility for loading selected large volume master files from multiple Datamaster workstations is provided
- During installation, support is provided for conversion of the System/23 Business Management Accounting System for Datamaster (Diskette) data files to disk
- An upgrade price for each application is available to all licensed users of the corresponding System/23 Business Management Accounting System application for Datamaster (Diskette)
- Accounting functions are identical to System/23 Business Management Accounting System for Datamaster (Diskette) licensed programs
- Master menu for user-installed applications
- All programs and data files reside on the disk (5247 Disk Storage Unit)

**DESCRIPTION****SYSTEM/23 GENERAL LEDGER (5715-XZ2)**

The General Ledger for Datamaster (Disk) application is a multi-industry offering designed to accomplish the basic accounting functions of posting journal entries to the General Ledger, generating financial statements, and producing special journals. The programs are based on double-entry accounting practices. Transactions may be directly entered as general journal entries and also received as summary entries from the Billing, Accounts Receivable, Payroll, and Accounts Payable (Disk) applications, if installed.

**Features and Functions**

- Calendar-driven 1 to 13-period support

- User-defined fiscal year
- Optionally combined financial statements for multiple companies
- User-defined statement formatting
- Special journal capabilities which allow the users to tailor their journal's format
- Previous year history maintained for comparative statements
- Budget and encumbrance support
- Annual ledger capability
- Page width option allowing statements on 8-1/2" x 11" inch paper
- Future fiscal year posting
- Automatic year-end closing

**SYSTEM/23 DISK ACCOUNTS PAYABLE (5715-XZ3)**

The Accounts Payable for Datamaster (Disk) application is a multi-industry offering designed to assist the user in controlling the outflow of cash and maintaining accurate records of liabilities to trade and other vendors. Payable items are handled on an accrual basis and vendor analysis reporting allows the user to determine key purchase volumes and discounts taken or lost for the current and previous year. Summarized journal information can be passed to the General Ledger for Datamaster (Disk) application, if installed.

**Features and Functions**

- Allows one-time vendor checks
- Cash discount by percent or amount on invoice total or line items
- Supports multiple General Ledger distributions per invoice
- Payment selection by due date and/or by vendor/invoice
- Partial payment support
- User-defined excessive check amount warning
- Debit memos available
- Vendor open-item inquiry
- Manual checks
- User-tailorable 5-column purchase and cash disbursement journals
- Default General Ledger distribution by vendor
- Default vendor cash discount percent
- Check reversals

**ACCOUNTS RECEIVABLE (5715-XZ4)**

The System/23 Accounts Receivable (Diskette) application is designed to assist the user in managing one of the most important assets of a business - the money owed by its customers. This multi-industry offering provides timely information to help improve cash flow and reduce bad debt losses through control of accounts receivable. Invoice transactions can be entered directly into the Accounts Receivable application and also received from the System/23 Billing application. Cash Receipts and Adjustment transactions are entered through the Accounts Receivable data entry menu option. Accounts Receivable can also pass summarized accounting information to the System/23 General Ledger application, if installed.

**Features and Functions**

- Supports entry of non-Accounts Receivable cash such as vending machine receipts
- Open-item or balance forward account type selection by customer
- Cash and COD sales support
- Partial and overpayment of invoices
- Statement selection by customer
- Supports invoices with future due dates
- Current plus 4 past due periods
- Optional late charges by customer
- Consolidated statements for companies with multiple branches
- Interactive cash entry for open-item customers
- User-tailorable 5-column sales and cash receipts and adjustment journals

**PAYROLL (5715-XZ5)**

The System/23 Payroll (Diskette) application is a multi-industry solution that performs basic payroll computations and produces payroll checks with earnings statements and supporting reports. Both hourly and salaried payroll processing is supported. Individual earnings may

### S/23 Business Management Accounting System (cont'd)

be taxed for up to three taxing jurisdictions per time and adjustment transaction. Summarized accounting information can be transferred to the System/23 General Ledger application, if installed.

#### Features and Functions

- Weekly, biweekly, semimonthly and monthly pay frequency
- Shift differentials as a percent of employees hourly rate or a fixed dollar amount per hour
- Hourly, exempt, and non-exempt salaried employees
- Payroll calculations provided for:
  - Gross pay
  - Federal Income Tax (FIT)
  - Federal Insurance Contributions Act (FICA)
  - State and Local Taxes
  - State Disability Insurance (SDI)
  - Federal Unemployment Tax Act (FUTA)
  - Earned Income Credit (EIC)
  - Net Pay
- Taxable and non-taxable adjustments
- Automatic deductions based on:
  - Percent of taxable gross
  - Rate per hour worked
  - Flat dollar amount per pay period
- Resetting deductions (that is, bonds)
- Automatic benefits (with optional maximums) can be calculated using the same algorithms used for automatic deductions
- Separate checks available for vacation and bonus payments
- Tip accounting with optional minimum hourly guarantee
- Workmen's compensation worksheet
- Detailed earnings and deductions shown on earnings statement

#### INVENTORY ACCOUNTING (5715-XZ6)

The System/23 Inventory Accounting (Diskette) application offers management reports which aid the user in optimizing inventory levels. Up-to-date reports reflecting stock movement, on-hand positions, sales, and cost information enhance purchasing decisions. The Inventory Accounting application can receive summarized sales information from the System/23 Billing application.

#### Features and Functions

- Support for up to 3 warehouses per item
- Broken-case handling
- Pricing conversion
- Both returns and allowances supported
- Maintains both average and last cost for an item
- Both stock movement and financial information maintained
- Suggested reorder quantities based on user-supplied:
  - Minimum balance
  - Maximum balance
  - Lead time
  - Pack size
  - Vendor minimum
- Item inquiry including both item master and item balance information
- Inventory analysis based on sales, cost and profit amounts.

#### BILLING (5715-XZ7)

The System/23 Billing (Diskette) application is a multi-industry billing application providing the user with the ability to create invoices for customer orders already picked and shipped. Customer and item names, prices, and tax information are automatically retrieved from the Billing Application master files during invoice entry. Summarized data is optionally available to the IBM System/23 Accounts Receivable, General Ledger, and Inventory Accounting applications, if installed.

#### Features and Functions

- Postbilling
- Selective printing of invoices
- 5 standard prices
- Pricing conversion
- Broken-case pricing
- Flexible terms and invoice discounts
- Federal Excise Tax (FET)

- Special charges and comments
- Credit memo support with returns and allowances
- Billing of non-inventory items
- Cash and COD sales
- Invoices for one-time customers
- Up to 3 sales taxes per invoice, maximum of 50 taxing bodies
- Optional profit tear strip on invoices
- User-tailorable 5-column sales journal
- Data entry overrides of master file data

#### Program Documentation

The documentation provided for each application is designed to help the user understand, install, and operate the application. The materials are consistent in size and format with the System/23 Datamaster publications and:

- Introduce new application users to automating typical business tasks in a way that invites use, reinforces efforts to learn and use, and builds confidence and willingness to reuse after learning
- Are written in "friendly", user-oriented language
- Are visually attractive with multicolor printing
- Are small in size to be usable in a work area with limited space
- Are presented in a step-by-step task fashion that guides the user through installation and operation
- Are designed to improve communication with the ANMSC.

The following materials are provided for each application:

**Introducing:** This book is intended for all users of the application. The owner/executive, installer, operator, user department, programmer, and consultant can use this book as their first source of information about the application. The book is designed to be a general introduction to how the application fits within the user's business.

**Learning:** This learning package consists of a book, cassette, and a sample data files diskette. Separate exercises step the operator through application operations and are designed to be consistent with the system training.

**Installing:** This package consists of a book and a forms pack. The book details the steps to follow in installing and tailoring the application, collecting, and recording the data, entering it, and scheduling operator training. The forms pack contains reproducible copies of all input forms needed to install and run the application as well as control logs pertinent to that application. Preprinted forms are documented in actual size for the user to provide to IBM SSD or to other forms vendors to minimize customer effort in forms layout.

**Running:** This book contains information the operator needs in order to run the application. The learning package introduces and explains to the operator specific sections of the Running book. In addition to application training, the operator becomes familiar with the format of the Running book.

**Using:** This book is intended primarily for the user of the application information. It contains information the user needs to:

- Understand application concepts
- Prepare input to the application
- Analyze reports provided by the application
- Aid in using the reports for management of the business
- Understand alternative uses of the reports

**Messages:** Messages for each application are printed as separate pages which are delivered with each application library. They are designed to be added as sections to the system message book so that the operator has one message book for the system and all installed accounting applications.

**Application Program Manual:** A separate application program manual is available as optional material (feature #7048). It contains record formats, logic flows, and other technical information to be used primarily by the experienced BASIC programmer interested in understanding the detail design of the application.

#### Use of BRADS III (5715-RG2)

BRADS III provides the facility for a non-programmer to define files, create and maintain the files, build file inquiries and generate reports from the file data. The System/23 Business Management Accounting System programs will support that capability by providing selected BRADS III file definitions with the applications. Thus, the task of definition, file creation, and maintenance is accomplished as part of the application. A user who has BRADS III can build inquiries and develop

**S/23 Business Management Accounting System (cont'd)**

additional reports for the defined files to help meet requirements unique to the user, not contained in the applications.

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

The customer is responsible for error detection and analysis, and submission of APARS, but can obtain assistance from the ANMSC.

IBM Central Service is responsible for the development and distribution of program fixes, but the customer has the responsibility to apply fixes to the program and can obtain assistance in doing so from the ANMSC.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

These licensed programs are written in BASIC and operate on the IBM System/23.

- Minimum Configuration
  - 1 - IBM 5322 Computer, mdl 123 (64K, 1 MB) or 1 - IBM 5324 Computer model 123 (64K, 1MB)
  - 1 - IBM 5217\*\*, 5241 or 5242 Printer (any model)
  - 1 - IBM 5247 Disk Storage Unit (any model)
  - IBM System/23 Disk(ette) Sort feature (#6300)
- Maximum Configuration:
  - 4 - IBM 5322 or 5324 Computers (any 64K model)\*
  - 4 - IBM 5217\*\*, 5241 or 5242 Printers (any model)
  - 1 - IBM 5247 Disk Storage Unit (any model)
  - IBM System/23 Disk(ette) Sort feature #6300
- \* At least one (1) of the 5322 or 5324 computers must have 1MB of diskette in any configuration. The Install, Learning and Backup/Restore functions require access to 1MB of diskette.  
Any 5322 or 5324 computer within a particular configuration that will be used for any task besides Inquiry, must have access to a printer, either by direct cabling or through the special feature (#5600) Printer Switch and Cable Assembly.
- \*\* The 5217 printer must be equipped with the optional continuous forms tractor (#7850). The standard character type wheel supplied with the printer (ASCII courier 10 - part number 1439652) will handle the printing requirements for the Business Management Accounting System applications.  
Each 5322 or 5324 computer which will utilize the 5217 printer must have the second printer attachment (#6350) installed.

**SOFTWARE REQUIREMENTS:** None

**DOCUMENTATION**

(available from Mechanicsburg)

*Billing Reports (G280-0229-2) ... Accounts Receivable Reports (G280-0230-2) ... Accounts Payable Reports (G280-0231-2) ... General Ledger Reports (G280-0232-2) ... Inventory Accounting Reports (G280-0233-2) ... Payroll Reports (G280-0234-2) ... Application Flyer (G580-0234-2) ... Proposal Insert (G280-0228-1) ... BRADS III Features and Sample Reports (G280-0237-1)*

**Unlicensed Documentation:**

The following publications will be available for each application:

*IBM System/23 Installing ... IBM System/23 Learning ... IBM System/23 Running ... IBM System/23 Using.*

Ordering instructions for publications will be provided at program availability.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**CLINICAL LABORATORY  
DATA ACQUISITION SYSTEM  
5718-H11****PURPOSE**

The IBM 1800 Clinical Laboratory Data Acquisition System (CLDAS) provides a basic framework for satisfying the data acquisition and processing requirements which exist in clinical laboratories of modern hospitals. It is designed to help alleviate some of the more pressing problems being created by an ever increasing demand for more and better laboratory services. CLDAS is directed towards increasing the productivity of the laboratory technologist, reducing the likelihood of errors in the testing process, and improving responsiveness of the laboratory.

**DESCRIPTION**

CLDAS is an online data acquisition and analysis program designed for the IBM 1800 Data Acquisition and Control System. It provides for the monitoring and automatic acquisition of data from the continuous flow type single or multiple channel automatic analyzer commonly found in laboratories today. Data reduction and analysis are then performed to convert the raw instrument readings into final determinations which are listed for verification and reporting.

**Features:** Many instruments and channels can be monitored simultaneously. Regrouping of laboratory instruments into new batteries is facilitated by a Procedure File concept. Direct monitoring of instruments provides feedback on errors as they occur. All data reduction and analysis are automatic. Modular design of the program simplifies addition of instruments and procedures.

CLDAS utilizes two data files for this function. The first, a Procedure File, containing parameters uniquely describing each laboratory procedure to be automated, is loaded by the user when the system is initially installed. CLDAS then references the Procedure File and creates the second file, a Worklist File, whenever work requiring a specific procedure enters the laboratory.

The technologist loads the automatic analyzer tray with the available samples and activates the Clinical Laboratory Data Acquisition System. The program provides for monitoring the instrument output and placing the instrument readings into the newly generated Worklist File. Potential problems such as washouts, off scale readings, shoulders, noise spikes, etc., are reported via messages to the technologist as the run progresses. At the completion of the run, the results in the Worklist File are calibrated and printed for verification and final reporting.

**CUSTOMER RESPONSIBILITIES**

CLDAS is an online data acquisition and analysis program which may be tailored to fit a user's environment. A good understanding of this program and the TSX system is required for successful installation.

The user is responsible for the direct attachment of laboratory instruments to the IBM 1800 Data Acquisition and Control System. Acceptable voltage levels must be provided to the IBM 1800 from the instruments. Device support programs must be written if devices other than continuous flow automatic analyzers are to be attached.

The user must provide the data required to build the Procedure File and to establish program parameters which define the laboratory to CLDAS.

The user should generate and maintain a compilation listing, which should be available for all personnel servicing the program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The TSX system has minimum system requirements for System Generation as outlined in *IBM 1800 Time Sharing Executive System Concepts and Techniques* (SC26-3703). CLDAS has several additional requirements. The IBM 1801 Processor-Controller must have at least 16K core storage (a minimum of 6K of variable core is required in the TSX system). An IBM 1443 Printer is required in addition to the IBM 1816 Console-Typewriter. IBM 1800 Process I/O features appropriate for the user's laboratory instruments are required (at least one word of process interrupt must be included if plateau type devices are monitored).

**SOFTWARE REQUIREMENTS**

Both IBM 1800 FORTAN and IBM Assembler language are used in CLDAS. Programming additions may be written in either language as appropriate.

**DOCUMENTATION**

*Application Description Manual* (GH20-0715).

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**CLINICAL LABORATORY MANAGEMENT SYSTEM  
5718-H12****PURPOSE**

The IBM 1800 Clinical Laboratory Management System (CLMS) is a system of files and procedures designed to satisfy the basic information processing requirements of clinical laboratories in modern hospitals. Using the Clinical Laboratory Data Acquisition System (CLDAS) program product (5718-H11) or its equivalent for the data acquisition function, CLMS provides a broad base for an information management system. CLMS, with its unique file approach, directs and controls the flow of information from receipt of the initial requisition for a test to final result reporting.

The MPX feature (#6000) to CLMS (5718-H12) facilitates the conversion of CLMS such that it can operate (exclusive of those programs designed to interface CLDAS) under the IBM 1800 MPX (Multiprogramming Executive System) Operating System. Those CLMS programs not converted are DIAGN, ERRRR, INTWV, PKINT, PLINT, SSSSS, SUWLG, SYMB, UPSET, and STATA.

**HIGHLIGHTS**

Creates and prints a master log of requested work for reference in the laboratory.

Organizes and generates worklists to be used at the work stations.

Prints a quality control listing for verification of numeric data from automatic analyzers.

Permits result verification and correction by the technologist using simple English language typewriter procedures.

Summarizes test results into patient reports.

Maintains a master file reflecting the status of laboratory requests for response to inquiry.

Collects and stores laboratory operating data for management and planning.

**DESCRIPTION**

CLMS processing revolves around a key file, the Master Log File, which maintains the status of each test as it progresses through the laboratory cycle. Initial entries in this file are created from test requisitions entering the laboratory. The system uses this file to generate the printed master log and the worklists for the various workstations. As the test runs at the workstations are completed, the system prints quality control listings to permit verification of final test results before they are made available for reporting. Upon verification, these results are placed by the system into the Master Log. Periodically, the Master Log can be reviewed and a patient report printed for completed tests. Entries into a charge file may be made at several points in the process.

The Master Log contains work status indicators which are maintained by the system. These indicators show when a specimen has physically entered the laboratory, when it has been placed on a worklist for a test run, and when a result has been obtained and is ready for reporting. These indicators are used by the system to direct the laboratory work flow. They are also available to the user for realtime response to inquiries on the status of tests.

The Master Log, in the normal course of processing, collects data on most aspects of the laboratory operation: The type and number of tests performed, the technologists performing them, the devices and procedures used, etc. This information is available to the user for the preparation of statistical and other special reports of value in managing the laboratory and planning for its future.

CLMS does not perform the data acquisition function for the laboratory. CLDAS or its equivalent must be used for this purpose. If customers intend to monitor instruments online to the computer, they should be cautioned that it requires a relatively complex programming effort.

**Use:** CLMS directs and controls the flow of information from receipt of the initial requisition for a test until the final result has been developed and is ready for reporting. It should provide a flexible base for both growth and customization of the user's clinical laboratory.

**CUSTOMER RESPONSIBILITIES**

CLMS may be tailored to fit a user's environment. A good understanding of the system is necessary for successful installation and operation.

For a description of the laboratory, CLMS uses a set of internal descriptive files. These files are created by the system from punched cards containing operational data specified by the user. By respecifying the operational data, users may at any time modify the system to reflect additions, deletions, or rearrangements in their test procedures.

CLMS uses the card reader, printer, and console typewriter as its principal means of communication with the user. However, all input and output functions of CLMS originate or terminate in a system file. These interfacing files simplify the incorporation of other input/output devices into the system. The user is responsible for any additional device support programs. A knowledge of the 1800 and its programming languages is required to write these additional device support programs.

CLMS uses an internal file, the Patient ID File, for patient data such as name, location, birthdate, and sex. The user is responsible for creating and maintaining this file.

CLMS is designed to operate concurrently with the data acquisition function. Users must provide CLDAS or its equivalent for the direct monitoring of their laboratory instruments.

If the user wishes to use CLDAS (5718-H11) with CLMS (5718-H12) and CLMS MPX feature (#6000), the user is responsible for converting DIAGN, ERRRR, INTWV, PKINT, PLINT, SSSSS, SUWLG, SYMB, UPSET, STATA and the CLDAS program to MPX.

The modification of the basic CLMS program product 5718-H12 by installing the MPX feature (#6000) conversion kit is also a customer responsibility if it is desired to operate CLMS under MPX. This entails the insertion of statements to some programs, the addition of new programs, and the replacement of some existing programs. These modifications are straight forward and step by step instructions are provided.

The user should generate and maintain a compilation listing which should be available for all personnel servicing the system.

When feature code #6000 (MPX feature) is added to CLMS (5718-H12), CLMS will operate under the 1800 MPX Operating System. This feature does not convert programs designed to interface CLDAS as noted above. The MPX Feature uses both IBM 1800 FORTRAN Language and the IBM 1800 Assembler language.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The TSX system has minimum system requirements for Systems Generation as outlined in "IBM 1800 Time Sharing Executive System Concepts and Techniques" (C26-3703). CLMS requires that the IBM 1801 Processor-Controller have at least 16K core storage (a minimum of 6,244 words of variable core is required in the TSX system). An IBM 1443 Printer, 1442 Card Read Punch, and an 1816 Console Typewriter are required. An IBM 1810 Disk Storage model A2 is also required. While the model A2 will normally provide adequate storage capacity, it is possible that laboratory volumes could be large enough to necessitate a model A3. Refer to the *Application Description Manual* (GH20-0772) for guidelines in determining disk storage requirements. The user's method of executing the data acquisition function will dictate the IBM 1800 Process I/O features required on the system.

The MPX system has minimum system requirements for System Generation as outlined in "IBM 1800 MPX System Introduction" (GC26-3718). CLMS with MPX feature (#6000) requirements are the same as for the TSX version with the following exceptions:

1. The IBM 1801 Processor-Controller must have at least 24K core storage.
2. A minimum of 6,850 words of variable core is required.
3. The FLET area required to hold the coreloads is increased to 1,125 sections (1,000 for TSX version).
4. Subroutine BUFFP (MPX Version) must be included in the system executive with at least two buffers specified; this requires 880 words.
5. Subroutine COIB2 (22 words) must also be included in the system executive.
6. 120 words of INSKEL COMMON must be reserved for core resident data. This does not include CLDAS INSKEL COMMON requirements.

**SOFTWARE REQUIREMENTS**

CLMS operates under the IBM 1800 Time-Sharing Executive System (TSX). Both the IBM FORTRAN Language and the IBM 1800 Assembler language are used in the system.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Application Description Manual* (GH20-0772).

**TERMS and CONDITIONS:** See PP Index

**PROSPRO II (TSX/1800)  
PROCESS SYSTEMS PROGRAM  
5718-P81**

**PURPOSE**

IBM 1800 PROSPRO II is a unique programming approach to industrial control computer applications which are mostly continuous operations. It offers simple, fill-in-the-blanks, tabular programming of the IBM 1800 Data Acquisition and Control System; enhancing and in no way obstructing user access to the TSX operating system. PROSPRO II substantially reduces the programming effort associated with the installation of process control systems. User coding is only necessary for special instruments, special logs, and special messages to operators.

Applications that are dedicated DDC (Direct Digital Control), supervisory control, operation sequencing, data acquisition, or combinations of these are efficiently served by using features of PROSPRO II that are applicable. In addition, process data management is provided.

**DESCRIPTION**

This program contains the following additions and improvements over PROSPRO/1800 (PROcess Supervisory PROgram):

- A Direct Digital Control (DDC) processor with its own General Block language for advanced control
- Extension of the supervisory General Action language
- Operator communication through the 1892 model 11 Process Operators Console (RPQ)
- Redesigned process I/O routines
- Improved bumpless transfer and system restart procedures
- An enhanced Preprocessor accommodates additional data forms
- Modification of the TSX error recovery procedures to better accommodate process control requirements

The 1892 model 11 Process Operators Console is an RPQ device attachable to the 1800. This console provides three rows of 10-character displays, 20 backlit pushbuttons, and a total of 104 interrupt generating pushbuttons in 10 groups.

All of these features are used by PROSPRO II to provide extensive and highly interactive operator communication with the 1800 for every defined process constant, process variable, closed loop and process unit.

PROSPRO II offers two levels of control. The upper supervisory control level provides minute-by-minute file updating and processing of variables against conditions that may call for actions, which are then executed, such as closed loop regulations, alternate procedures, messages, or transfer of objectives to the lower level. The lower control level provides second-by-second alarm scanning of measured variables and DDC. DDC processing provides fast closed loop regulation without the use of instrument controllers. PROSPRO II with DDC also offers rapid sequence control of industrial operations.

The user specifies the parameters of control strategy and/or data acquisition by filling in blanks on three to eleven special forms from which cards are punched and entered, online, into the 1800. Groups of data that pass logic consistency tests are preprocessed into data files and tables of pointers which cause the system to perform the defined actions. Minimal knowledge of computer programming is required to fill in the forms. Thus, PROSPRO II may be easily used by plant engineers. Initial functions and strategy can be created in a very short time. Changes in these functions and the strategy may be made quickly by entering new or different data cards online.

The completed PROSPRO II special data forms become the organized documentation of that installation.

PROSPRO II is designed for efficient execution with a complete file structure and prioritized file buffering. The design enables unique compiler preprocessing of the forms information to eliminate interpretive execution and inline code generation. A simple fill-in-the-blanks approach oriented toward industrial control with greater execution efficiency than normal Assembler/FORTRAN approaches is a significant advance.

PROSPRO II is extremely comprehensive. Data acquisition from standard instruments and essentially all process control and operator communication may be implemented by using only the system and filling in the forms. It may be used as an enhancement to the TSX operating system under which other associated functions are added as well as unassociated functions which may operate in the process or nonprocess mode. Buffered access to the files is provided by FORTRAN 'CALL' statements.

**Features**

- Special forms for data acquisition and control definition
- Lower installation costs
- Shorter implementation time

- Improved process control, operator communication, and data management
- Quick and safe online changes to strategy
- Efficient execution due to unique program design
- Thorough system documentation by the manuals
- Organized application documentation by the forms

**CUSTOMER RESPONSIBILITIES**

Customers must have a basic knowledge and understanding of the use of the system before implementation, and a TSX trained representative to generate it; know the instrumentation required; know the processes to be controlled and the desired data acquisition and control strategy; and describe that strategy on the standard forms.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

IBM 1801 or 1802 Processor - Controller model 1D or 2D, 1442 Adapter (#4430), three additional Data Channels (#3222), Analog Input Data Channel Adapter 1 (#1233), Analog Input Data Channel Adapter 2 (#1234), Analog-Digital Converter model 1 (#1231), Comparator (#2185), Multiplexer/R Control (#5256) ... IBM 1442 Card Read Punch model 6 or 7 ... IBM 1810 Disk Storage model A2 or B2 ... IBM 2315 Disk Cartridges ... IBM 1892 model 11 Process Operators Console (RPQ C08400 and prerequisites).

The number required, if any, of the following, depends on the application.

Digital Input Data Channel Adapter (#3291)\*, Digital and Analog Output Data Channel Adapter (#3290)\*\* (features 3290/1 may share a data channel), Process Interrupt Adapter (#5710), Process Interrupt-Contact (#5715), Digital Input Adapter (#3262), Digital Input Contact (#3285), Digital Output Control (#3296), Digital Output Adapter (#3295), Electronic "Contact" Operate (#3612), Pulse Output (#5863)\*\* ... 1053 Printer ... 1828 Enclosure model 2 ... 1851 Multiplexer Terminal models 1 or 2, Multiplexer/R (#5252), Differential Amplifier (#3246), Signal Conditioning Element ... 1856 Analog Output Terminal model 1\*, Digital to Analog Converter model 1, 2, 3 or 4 (#3251-#3254)\*, Analog Driver Amplifier (#1227)\*, Precision Voltage Reference (#5527 or 5528)\*.

The following devices must not be ordered.

Buffer Register (#1507/8), Multiplexer Overlap (#5259).

Consideration should be given to an IBM 1810 Disk Storage model B2 and an IBM 1801 or 1802 model 2D for best performance.

PROSPRO II transmits pulse trains to setpoints of controllers (up-pulses and down-pulses), if any, and a gated analog drive to DDC stations or controllers, if any. For each output there must be a position feedback analog signal to the computer. The setpoint feedback must have the same signal range as the loop's measured input signal but may connect to any terminal address. The DDC feedback signal range must be 20-100 percent of the computer input range and must be connected to the next highest terminal number from the loop's measured input. For each DDC output, there must also be a digital input signal for the DDC/Local switch on the station or controller. The terminal number for this digital input and the terminal number for the analog drive signal gate (ECO or PO) must correspond.

Refer to the "Configuration" section of the *Application Description Manual* and the "Wiring Considerations" section of the *Program Description Manual* for further installation assistance.

Prior to completing the Process Interrupt Status Word Assignment Form and the Data Channel "Specify" codes, refer to the sections on Interrupt Level Assignments and 1801/1892 Interface Description in the *Operations Manual*.

**SOFTWARE REQUIREMENTS**

PROSPRO II operates under the IBM 1800 TSX operating system. The TSX Non-Reentrant Subroutines may be used. IBM 1800 FORTRAN and Assembler language are the source languages for PROSPRO II.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Application Description Manual* (GH20-0718).

**TERMS and CONDITIONS:** See PP Index

\* Required for DDC.  
\*\* Required for setpoint control.

## 1800 REPORT PROGRAM GENERATOR (RPG) 5718-RG1

### PURPOSE

The IBM 1800 Report Program Generator (RPG) significantly enhances the commercial data processing capability of the IBM 1800 Data Acquisition and Control System. The 1800 RPG operates under the IBM 1800 Multiprogramming Executive System (MPX), and provides a language which is easy to learn and specifically oriented to commercial applications such as accounts receivable, payroll, inventory accounting, and sales analysis. In addition, a file conversion utility (DFCNV) enables RPG to be used for generating operating reports from sensor-based disk data files created by FORTRAN-coded online programs.

### DESCRIPTION

The 1800 RPG consists of a problem-oriented symbolic language, a compiler, and a library of subroutines. The user describes the problem by coding source statements, on RPG coding forms, that describe the input and output files, records and fields, and the data processing to be performed. The source statements are then punched into cards. The compiler converts the source statements to an object program with subroutine linkages, which in turn is executed to accomplish the problem solution.

The 1800 RPG uses the same coding forms as System/360 RPG and provides language specifications identical to 1130 RPG. Minor differences between the two systems exist in the job control language and input/output devices supported.

The 1800 RPG compiler can be executed in either the time-sharing mode under MPX or in the batch-processing mode under the MPX Basic Operating Monitor (BOM). At the user's option, an RPG object program can be executed as an area, main-line, or batch-object coreload, and can execute in any core partition except the Special Area (SPAR) or the System Executive.

The following operating restrictions apply:

- RPG can process disk files created only by an RPG program or the file conversion utility DFCNV.
- When processing an indexed sequential file, additions and updates to the file cannot both be made in the same program.
- A disk file must be contained in a contiguous area on one 2315 disk pack. Split extents and multi-volume files are not supported.
- The maximum key length in an indexed sequential file is 50 characters. The key must begin in the first position of the record.

**Features:** The 1800 RPG includes the following functions:

- Edit codes, to reduce the coding necessary to edit numeric printed data. With the use of a one-character edit code, the programmer can edit most numeric fields along with data fields. Where the edit codes are not sufficient, edit words are still supported.
- CHAIN operation code, to allow greater flexibility in random references to disk files. By using the CHAIN op code during calculations, the programmer may retrieve a record from an indexed sequential file and have it immediately ready for processing. With the use of CHAIN, the programmer can determine a record-not-found condition, and provide a routine to handle this instead of going to a halt condition. Multiple records can be retrieved from one file. A chained file may CHAIN to itself as well as CHAIN to other files. Through the use of CHAIN and relative record number, records may be randomly retrieved from sequential disk files.
- Subroutines, to avoid repeated coding of similar calculation routines. An often-used calculation routine may be coded as an RPG subroutine. The RPG subroutine must be compiled with the program that uses it. The use of Assembler language-coded subroutines is also supported.
- EXCPT operation code, to permit records to be output at other than fixed points in the RPG processing. With the use of the EXCPT op code the programmer can produce output at any time and as often as desired during both detail and total calculations.
- 1800 Input/Output Subroutines, to create and process sequential and indexed sequential files on the 1810 Disk Storage. These subroutines may also be used by 1800 Assembler language programs to create and process files. The subroutines accomplish these functions.
  - Create an indexed sequential file
  - Add records to an existing indexed sequential file
  - Sequentially process indexed sequential files, either within limits or the entire file
  - Randomly process individual records of indexed sequential files
  - Sequentially process input or output records of a sequential file
  - Randomly process input or update records of a sequential file

In addition, the following features can provide other benefits depending on the user's application:

- Cylinder Index in Core - One sector of the cylinder index remains in core during the processing of an indexed sequential file. Consequently, when randomly processing an indexed sequential file, greater throughput will normally be realized if the input is sorted first.
- Sequential Files - A sequential disk file may be retrieved either sequentially or randomly (by use of relative record number). Random retrieval of a sequential file replaces the direct access concept and allows for fast retrieval of files which make use of the relative record number technique.
- The LOCAL function - It is possible to overlay subroutines called by RPG. This function may reduce throughput to save on core.
- S/360 Appearance - Through the use of RPG, the programmer no longer need be aware of the fact that the 1800 is a fixed-word binary machine. The 1800 with the use of RPG appears to be a character-oriented system. Like S/360, both zoned decimal and packed decimal may be used.
- Dual I/O Areas - Dual I/O areas are supported for all card and printer devices. This allows the programmer to call for execution time options which afford, in most cases, increased throughput at the expense of core.

**Use:** The RPG compiler is a series of batch-process coreloads that operate under the Multiprogramming Executive System. Execution is initiated by entering a job in the card reader with an XEQ control card containing the coreload name RPG18. RPG source statements are read from the card reader, processed, and generated into a relocatable object program stored temporarily in disk working storage. The relocatable program can then be executed immediately, stored into the relocatable program library, punched into cards, or built into a coreload for later execution, all under control of the MPX Disk Management Program (DMP). Disk file areas can be reserved for the use of RPG applications by the \*DFILE or \*STOREDATA functions of DMP.

### CUSTOMER RESPONSIBILITIES

The customer is responsible for:

- Developing application programs in the RPG language.
- Generating the MPX operating system.
- Loading the RPG compiler and subroutines to disk storage under MPX control.
- Compiling RPG application programs and building them into core loads for execution.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

- A. Compiler execution - IBM 1801/1802 Processor-Controller, model 1C or 2C (16K)
  - IBM 1810 Disk Storage, model A2 or B2
  - Two IBM 2315 Disk Cartridges
  - IBM 1816 Printer-Keyboard or 1053 Printer, model 3 or 1443 Printer, model 1 or 2
  - IBM 1442 Card Read Punch, model 6 or 7
- B. Object program execution - IBM 1801/1802 Processor-Controller, model 1C, or 2C (16K)
  - IBM 1810 Disk Storage, model A2 or B2
  - IBM 1442 Card Read Punch, model 6 or 7
  - Output devices as required by the application program
- C. Devices Supported by IBM 1801/1802 Processor-Controller (up to 32K)
  - Two IBM 1442 Card Read Punches, model 6 or 7
  - One IBM 1443 Printer, model 1 or 2
  - IBM 1810 Disk Storage, model A3 or B3
  - Two IBM 1816 Printer-Keyboards
  - Six IBM 1053 Printers, model 3

#### SOFTWARE REQUIREMENTS

The IBM 1800 RPG compiler is written in IBM 1800 Assembler language and operates under the IBM 1800 Multiprogramming Executive System (MPX). The Disk Management Program (DMP) of MPX provides utility functions to assist in RPG installation and

**1800 RPG (cont'd)**

operation, including loading programs to disk, creating of files, and building application program core loads.

The RPG compiler can execute under time-sharing within the 5,140-word variable core area required by MPX. The RPG compiler uses the LOCAL feature to execute within the 5,140-word area. The LOCAL feature is not necessary if the available variable core area exceeds 7,140 words. Additional available variable core area will be used automatically by the RPG compiler to increase throughput.

Approximately 30 cylinders of disk storage are required for the compiler and the supporting subroutine library.

Disk working storage is required for the generated object program and for temporary storage of source statements when they exceed the number which can be contained in available core storage.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Introduction to 1800 RPG Manual (GH20-0760).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/7 ASSEMBLER**  
**5718-SC2 (Features #7027, #7029, #9005)****PURPOSE**

System/7 Assembler language is a symbolic programming language for use with the System/7. This language provides the programmer with a convenient means of writing machine instructions, designating registers, and specifying format and addresses of storage areas, data, and constants. All operational capabilities of the System/7 can be expressed in System/7 Assembler language programs.

**DESCRIPTION**

The System/7 Assembler is a paper tape-oriented, one pass, one-for-one Assembler program which translates source programs written in System/7 Assembler language into machine loadable object programs on paper tape.

The most significant features provided are briefly summarized in the following paragraphs:

- One-pass: By resolving forward referenced symbols as overlay patches, the assembly is completed in one pass.
- Forward Referencing: Symbolic names may be referenced prior to definition.
- Renaming Symbols: A symbolic name can be equated to another symbol so that both refer to the same storage location, register, etc.
- Convenient Data Representation: Constants can be specified as alphabetic characters, decimal digits, and storage addresses for ease of definition.
- Optional Program Listing: Program listings can be provided, at assembly time, of source and resulting object program. This is a programmer option.
- Error Checking: Source programs are examined by the assembler for possible errors arising from incorrect usage of the language. A message is printed on the printer describing the error discovered. This occurs even if the above program listing was not requested.
- Subroutine Entry: Subroutine names that are still undefined symbols at the end of assembly are printed on the keyboard printer. The source for these subroutines can then be entered and the assembly completed.
- Multiple Assemblies: Multiple assemblies may be done without reloading the assembler program.
- Minimum System Requirements: A System/7 with at least 4K words of storage and an Operator Station.

Although this assembler offers a subset of the resources that are available with the macro assemblers, a programmer can prepare an effective program to control an application. (The Functional Subroutines, with the exception of multiply and divide, are not available in Paper Tape Format.)

**System/7 Utilities:** Included with the System/7 Assembler are utility programs to provide the user with tested and maintained programs to assist in program maintenance and debugging on System/7. The following utilities require 128 words of storage and reside in the System/7 IPL area.

- Storage Dump: Output the contents of storage to the keyboard printer or paper tape punch.
- Storage Patch: Alter storage locations via the Operator Station keyboard.
- IPL Loader: Reads the storage load paper tape produced by the System/7 Assembler, Host Program Preparation Facilities, or storage dump. This loader will construct the necessary storage load in the System/7.
- Storage Initialization: Initializes both System/7 storage and registers. This function must be performed after power-on of the System/7.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**Minimum System Configuration:** System/7 Assembler requires a System/7 with a minimum of 4K of storage and an Operator Station. (Program preparation cannot be accomplished on a 2K system.)

**DOCUMENTATION**

(available from Mechanicsburg)

*MSP/7 Program Logic Manual (GY34-0003).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**1800 CHROMATOGRAPH MONITORING  
5718-XX1**

**PURPOSE**

IBM 1800 Chromatograph Monitoring provides advanced data acquisition and fused peak analysis techniques for the simultaneous monitoring of multiple chromatographs in realtime. The program scans the signals from the chromatographs, analyzes the peak spectrum, and produces the reports. It is particularly well suited to the quality-control laboratory environment.

**DESCRIPTION**

The Chromatograph Monitoring Program operates either under the 1800 Time-Sharing Executive (TSX) or the 1800 Multiprogramming Executive (MPX). Time-sharing jobs may execute concurrently in the TSX version, and background jobs in the MPX version.

The advantages are reduced turn-around time on chromatograph runs, greater accuracy and better reproducibility than manual methods, better utilization of analyst time, and greater chromatograph utilization through automatic control.

The maximum number of chromatographs that can be monitored is a function of 1800 core size and speed, and the scanning frequency desired. Typical systems have 10 to 60 chromatographs wired, with 10 to 30 operating simultaneously.

Extensive digital filtering techniques are employed to minimize noise problems, including spike rejection of raw data. First and second curve derivatives are calculated using a least squares technique. Exponential smoothing is applied to raw data and curve derivatives. Dead bands and confirming counts are used to insure that only significant, persistent changes in the derivatives are considered. All filter parameters are adjustable and can be changed during a run.

Backflushing, and column-switching can be controlled by the program.

The rate of scanning each chromatograph can be varied individually, and can be changed during a run.

Analytical methods (for example, run parameters, peak decomposition method, type of run) can be defined and updated in real time by a series of data cards without interrupting the routine operation of the system.

Multiple reference peaks can be used to improve the estimation of expected peak times.

Peak areas can be calculated by several methods including a least squares curve fitting technique.

**Use:** The lab analyst initiates scanning of the chromatograph by entering information about the analytical method to be used, the chromatograph number, date and time of the sample, and other experimental parameters through a 1092 Keyboard, and then closing the start switch on the chromatograph. The chromatograph start light is turned on confirming computer monitoring. No further attention by the analyst is required to record the spectrum and produce the report. Offline or background jobs can be executed during the monitoring of the chromatographs.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for performing the following functions:

Installing start buttons and lights at each chromatograph with cabling to the 1800 PI and ECO terminals.

Providing low-noise, low-impedance chromatograph analog signals to the 1800.

Generating a suitable TSX or MPX operating system.

Defining system equates which specify the machine configuration addressing.

Executing the customizer program to modify the source programs for the particular installation.

Generating the required COMMON/INSKEL/cards using a utility program provided.

Compiling or assembling the package programs supplied in source form and building the core loads and data files.

Maintaining suitable listings and core maps for the use of system maintenance personnel.

As with other systems, customers are responsible for providing adequate protection against accidental loss or misuse of their data. This includes an adequate review of the system's security provisions by the user.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

- IBM 1801 Processor-Controller model 1C or 2C (16K) for TSX, model 1CB or 2CB (24K) for MPX
- IBM 1810 Disk Storage model A1 or B1
- One IBM 1442 Card Read/Punch model 6 or 7
- One IBM 1816 Printer Keyboard or 1053 Printer model 3
- IBM 1828 Enclosure model 2
- Analog-Digital Converter model 1 (#1231)
- Two IBM 1851 Multiplexer Terminals model 1
- Three Differential Amplifiers (#3246)
- One IBM 1092 Matrix Keyboard model 1 with 1051 Attachment (#7915) and RPQ C08735 (1800 attachment)
- IBM 1894 model 10 (RPQ C08056), 1092 Keyboard Attach Basic with #3612, ECO-one group, #5715, PIC-one group, and #3285, DIC-one group (Option A) or #5715, PIC-one group (Option B)
- IBM 1894 model 1, 1092 Keyboard Attach, Adapter (RPQ C08057).

The following is required for each chromatograph wired to the system: Four analog input MPX/R points; one on each of four input voltage levels (10 mv, 50 mv, 500 mv, 5 volt) (#5252) ... one point of Process Interrupt-Contact (#5715) ... one point of Electronic Contact Operate (#3612).

Additional devices that are supported and recommended are: A 1443 printer if much offline work is to be done. It is also helpful in system installation for online monitoring of the scan program ... additional 1810 Disk Drive if more than 472 sectors are required for data files in TSX or 571 sectors in MPX ... additional 1053 Printers if chromatographs are widely separated ... additional 1092 Keyboards if chromatographs are widely separated.

**Note:** The CNP programs may only use the 12 standard interrupt levels.

The TSX Version requires a Variable Core of 5,600 words, 1,880 words for skeleton programs, and 2,626 words of skeleton COMMON (20 chromatographs and one 1092). The MPX version requires a Variable Core of 5,186 words, a core load area of 2,192 words, 3,592 words of skeleton programs including system routines, and 1,918 words of skeleton COMMON (14 chromatographs and one 1092). The core load area may be eliminated by operating an interrupt core load in variable core, at some increase in system overhead.

To compile and build the program requires the above configuration without the Process I/O and 1092 Matrix Keyboard and its attachments.

**SOFTWARE REQUIREMENTS**

The IBM 1800 Chromatograph Monitoring Program is written in IBM 1800 Assembler language and 1800 FORTRAN. It operates under either the IBM 1800 Time-Sharing Executive (TSX) or the 1800 Multiprogramming Executive (MPX). The calculation routines, and the analysis report output programs, are written in FORTRAN to facilitate modification.

This program product is released to work with Version 3 of TSX, or Version 3 of MPX, and all subsequent versions and modifications unless so stated in a future revision of this document.

The Error Alert Control program (EAC) within the TSX operating system masks all interrupt levels during the processing of an error. Since EAC uses a series of overlays from the disk, the time involved can be as much as several seconds. The Chromatograph Monitoring program cannot operate under these conditions because data would be lost. A change is therefore made to EAC to allow the level(s) of the timers and analog input to remain unmasked during EAC operation. Any errors on the unmasked level(s) can result in a double entry into EAC with a resultant unrecoverable MLTP EAC message. The multiple EAC, however, is probably due to hardware problems on the unmasked level(s) and should not be considered a TSX problem. The Interval Timer Control program in TSX is also modified to allow timer A to continue running after a timer interrupt is processed. Customer Engineering involvement in these areas of code is potentially billable.

**DOCUMENTATION**

(available from Mechanicsburg)

*Application Description Manual (GH20-0724).*

**TERMS and CONDITIONS:** See PP Index

**REALTIME PROGRAMMING SYSTEM  
INDEXED ACCESS METHOD  
5719-AM1****PURPOSE**

The IBM Series/1 Indexed Access Method licensed program contains features of the Realtime Programming System Indexed Access Method PRPQs (5799-TBN, TCA, TCB). This licensed program provides improved usability and storage utilization. Additional function and the elimination of certain restrictions are also included. The product contains major enhancements such as: More efficient use of data file space to alleviate the problem of running out of space in a particular area of a file; a special online utility to define index data set organization; improved integrity via a write verify option; a macro to extract file attribute information from an index data set; key checking; termination clean-up and an immediate write option.

The Indexed Access Method licensed program will allow users of the COBOL (5719-CB1) licensed program to write application programs that directly access Indexed Access Method files. By using the new file definition utility to create the indexed file, a higher level language user need never use Series/1 Assembler language to create an indexed file.

In addition, users of the Sort/Merge (5719-SM1) licensed program will be able to specify Indexed Access Method data sets as input files. Users of COBOL and Sort/Merge will be able to use the Indexed Access Method licensed programs without having to write Assembler language programs as they did with the Indexed Access Method.

**HIGHLIGHTS**

This licensed program includes all Indexed Access Method PRPQ functions plus the following new functions:

- The requirement that the user always use the specified DSD name when referencing an Indexed Access Method file, and requiring the DSD to always be in the DSDT, has been removed. The user may now specify which task set the DSD should be associated with.
- The user may now specify a free pool area to be generated that contains reserved blocks. These blocks may be later allocated as data blocks or index blocks to expand a portion of a file due to heavy insert activity in that area.
- The access method will now verify that the key field of a data record has not been modified during an update operation.
- The user may select at file definition time whether or not the hardware write-verify option is to be used on file writes.
- Indexed files will automatically be closed and access method resources freed when a using task terminates either normally or abnormally. This is an option on Realtime Programming V4 which may be selected during SYSGEN.
- A macro is now provided which will allow the user to extract information about a file; for example, key length, key displacement, block size, record size and other more detailed data regarding the file structure.
- A utility program will be provided to create an indexed file. The utility executes as a user task set and it performs functions for the user that would otherwise require him to write an assembler language program. The utility has an interactive command language capability which makes it easy to use.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified environment.

**HARDWARE REQUIREMENTS**

This product operates on IBM Series/1 systems which use Realtime Programming System device support for the following input/output devices:

IBM 4962 Disk  
IBM 4964 Diskette  
IBM 4963 Disk  
IBM 4966 Diskette Magazine Unit

**SOFTWARE REQUIREMENTS**

The minimum system for executing the product is specified in the IBM Series/1 Realtime Programming System, either Version 3 (5719-CP3) or Version 4 (5719-PC4). The Version 4.1 Command Language Facility INSTALL Command may be used to "Post-Install" Indexed Access Method licensed program, Version 1.1. In addition, the Indexed Access Method licensed program has the following relationships to other software products:

COBOL - User access to Indexed Access Method functions via standard COBOL verbs.

Sort/Merge - Accepts Indexed Access Method files as input.

The Realtime Programming System licensed program Version 3 or Version 4 and Program Preparation Subsystem Version 3 or Version 4 are prerequisite for the Indexed Access Method licensed program.

**COMPATIBILITY**

The following compatibilities/incompatibilities exist:

- User macro coding is a superset of the previous PRPQs. A program which operates under the Indexed Access Method PRPQ will operate with the same application results on the licensed program.
- Functional capabilities are a superset of the Indexed Access Method PRPQ functions.
- Application object code which invoked functions of the PRPQ on Version 3 or 4 of the Realtime Programming System need not be recompiled in order to execute with this product. Execution of this program provides identical results under the licensed program and under the PRPQ.
- Data files created by the PRPQ are capable of being processed by this licensed program, using the same level of function. To facilitate PRPQ to licensed program migration, a PRPQ file may be accessed via the licensed program and, as long as the file is not updated via the licensed program, the file may again be used with the PRPQ.

**DOCUMENTATION**

*IBM Series/1 Realtime Programming System Indexed Access Method User's Guide and Reference Manual (SC34-0293). ... IBM Series/1 Realtime Programming System Indexed Access Method Licensed Program Specifications (GC34-0292).*

**TERMS and CONDITIONS:** See PP Index

**REALTIME PROGRAMMING SYSTEM  
INDEXED ACCESS METHOD VERSION 2  
5719-AM2****PURPOSE**

The IBM Series/1 Realtime Programming System Indexed Access Method Version 2 licensed program is an extension of Indexed Access Method (5719-AM1). The Indexed Access Method allows the user to build, access, and maintain user-defined records in indexed data sets via predetermined fields called keys. Version 2 of the Realtime Programming System Indexed Access Method, which operates under the IBM Series/1 Realtime Programming System Version 5.1 (5719-PC5), provides improvements for usability, capability for improved performance and enhanced flexible utility functions.

**HIGHLIGHTS**

The Series/1 Realtime Programming System Indexed Access Method Version 2 supports all the functions available in the previous version plus the following functions:

- Multiple secondary index support feature - every indexed data set contains a unique key field within a record called a primary key. It is used as a basis for the primary index. Keys other than the primary keys are called secondary keys which may be used to create separate secondary index files. Duplicate keys can exist in these files. This feature allows data retrieval and data manipulation using multiple keys for a specific record.
- A data paging function which utilizes unmapped storage can improve the performance of the Indexed Access Method. Data paging keeps the most frequently used indexed file pages (which consist of both data blocks and index blocks) in storage and operates in a manner similar to a cache, thereby reducing the number of file I/O accesses and improving response time.
- A set of enhanced Indexed Access Method Utilities which have a simpler interface and simplified procedures in the areas of file definition/creation (IDEF), load/unload and file reorganization.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system for executing this licensed program is specified in the IBM Realtime Programming System Version 5.1 (5719-PC5). The Series/1 Realtime Programming System Indexed Access Method requires at least 6K bytes of resident code. Control blocks, Indexed Access Method buffers (minimum 2 x block size), the secondary index update buffer (minimum 2 x record size), and unmapped storage for the paging area are additional.

The following devices are specifically supported:

- IBM 4952 Processors (models A & B)
- IBM 4952 model C Processor with Diskette Drive
- IBM 4955 Processors (all models)
- IBM 4962 Disk Storage Unit
- IBM 4963 Disk Storage Subsystem
- IBM 4964 Diskette Unit
- IBM 4965 Diskette Drive and I/O Expansion Unit
- IBM 4966 Diskette Magazine Unit
- IBM 4969 Magnetic Tape (Load, Unload Utility, Commands)

**SOFTWARE REQUIREMENTS**

The Realtime Programming System Version 5.1 (5719-PC5) is prerequisite for the Indexed Access Method Version 2 (5719-AM2). Sort/Merge (5719-SM1) is required only if the Indexed Access Method utility program is to be used to load a secondary index from an existing indexed file.

**COMPATIBILITY**

The Indexed Access Method licensed program has the following compatibilities:

- User macro coding is a superset of previous versions. A program which operates under Version 1 (5719-AM1) of the Indexed Access Method compiles and operates with the same application results on Version 2 of the Indexed Access Method.
- Functional capabilities are a superset of Indexed Access Method Version 1 functions.
- Application object code which invoked functions of Version 1 of the Indexed Access Method need not be recompiled in order to execute

with Version 2 of the Indexed Access Method Licensed Program. Execution of these programs provides identical results under Versions 1 and 2.

- Data sets created by Version 1 are capable of being processed by Version 2, using the same level of function.
- Indexed Access Method Version 2, like Version 1, will allow users of COBOL (5719-CB7 or 5719-CB1) and PL/I (5719-PL2) to write application programs that directly access Indexed Access Method data sets. In addition, users of Sort/Merge (5719-SM1) will be able to specify Access Method data sets as input files.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Programming Systems Summary (GC34-0285) ... IBM Series/1 Realtime Programming System Indexed Access Method Version 2 User's Guide (SC34-0396) ... IBM Series/1 Realtime Programming System Indexed Access Method Version 2 Program Logic Manual (LY34-0237) ... IBM Series/1 Realtime Programming System Indexed Access Method Version 2 Licensed Program Specifications (GC34-0395).*

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE INDEXED ACCESS METHOD  
5719-AM3**

**PURPOSE**

The IBM Series/1 Event Driven Executive Indexed Access Method licensed program (5719-AM3) provides data management facilities supporting indexed file operations for the IBM Series/1 Event Driven Executive system. This facility operates under the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1). It allows the user to build, access, and maintain user-defined records in indexed data sets via a predetermined field called a key. The Indexed Access Method builds an index of keys which provides fast access to records in an Indexed Access Method data set. The access method supports a high degree of insert/delete activity providing both direct and sequential access to the data from multiple programs concurrently accessing the same or different indexed data sets. Applications that use the Indexed Access Method support can be programmed in the Event Driven Executive Language, PL/1 or COBOL. It is supported by the Series/1 Event Driven Executive Sort/Merge licensed program (5719-SM1) which will accept Indexed Access Method data sets as input files. Also provided is a utility to define and maintain indexed data sets. This utility can be used from a user terminal or program.

**HIGHLIGHTS**

- The Series/1 Event Driven Executive Indexed Access Method support provides keyed access to user data to support a wide variety of applications ranging from batch processing to multi-user interactive applications.
- The data set organization is designed to provide efficient direct and sequential processing of files. This is accomplished by using cascading index data blocks for sequential processing.
- The access method design supports data sets which have high add/delete activity (such as open order files) to minimize performance degradation. This is accomplished by distributing free space for additions throughout the file, by updating and inserting additions in place, and by dynamically reclaiming space after deletions.
- Indexed Access Method supports multiple programs and tasks sharing the same data sets. In a shared environment, data integrity is maintained by record and block level locking to prevent access to an indexed or data record while the record is being modified.

**DESCRIPTION**

The following functions are provided:

LOAD	Connects user to requested data set for initial load of file.
PROCESS	Connects user to requested data set for reading, updating, inserting and deleting records.
DISCONN	Terminates and disconnects user from requested data set. Forces buffer flush and releases any outstanding record locks.
GET	Directly retrieves a record from the data set which has a key equal (EQ), greater than (GT), or greater than or equal (GE) to the requested key. This operation can operate on a full or partial key. It moves the record to the user area. Both Update and Read-Only are supported.
GETSEQ	Sequentially retrieves the next record (in ascending key order) from the point of the last sequential access. A group of sequential retrievals may begin at the beginning of the indexed data set, or at a random record. Both Update and Read-Only are supported.
PUTUP	Replaces a record previously retrieved and releases the lock.
PUT	Loads or inserts a new record into the data set. The new key must be unique from those in the data set.
PUTDEL	Logically and physically deletes the record previously retrieved and releases the record lock.
DELETE	Logically and physically deletes a record, by key, from the data set.
RELEASE	Frees a previously obtained record lock. This eliminates the need for the user to replace unmodified records.
ENDSEQ	This is used with sequential option to terminate sequential processing.
EXTRACT	Returns data set information to user area.

Fixed length user data records are supported. The user records may be blocked in the data set.

User keys must be unique in each data set. The keys must be fixed length (254 byte maximum) and must be a single field within the data record.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system for execution of this licensed program is as specified for the IBM Series/1 Event Driven Executive Supervisor and Emulator (5719-XS1) Version 1. Storage requirements for the Series/1 Event Driven Executive Indexed Access Method requires a minimum of 14K bytes to be able to perform all of its functions. This minimum is in addition to the number of bytes required by the Event Driven Executive Supervisor for calling the Indexed Access Method or the size of any user error exit routines. There must be sufficient diskette or disk space for user data sets. The following devices are specifically supported:

- IBM 4962 Disk Storage Unit
- IBM 4963 Disk Subsystem
- IBM 4964 Diskette Unit
- IBM 4966 Diskette Magazine Unit

**SOFTWARE REQUIREMENTS**

Program Preparation for the Event Driven Executive (EDX) system which includes the Indexed Access Method requires the EDX Utilities Version 1.1 (5719-UT3), plus any combination of the following:

Event Driven Executive Program Preparation Facilities Version 1.1 (5719-XX2)

or

Event Driven Executive Macro Assembler Version 1 (5719-ASA)

Event Driven Executive Macro Library Version 1 (5719-LM5)

or

System/370 Program Preparation Facilities for Series/1 (5798-NNQ)

Event Driven Executive Macro Library/Host Version 1.1 (5740-LM2)

or

Event Driven Executive COBOL Compiler and Resident Library Version 1.1 (5719-CB3)

Event Driven Executive COBOL Transient Library Version 1.1 (5719-CB4)

**COMPATIBILITY**

Data sets created by the Series/1 Event Driven Executive Indexed Access Method are compatible with the Series/1 Realtime Programming System Indexed Access Method, provided the block size used is a multiple of 256 bytes.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive System Guide (SC34-0312) ... IBM Series/1 Event Driven Executive Utilities, Operator Commands, and Program Preparation (SC34-0313) ... IBM Series/1 Event Driven Executive Language Reference (SC34-0314) ... IBM Series/1 Event Driven Executive Reference Summary (SX34-0101) ... IBM Series/1 Event Driven Executive Indexed Access Method Licensed Program Specifications (GC34-0345).*

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE  
INDEXED ACCESS METHOD VERSION 2  
5719-AM4****PURPOSE**

The IBM Series/1 Event Driven Executive (EDX) Indexed Access Method Version 2 is an extension of the Indexed Access Method (5719-AM3). The Indexed Access Method allows the user to build, access, and maintain user-defined records in indexed data sets via predetermined fields called keys. Version 2 of the EDX Indexed Access Method, which operates under the IBM Series/1 Event Driven Executive Version 3.1 (5719-XS3), provides improvements for usability, capability for improved performance, and enhanced flexible utility functions.

**HIGHLIGHTS**

The Series/1 EDX Indexed Access Method Version 2 supports all the functions available in the previous version plus the following functions:

- Multiple secondary index support feature. Every indexed data set contains a unique key field within a record called a primary key. It is used as a basis for the primary index. Keys other than the primary keys are called secondary keys, which may be used to create separate index files. Duplicate keys can exist in these files. This feature allows data retrieval and data manipulation using multiple keys for a specific record.
- A data paging function which utilizes the same or other partitions in storage can improve the performance of the Indexed Access Method. Data paging keeps the most frequently used indexed file pages (which consist of both data blocks and index blocks) in storage and operates in a manner similar to a cache, thereby reducing the number of file I/O accesses and improving response time.
- A set of enhanced Indexed Access Method Utilities which have a simpler interface and simplified procedures in the areas of file definition/creation, and improvements in load/unload and file reorganization processing.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system for executing this licensed program is specified in IBM EDX Version 3.1 (5719-XS3). The storage requirements range from approximately 15K to 27K bytes, depending on the package selected from the diskettes, for your function and performance needs. Control blocks, Indexed Access Method buffer (minimum 2 x block size), the secondary index update buffer (minimum 2 x record size) and the paging area are additional.

This minimum is in addition to the number of bytes required for calling the Indexed Access Method or the size of any user error exit routines. There must be sufficient diskette or disk space for user data files. The following devices are specifically supported:

- IBM 4952 Processors (models A & B)
- IBM 4952 model C Processor with Diskette Drive
- IBM 4955 Processors (all models)
- IBM 4962 Disk Storage Unit
- IBM 4963 Disk Storage Subsystem
- IBM 4964 Diskette Unit
- IBM 4965 Diskette Drive and I/O Expansion Unit
- IBM 4966 Diskette Magazine Unit
- IBM 4969 Magnetic Tape (Load, Unload Utility Commands)

**SOFTWARE REQUIREMENTS**

EDX Version 3.1 (5719-XS3) and Utilities (5719-UT5) are prerequisites for the Indexed Access Method Version 2 licensed program (5719-AM4). Sort/Merge (5719-SM2) is required if the Indexed Access Method Utility Program is to be used to build a secondary index for an existing primary indexed file.

To prepare a program which uses the Indexed Access Method, the user requires one of the following:

- IBM Series/1 Event Driven Executive Utilities (5719-UT5) and the IBM Series/1 Event Driven Executive Program Preparation Facility (5719-XX4)

or

- IBM Series/1 Event Driven Executive Macro Assembler (5719-ASA) and the IBM Series/1 Event Driven Executive Macro Library (5719-LM7)

or

- IBM Series/1 Event Driven Executive COBOL Compiler and Resident Library (5719-CB5 or 5719-CB3) and IBM Series/1 Event Driven Executive COBOL Transient Library (5719-CB6 or 5719-CB4)

or

- IBM System/370 Program Preparation Facilities for Series/1 (5798-NNQ) and IBM Series/1 Event Driven Executive Macro Library/Host (5740-LM4).

or

- IBM Series/1 Event Driven Executive PL/I Compiler and Resident Library (5719-PL5) and the IBM Series/1 Event Driven Executive PL/I Transient Library (5719-PL6)

**COMPATIBILITY**

The Indexed Access Method has the following compatibilities:

- Available functions are a superset of previous versions. A program which operates under Version 1 (5719-AM3) of the Indexed Access Method compiles and operates with the same application results on Version 2 of the Indexed Access Method.
- User macro coding is a superset of previous versions. A program which operates under Version 1 (5719-AM3) of the Indexed Access Method compiles and operates with the same application results on Version 2 of the Indexed Access Method.
- Functional capabilities are a superset of Indexed Access Method Version 1 functions.
- Application object code which invoked functions of Version 1 of the Indexed Access Method need not be recompiled but must be relinked in order to execute with Version 2. Execution of these programs provides identical results under Versions 1 and 2.
- Data sets created by Version 1 are capable of being processed by Version 2, using the same level of function.
- Indexed Access Method Version 2, like Version 1, will allow users of COBOL (5719-CB5 or 5719-CB3) and PL/I (5719-PL5) to write application programs that directly access Indexed Access Method data sets. In addition, users of Sort/Merge (5719-SM2) will be able to specify Indexed Access Method data sets as input files. New Indexed Access Method functions will be available through PL/I and COBOL.

Data sets created by the IBM Series/1 Event Driven Executive Indexed Access Method are compatible in indexed file structure with the Realtime Programming System Indexed Access Method file provided the block size used is a multiple of 256.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Systems Programming Summary (GC34-0285) ... IBM Series/1 Event Driven Executive Indexed Access Method Version 2 (SC34-0404) ... IBM Series/1 Event Driven Executive Messages and Codes (SC34-0403)*

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE MACRO ASSEMBLER  
5719-ASA****PURPOSE**

The IBM Series/1 Event Driven Executive Macro Assembler (5719-ASA) is a licensed program which will allow the user to assemble application programs or program modules concurrent with the execution of other programs operating under the control of the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1).

The Macro Assembler converts text data sets containing machine assembler and macro instructions that have been coded in the Series/1 instruction set, into object modules to be processed by the linkage editor that is included with the Assembler. In conjunction with the Series/1 Event Driven Executive Macro Library (5719-LM5), applications coded in the Series/1 Event Driven Executive language can also be processed by the Series/1 Event Driven Executive Macro Assembler, including the reconfiguring or customizing of the Series/1 Event Driven Executive supervisor. User-generated macros for commonly used routines can be incorporated into the macro library.

The Assembler also provides the user the facility to generate device support modules, specific routines in support of user exits, or customized supervisory functions. These routines can then be link edited with the user applications generated in the Series/1 Event Driven Executive language, FORTRAN IV, COBOL, and/or PL/I.

**HIGHLIGHTS**

- A function-oriented Assembler language for specifying machine instructions
- A macro language facility
- Conditional assembly capability within macros
- Sectional assembly capability
- Assembler options for listing control
- Relocatable object module output
- Support for the 4952 Processor instructions
- Listing output of the source program and object text, external symbol dictionary, relocation dictionary, cross reference table, error messages, and statistics
- Linkage editor

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following operating environment:

**HARDWARE REQUIREMENTS**

The Macro Assembler operates under the control of the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1) and depends upon the operating system to be its interface to the hardware. The resultant object code is link edited with or without other programs and can be run as a program under control of the Event Driven Executive supervisor.

The minimum system required for assemblies is:

<b>Processor</b>	IBM 4952, 4953, or 4955 Processor
<b>Storage</b>	48K bytes (64K bytes for the IBM 4952), including 22K bytes for the Macro Assembler
<b>Diskette Only (non-macro assemblies)</b>	1 - IBM 4964 Diskette Unit or 1 - IBM 4966 Diskette Magazine Unit
<b>Printer</b>	1 - IBM 4973 Line Printer or 1 - IBM 4974 Printer
<b>Operator Station</b>	1 - IBM 4979 Display Station or 1 - IBM 4978 Display Station or 1 - Teletypewriter Adapter (#7850) with Teletype® Models ASR 33/35

In addition to the minimum configuration, one or more of the following disks are required for macro assemblies or are recommended for improved assembly performance:

<b>Disk</b>	1 - IBM 4962 model 2, 2F, or 4 Disk Storage Unit (combination disk/ diskette unit) or 1 - IBM 4962 model 1, 1F, or 3 Disk Storage Unit or
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1 - IBM 4963 Disk Subsystem

**SOFTWARE REQUIREMENTS**

IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1)

IBM Series/1 Event Driven Executive Utilities (5719-UT3)

IBM Series/1 Event Driven Executive Macro Library (5719-LM5). (Required if Series/1 Event Driven Executive language is used or if supervisor customization is included in the assembly process.)

**COMPATIBILITY**

The Series/1 Event Driven Executive Macro Assembler is upward compatible from the Series/1 Base Program Preparation Facilities (5719-PA1) and source language compatible with the Series/1 Program Preparation Subsystem Version 4 (5719-AS4), with the exception of the GLOBL assembler instruction.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Macro Assembler Reference (GC34-0317) ... IBM Series/1 Event Driven Executive Macro Assembler Licensed Program Specifications (GS34-0305) ... IBM Series/1 Macro Assembler Reference Summary (SX34-0128)*

**Note:** Publications should be ordered via SLSS for customers. Customers on subscription for a current version of a licensed program will not automatically receive publications for a subsequent version; SLSS must be updated for each version of a licensed program.

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**PROGRAM PREPARATION SUBSYSTEM  
5719-AS1****PURPOSE**

The IBM Series/1 Program Preparation Subsystem licensed program is a set of four programs that provide the user a batch processing environment, and aids for preparing programs for execution on the Series/1. The licensed program consists of these four components: Job Stream Processor, Text Editor, Macro Assembler, and the Application Builder. These programs will run in the batch partition as task sets under Series/1 Realtime Programming System (5719-PC1).

**HIGHLIGHTS**

- Provides program preparation and/or general purpose batch computing concurrently with realtime program execution.
- Aids the user in developing task sets for realtime or batch execution.
- Programs run in a Series/1 partition under control of the Realtime Programming System.

**DESCRIPTION****Job Stream Processor**

The Job Stream Processor provides the Series/1 user with a batch processing facility. This program provides a convenient and easily modified method of invoking programs, communicating with these programs, and defining or creating the data sets the programs will use. The facilities of this program are used to run (in the batch partition) the three program preparation aids that are included in this licensed program.

- Easy-to-use command language
- Multiple jobs and steps per job stream
- Data set creation and definition
- Predefined environments and job streams
- Also supports FORTRAN IV (5719-FO1) and PL/I (5719-PL1) compilers

**Text Editor**

The Text Editor Provides the user the capability to create and edit text modules. These text modules can be source programs for input to the Macro Assembler, FORTRAN IV compiler or the PL/I compiler or the PL/I compiler; job streams for batch processing; or data sets for user-written programs.

- Data can be entered from operator station, disk or diskette.
- Variety of command functions to aid user in Text Editing
- Create, display or modify text modules
- Search for, or change a field or character string
- Share display station with system console
- Flexible editing environment

**Macro Assembler**

The Assembler processes the user's source statements consisting of machine, assembler and macro instructions which were coded in the Series/1 Assembler language. This assembler program produces a machine language object module which will require address resolution prior to use.

- Source input from job stream or data set.
- Symbolic statements; mnemonic operation codes.
- Output modules on disk/diskettes along with information for address resolution, relocation and external symbol dictionary.
- Output to printer includes source program listing, symbol dictionaries, cross reference table and error messages.
- Control sections, common, and external references.

**Application Builder**

The Application Builder converts one or more object modules into an executable load module or a task set. The executable load module is intended for use with a user-provided operating system. The task set is intended for execution under control of the Realtime Programming System (5719-PC1) and will contain the various tables and control blocks required for this specific environment. In addition to this user task set, the Application Builder can also be used to create a special module (shared task set) consisting of programs and data areas that are shared by several user task sets.

- Processes object modules which are produced by the language translators
- Creates composite modules, assigns storage addresses, resolves external references

- Combines composite modules, tables and control blocks to form a task set
- Optional prebind capability for faster task set initiation
- Processes program overlay sections per composite modules
- Processes common/global sections
- Auto-Call facility automatically includes routines from program library
- Produces output listing of control statements, error messages, and task set map

**FORTRAN IV and PL/I Compilers**

The FORTRAN IV Compiler (5719-FO1) and the PL/I Compiler (5719-PL1) are not included as part of this Licensed Program. However, either of these compilers will run in the batch partition under control of the Job Stream Processor. These compilers produce object modules that are similar to those produced by the Macro Assembler. All these object modules require address resolution by the Application Builder program. The FORTRAN IV compiler will run in a 16KB batch partition. The PL/I compiler requires a 28KB batch partition.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system requirements for the Series/1 Program Preparation Subsystem are:

<b>Processor</b>	IBM 4953 or 4955 Processor
<b>Storage</b>	48K byte minimum system, with at least a 16K byte partition for the Program Preparation Subsystem
<b>Disk/Diskette</b>	1 - IBM 4962 model 2, 2F, or 4 Disk Storage Unit (Combination disk/diskette unit) or 1 - IBM 4962 model 1, 1F, or 4 Disk Storage Unit and 1 - IBM 4964 Diskette Unit
<b>Printer</b>	1 - IBM 4973 Line Printer or 1 - IBM 4974 Printer
<b>Operator Station</b>	1 - IBM 4979 Display Station or 1 - Teletypewriter Adapter #7850 with Teletype® Models ASR 33/35 or an ASCII equivalent device

**SOFTWARE REQUIREMENTS**

IBM Series/1 Realtime Programming System (5719-PC1).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Program Preparation Subsystem Introduction (GC34-0121) ... IBM Series/1 Program Preparation Subsystem: Licensed Program Specifications (GC34-0128) ... IBM Series/1 Program Preparation Subsystem: Macro Assembler User's Guide (SC34-0124) ... IBM Series/1 Program Preparation Subsystem: Batch User's Guide (SC34-0122) ... IBM Series/1 Program Preparation Subsystem: Text Editor User's Guide (SC34-0123) ... IBM Series/1 Program Preparation Subsystem Application Builder User's Guide (SC34-0125) ... IBM Series/1 Program Preparation Subsystem: Messages (SC34-0126) ... IBM Series/1 Program Preparation Subsystem: Macro Assembler Reference Summary (SX34-0127).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

PROGRAM PREPARATION SUBSYSTEM VERSION 2  
5719-AS2

PURPOSE

The IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2) Licensed Program provides all the facilities of the IBM Series/1 Program Preparation Subsystem Version 1 (5719-AS1) plus support for the following additional features:

- Support for the 4962 Disk Storage Unit models 3 and 4 with a capacity of 13,962,240 bytes.
- New overlay manager controlling both disk and storage overlays.
- Job stream processor provides the following new functions:
  - Display jobs
  - Cancel jobs
  - Restart jobs
- Text editor for Version 2 offers eight additional editing commands
 

DF	Define, delete DSD statements, create volumes and data sets.
ED	Edit entire page of data from display station.
ID	Prints indexing line.
JS	Job stream creation.
LC	List and describe command syntax.
RE	Replace text with new text.
SU	Submit a job stream to job stream processor.

 (Command) Display syntax.
- Application Builder supports Program Preparation Facilities for Realtime Programming System Version 1 and 2.
- Application builder support for storage overlays.
- A packaged subsystem with prebuilt job stream processor, text editor, assembler, and application builder. Pre-defined DSDTs for the text editor, assembler, and application builder are also provided.

CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The minimum system requirements for the IBM Series/1 Program Preparation Subsystem Version 2 are:

Processor	IBM 4953 or 4955 Processor
Storage	48K byte minimum system, with at least a 16K byte partition for the Program Preparation Subsystem
Disk/Diskette	1 - IBM 4962 model 2, 2F or 4 Disk Storage Unit (Combination disk/ diskette unit) or 1 - IBM 4962 model 1, 1F or 3 Disk Storage Unit and 1 - IBM 4964 Diskette Unit
Printer	1 - IBM 4973 Line Printer or 1 - IBM 4974 Printer
Operator Station	1 - IBM 4979 Display Station or 1 - Teletypewriter Adapter #7850 supported for use with Teletype® Models ASR 33/35

SOFTWARE REQUIREMENTS

IBM Series/1 Realtime Programming System Version 2 (5719-PC2)

COMPATIBILITY

The IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2) can prepare programs to execute on Series/1 Realtime Programming System Version 1 (5719-PC1) and Series/1 Realtime Programming System Version 2 (5719-PC2). The Series/1 Program Preparation Subsystem Version 1 (5719-AS1) can prepare programs to execute only on Series/1 Realtime Programming System Version 1 (5719-PC1).

DOCUMENTATION

(available from Mechanicsburg)

*IBM Series/1 Program Preparation Subsystem Version 2: Introduction (GC34-0127) ... IBM Series/1 Program Preparation Subsystem Version 2: Licensed Program Specifications (GC34-0155) ... IBM Series/1 Program Preparation Subsystem: Macro Assembler User's Guide (SC34-0124) ... IBM Series/1 Program Preparation Subsystem Version 2: Batch User's Guide (SC34-0151) ... IBM Series/1 Program Preparation Subsystem Version 2: Text Editor User's Guide (SC34-0152) ... IBM Series/1 Program Preparation Subsystem Version 2: Application Builder User's Guide (SC34-0153) ... IBM Series/1 Program Preparation Subsystem Version 2: Messages (SC34-0154) ... IBM Series/1 Program Preparation Subsystem: Macro Assembler Reference Summary (SX34-0127).*

TERMS and CONDITIONS: See PP Index

**PROGRAM PREPARATION SUBSYSTEM VERSION 3  
5719-AS3****DESCRIPTION**

The IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3) is a licensed program which provides all the facilities of the Program Preparation Subsystem Version 1 (5719-AS1) and Version 2 (5719-AS2) plus the following features:

Support for all functions being provided in Version 3 and Version 4 (except for Command Language Facility in 5719-PC4) of the IBM Series/1 Realtime Programming System.

Usability enhancements to the application builder:

- Automatic creation of data set definitions for data sets used by the application builder.
- Automatic deletion of an existing data set with same name as one being defined if data set is too small.
- Optional update of the System Data Set Definition Table for newly-built task sets.

The Program Preparation Subsystem Version 3 also has the ability to prepare applications to execute on the Realtime Programming System Versions 1, 2, 3, and 4.

**Note:** Version 3 does not provide assembler language instructions for the 4952 Clock/Comparator.

Features included in the Program Preparation Subsystem Version 3 are listed below.

The Application Builder provides the following additional function:

- Builds relocatable load modules.
- Builds relocatable task sets.
- Builds task sets that will execute under the Realtime Programming System Versions 1, 2, 3 and 4.
- Provides an option to add a DSD to the System DSDT for the task set being built.
- Creates DSDs automatically for the work data sets and various Phase 3 output data sets.
- Deletes and recreates Phase 3 output data sets if necessary.

The Job Stream Processor provides support for the following:

- Statement to invoke the COBOL compiler.
- COBOL compile, load, and execute statement.
- COBOL environment list DSD.

The Macro Assembler improvements include:

- Internal performance enhancements.
- Additional structured macros including SEARCH, EXITIF, ORELSE, ENDLOOP, and ENDSRCH.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system requirements to install the IBM Series/1 Program Preparation Subsystem Version 3 are:

IBM 4952, IBM 4953, or IBM 4955 Processors. Refer to the IBM Series/1 Realtime Programming System Version 3 (5719-PC3) or Version 4 (5719-PC4) for minimum system requirements. Storage requirements are: A 16K byte partition is required for the Program Preparation Subsystem if running under the Multiple Address Space Management environment of the IBM Series/1 Realtime Programming System Version 3 (5719-PC3) or Version 4 (5719-PC4); a 48K byte minimum system with at least an 18K byte partition is required if running under the Single Address Space Management environment of Version 4 (5719-PC4) of the IBM Series/1 Realtime Programming System.

**SOFTWARE REQUIREMENTS**

IBM Series/1 Realtime Programming System Version 3 (5719-PC3) or Version 4 (5719-PC4).

**DOCUMENTATION**  
(available from Mechanicsburg)

Customers on subscriptions for Version 1 or Version 2 publications will not automatically receive Version 3 publications. A Version 3 subscription must be entered for Version 3 publications.

*IBM Series/1 Program Preparation Subsystem Version 3: Licensed Program Specifications (GC34-0227) ... IBM Series/1 Program Preparation Subsystem Version 3: Introduction (GC34-0221) ... IBM Series/1 Program Preparation Subsystem Version 3: Batch User's Guide (SC34-0222) ... IBM Series/1 Program Preparation Subsystem Version 3: Text Editor User's Guide (SC34-0223) ... IBM Series/1 Program Preparation Subsystem Version 3: Application Builder User's Guide (SC34-0224) ... IBM Series/1 Program Preparation Subsystem: Macro Assembler User's Guide (SC34-0124) ... IBM Series/1 Program Preparation Subsystem Version 3: Messages (SC34-0225) ... IBM Series/1 Program Preparation Subsystem Version 3: Macro Assembler Reference Summary (SC34-0130)*

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**PROGRAM PREPARATION SUBSYSTEM VERSION 4  
5719-AS4****PURPOSE**

The Program Preparation Subsystem Version 4 (5719-AS4) is a licensed program which provides all the facilities of the Program Preparation Subsystem Version 1 (5719-AS1), Version 2 (5719-AS2), and Version 3 (5719-AS3). The Program Preparation Subsystem Version 4 also has the ability to prepare applications to execute on the Realtime Programming System Versions 1, 2, 3, and 4. Improvements in assembler performance have been made. Also, several usability enhancements are incorporated.

Note: If the Command Language Facility of Realtime Programming System Version 4 (5719-PC4) will be used, then 5719-AS4 is required.

**HIGHLIGHTS**

- Provides all the capabilities previously announced for Program Preparation Subsystem Versions 1, 2 and 3.
- Automatic creation of Assembler work DSDs if the user specifies either a "WORKVOL" or "WORK1" DSD.
- OBJOUT data set will be automatically created if it does not exist at assembler invocation.
- Multiple assembly capability for processing all members of a partitioned data set or all data sets in a volume with a single assembler invocation.
- Support for 4952 Processor instructions in the Assembler.
- A new component, the macro preprocessor, allows the user to develop preprocessed macro programs which will improve assembler performance.
- A new job stream processor statement provides a simple, easy-to-use interface to the new macro preprocessor.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system requirements to install the Series/1 Program Preparation Subsystem Version 4 are:

<b>Processor</b>	<p>For a Realtime Programming System Version 4 Multiple Address Space Management Environment</p> <p>1 - IBM 4955 model B or D Processor equipped with Storage Address Relocation Translator #6335, or 4955 model E, or 4952</p> <p>For a Realtime Programming System Version 4 Single Address Space Management Environment</p> <p>1 - IBM 4952 Processor or 1 - IBM 4953 Processor or 1 - IBM 4955 Processor</p>
<b>Storage</b>	64K byte minimum system with at least a 16K byte partition for the Program Preparation Subsystem to operate in a Version 4 Multiple Address Space Environment or at least 48K minimum system and an 18K byte partition to operate in a Version 4 Single Address Space Management Environment.
<b>Disk</b>	<p>1 - IBM 4962 model 2, 2F, or 4 Disk Storage Unit (Combination disk/diskette unit) or 1 - IBM 4962 model 1, 1F, or 3 Disk Storage Unit or 1 - IBM 4963 Disk Subsystem Unit may be used.</p>
<b>Diskette</b>	<p>1 - IBM 4964 Diskette Unit or 1 - IBM 4966 Diskette Magazine Unit</p>
<b>Printer</b>	<p>1 - IBM 4973 Line Printer or 1 - IBM 4974 Printer</p>
<b>Operator</b>	<p>1 - IBM 4979 Display Station or 1 - 4978 Display Station (RPQ P82572 Version 3, 5799-TCE)* or IBM 3101 Display Terminal (as Teletype® Models ASR 33/35 equivalent device) or</p>

1 - Teletypewriter Adapter #7850 with Teletype® Models ASR 33/35

\* Requires separate licensed program

**SOFTWARE REQUIREMENTS**

IBM Series/1 Realtime Programming System Version 4 (5719-PC4)

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Programming System Summary (GC34-0285) ... IBM Series/1 Program Preparation Subsystem Version 4: Licensed Program Specifications (GC34-0270) ... IBM Series/1 Program Preparation Subsystem Version 4: Batch User's Guide (SC34-0272) ... IBM Series/1 Program Preparation Subsystem Version 4: Text Editor User's Guide (SC34-0273) ... IBM Series/1 Program Preparation Subsystem Version 4: Application Builder User's Guide (SC34-0275) ... IBM Series/1 Program Preparation Subsystem Version 4: Macro Assembler User's Guide (SC34-0274) ... IBM Series/1 Program Preparation Subsystem Version 4: Messages (SC34-0279) ... IBM Series/1: Macro Assembler Reference Summary (SC34-0128).*

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**PROGRAM PREPARATION SUBSYSTEM VERSION 5  
5719-AS5****PURPOSE**

The IBM Series/1 Program Preparation Subsystem Version 5 licensed program contains changes to support functions offered in Version 5 of the IBM Series/1 Realtime Programming System, a Text Editor, and a repackaging to include facilities required for development use.

**HIGHLIGHTS****New Text Editor**

For improved productivity, a new Text Editor is supplied as part of the Program Preparation Subsystem Version 5 replacing the old Text Editor. It is a general purpose text editor for the Series/1, running under Version 5 of the Realtime Programming System. It supports three editing modes:

- Full screen (or visual)
- Single-line
- Non-interactive

The commands in single-line and non-interactive modes are the same; only the source of editor input varies.

The new Text Editor is a user task set supporting one terminal per partition. It is designed to be invoked from a Command Language Facility environment although it can be started via a TSET STR operator command, by a QUETS macro, or via the Job Stream Processor.

In full screen mode, the Text Editor presents a user interface which is very similar to that of the SPF editor for TSO and CMS. In this mode, the following editing functions are supported:

- Direct alterations of data by overtyping.
- Line commands for:
  - Inserting or deleting one or more lines for data entry
  - Moving or copying one or more lines from place to place within the files
  - Repeating one or more lines, one or more times
  - Shifting data or block printing on one or more lines
  - Displaying an indicator line for columnar alignment
- Primary commands for:
  - Scrolling the data being edited in any direction and any amount
  - Finding or changing text strings
  - Saving the data being edited
  - Save in place
  - Cancelling the edit session without saving the data being edited
  - Copying another file into the current file
  - Controlling whether data in the file should be translated to upper case

There is also a menu interface for the selection of data to be edited; this interface is primarily designed for use when the editor is not invoked from the Command Language Facility.

In single-line and non-interactive modes, the new Text Editor presents an interface which is similar in appearance to that of the VM/370 CMS editor. This is not line number oriented. Commands are provided to:

- Change the current line pointer
- Find and change text strings
- Save the data being edited
- Save in place
- Cancel the edit session without saving the data being edited
- Copy another file into the current file
- Control whether data in the file should be translated to upper case
- Insert and delete one or more lines
- Move or copy one or more lines from place to place within the file
- Print feature

There are also commands to permit the selection of data to be edited; these commands are primarily intended for use when the editor is not invoked by the Command Language Facility.

File line numbers are provided on printed output for ease in updating.

**Application Builder**

Application Builder modifications to support specification of a new facility offered in Version 5 of the Realtime Programming System called "Secondary Storage Services".

**Job Stream Processor**

Job Stream Processor modifications to support Version 5 Realtime Programming System spooling parameters when building printer DSDs.

**Improved Packaging**

The Command Language Facility, SYSGEN, and the System User macros have been included into Version 5 of the Program Preparation Subsystem to separately provide the system functions required in a development environment and those required in a production environment.

The Job Stream Processor is also provided as a separate Programming RPQ (5799-TEC) so that "non-development" systems will not need the Program Preparation Subsystem in order to have access to a batch job stream capability.

**SYSGEN**

SYSGEN has been improved for the case where a customized system is required. The enhancements make SYSGEN easier, more accurate and faster through reduced questions, automatic answer verification, fewer assemblies, and by providing the user with the ability to restart the SYSGEN at various points.

**Command Language Facility**

New commands are provided to:

- Invoke the macro preprocessor (PREPM)
- Produce a formatted report of a system log (LLOG)

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system requirements for execution of the Series/1 Program Preparation Subsystem Version 5 in a Realtime Programming System Version 5 development environment are:

<b>Processor</b>	1 - IBM 4955
<b>Storage</b>	192K byte minimum processor storage with at least 32K byte partition for the Program Preparation Subsystem.
<b>Disk</b>	1-IBM 4962 model 4 Disk Storage Unit (combination disk/diskette unit) or 1 - IBM 4962 model 3 Disk Storage Unit or 1 - IBM 4963 Disk Subsystem unit may be used
<b>Diskette</b>	1 - IBM 4964 Diskette Unit or 1 - IBM 4965 Diskette Unit and I/O Expansion Unit or 1 - IBM 4966 Diskette Magazine Unit
<b>Printer</b>	1 - IBM 4973 Line Printer or 1 - IBM 4974 Printer or 1 - IBM 4975 Printer
<b>System Console</b>	1 - IBM 4979 Display Station or 1 - IBM 4978 Display Station or 1 - IBM 5251 Display* models 1 or 2 or 1 - IBM 3101 Display Station attached via: <ul style="list-style-type: none"> <li>• #1310 Multifunction Attachment (IBM 3101 models 10, 12, 13, 20, 22, or 23 on the first address, IBM 3101 models 13 or 23 on any address)</li> <li>• #1610 Asynchronous Communications Single-Line Control (IBM 3101 models 10, 12, 13, 20, 22, or 23)</li> <li>• #2091/#2092 Asynchronous Communication 8-Line Control and 4-Line Adapter (IBM 3101 models 10, 12, 13, 20, 22, or 23)</li> <li>• #2095/#2096 Feature Programmable 8-Line Multiline Communications Controller and 4-Line Attachment (IBM 3101 models 10, 12, 13, 20, 22, or 23) or</li> </ul>



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PP 5719-AS5.2

May 83

Major Revision

PROGRAM PRODUCTS

**Program Preparation Subsystem V5 (cont'd)**

1 - Teletypewriter Adapter #7850 with a 3101 terminal or equivalent teletypewriter device

\* Supported by separate licensed program

**SOFTWARE REQUIREMENTS**

IBM Series/1 Realtime Programming System Version 5 (5719-PC5) and IBM Series/1 5250 Information Display System (5719-TA1) if support is required.

**COMPATIBILITY**

**Files**

Text Editor Files generated with Version 4 (5719-AS4) are compatible with the Version 5 (5719-AS5) Text Editor.

**Programs**

Version 5 can prepare programs to execute on Versions 3, 4, and 5 of the Realtime Programming System (5719-PC3, PC4, PC5), respectively.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Program Preparation Subsystem Version 5: Licensed Program Specifications (GC34-0352) ... IBM Series/1 Realtime Programming System Version 5: System Customization Guide (SC34-0360) ... IBM Series/1 Realtime Programming System Version 5: Command Language Facility User's Guide (SC34-0362) ... IBM Series/1 Program Preparation Subsystem Version 5: Batch User's Guide (SC34-0376) ... IBM Series/1 Program Preparation Subsystem Version 5: Text Editor User's Guide (SC34-0374) ... IBM Series/1 Program Preparation Subsystem Version 5: Application Builder User's Guide (SC34-0375) ... IBM Series/1 Program Preparation Subsystem Version 5: Macro Assembler User's Guide (SC34-0377).*

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SERIES/1 PROGRAM PREPARATION SUBSYSTEM  
VERSION 6 (5719-AS6)****PURPOSE**

The Series/1 Program Preparation Subsystem Version 6 licensed program has been enhanced to support the functions offered in the Realtime Programming System, Version 6, and the Multiprocessing feature.

**HIGHLIGHTS**

Available July 29, 1983:

- Application Builder support of new function
- System Generation support for new function
- Text Editor Program Function Key tailoring
- High-Level Language tabs for the Text Editor

**DESCRIPTION**

**Application Builder Support of New Function:** The Application Builder will be updated to support the functions added to Realtime Programming System Version 6.

**System Generation Support of New Function:** New questions will be added to support the functions added to Realtime Programming System Version 6.

**Text Editor Function Key Tailoring:** The Text Editor now allows tailoring of Program Function Key definitions. Any or all of the Program Function Keys can be equated to any of the Full Screen Primary Commands so the specified command will be executed whenever the key is entered.

**High-Level Language Tabs for the Text Editor:** New Text Editor primary commands are defined to allow users entering source programs to set tabs at predefined column positions useful for source entry.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The following minimum configuration is required to operate the Program Preparation Subsystem, Version 6:

- The specified operating environment for the Realtime Programming System Version 6 (5719-PC6), or the Multiprocessing feature, for installation and customization.
- At least one 32K-byte partition for execution of Program Preparation Subsystem, Version 6.

**SOFTWARE REQUIREMENTS**

The following licensed program is compatible with the Program Preparation Subsystem, Version 6:

- IBM Series/1 Realtime Programming System, Version 6 (5719-PC6), or the Multiprocessing feature.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Program Preparation Subsystem, Version 6: Licensed Program Specifications (GC34-0461) ... IBM Series/1 Program Preparation Subsystem, Version 6: Batch User's Guide (SC34-0476) ... IBM Series/1 Program Preparation Subsystem, Version 6: Text Editor User's Guide (SC34-0474) ... IBM Series/1 Program Preparation Subsystem, Version 6: Application Builder User's Guide (SC34-0475) ... IBM Series/1 Program Preparation Subsystem, Version 6: Macro Assembler User's Guide (SC34-0477).*

**RPQs ACCEPTED:** Yes

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**SERIES/1-S/370 CHANNEL ATTACH  
5719-CA1**

**PURPOSE**

The Series/1-S/370 Channel Attach program runs under the control of the Series/1 Realtime Programming System. This program, when used in conjunction with the 4993 mdl 1 Series/1-S/370 Termination Enclosure and the Series/1-S/370 Channel Attachment (feature #1200), provides the Series/1 user with the ability to communicate with a S/370 (mdls 135-168), and the 3031, 3032, 3033, 4331, 4341, 4361 and 4381 Processors over a selector or block multiplexer channel.

**HIGHLIGHTS**

This program provides the Series/1 user the ability of transferring data, under joint consent, between user application programs in his Series/1 and a S/370. The S/370 must be using DOS/VS, OS/VS1 or OS/VS2 (SVS or MVS) and BTAM, or DOS/VSE with BTAM-ES. The support:

- Establishes, controls and terminates access between Series/1 application programs and the channel attach device
- Manages input/output transfers between the Series/1 application programs and the channel attach device
- Performs error logging
- Handles interrupts from the channel attach device
- Performs error recovery at the physical (Read/Write) level of support

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

One IBM 4993 model 1 Series/1-S/370 Termination Enclosure and one IBM Series/1-S/370 Channel Attachment (#1200).

Realtime Programming Systems using this support with the IBM 4952 or the IBM 4953 should be carefully reviewed to see that performance objectives can be achieved.

**SOFTWARE REQUIREMENTS**

The minimum system required to install the IBM Series/1-S/370 Channel Attach program (5719-CA1) is specified for the IBM Series/1 Program Preparation System Version 3 (5719-AS3) or the IBM Series/1 Program Preparation System Version 4 (5719-AS4).

The minimum system required for program execution of the IBM Series/1-S/370 Channel Attach program is as specified for the IBM Series/1 Realtime Programming System Version 3 (5719-PC3) or the IBM Series/1 Realtime Programming System Version 4 (5719-PC4).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1-System/370 Channel Attach Program General Information Manual (GC34-0217) ... IBM Series/1-System/370 Channel Attach Program Licensed Program Specifications (GC34-0214) ... IBM Series/1-System/370 Channel Attach Program Reference Summary (SX34-0029) ... IBM Series/1-System/370 Channel Attach Program Reference Manual (SC34-0215).*

**Note:** Publications should be ordered via SLSS for customers. Customers on subscription for a current version of a licensed program will not automatically receive publications for a subsequent version; SLSS must be updated for each version of a licensed program.

**REALTIME PROGRAMMING SYSTEM  
COBOL COMPILER AND RESIDENT LIBRARY (5719-CB1)  
COBOL TRANSIENT LIBRARY (5719-CB2)**

**PURPOSE**

IBM Series/1 Realtime Programming System COBOL provides customers with a powerful, comprehensive, easy-to-use language for use in preparation and execution of commercial and online data entry application software. The language offers a wide range of commercial features, plus extensive facilities for handling input and output, sorting and merging data files, structuring the source and object programs, and debugging COBOL programs. The Series/1 product also supports local communication functions enabling users to accept data from and display data to Series/1 interactive devices.

COBOL programs can be used with the Realtime Programming System Multiple Terminal Manager PRPQ (5799-TCY). With these facilities, COBOL programs can execute in an interactive environment where one or more applications can run concurrently with one or more terminals. Users can write interactive terminal handling applications and develop screen-oriented programs to accept and display data from predefined fields on screens dedicated to multiple applications.

COBOL is suited to an interactive commercial environment where users can run transaction processing applications, such as order entry and data collection, as well as applications that run in a background batch environment.

**DESCRIPTION**

Series/1 Realtime Programming System COBOL is offered as two licensed programs:

- Realtime Programming System COBOL Compiler and Resident Library (5719-CB1) for compilation and building of user programs
- Realtime Programming System COBOL Transient Library (5719-CB2) for execution of user programs

The Realtime Programming System COBOL compiler executes under Version 3 or Version 4 (5719-PC3 or 5719-PC4) of the Realtime Programming System and Version 3 or Version 4 (5719-AS3 or 5719-AS4) of the Program Preparation Subsystem. COBOL applications can execute under the Realtime Programming System for the Program Preparation Subsystem batch environment.

**COBOL Language**

The 1974 American National Standard COBOL processing modules supported include all of Level 1 for the:

- Nucleus: Language elements needed for internal processing of data
  - Table Handling: Define and process fixed-length tables
  - Sequential I/O: Define and access sequential files\*
  - Relative I/O: Define and access relative files\*
  - Indexed I/O: Define and access indexed files\*
  - Sort/Merge: Sorting of data files
  - Segmentation: Specify overlay of the Procedure Division at execution time
  - Library: Inclusion of pre-defined COBOL text into a COBOL source program
  - Debug: Convenient access for monitoring program execution
  - Interprogram Communication: Ability to transfer control from one object program to another within a task set
- \* RERUN clause is checked for syntactic correctness only.

In addition to the above, the following features are also supported.

- Merge feature of Sort/Merge Level 2
- NUCLEUS Level 2 features:
  - COMPUTE statement
  - Qualification
  - Arithmetic operators
  - CORRESPONDING phrase
  - ACCEPT and DISPLAY statement
  - Multiple operand support for arithmetic statements
  - Nested IFs
  - PERFORM UNTIL
  - 01 through 49 level numbers

**HIGHLIGHTS**

- Language
 

Series/1 COBOL is designed according to the specifications for American National Standard (ANS) COBOL X3-23-1974 as understood and interpreted by IBM as of March 1979, with the exception of the RERUN clause.

Series/1 COBOL exceeds the Low Intermediate Level COBOL as defined by FIPS PUB 21-1.

- Extensive User Options
  - source listings
  - cross reference
  - storage map of variables
  - statement offset listing
  - reentrant object code generation
  - compile-load-go feature
  - object listing
  - MAP 370 option
- Program Development and Productivity Aids
  - Symbolic debug, which makes storage maps and snapshots of data available in COBOL format.
  - Flow trace, which identifies the last statement executed before an abnormal termination.
  - Extensive error checking and error messages at five severity levels, ranging from source program fix-up, to warning messages, to serious and critical errors.
  - FIPS Flagger enables quick and easy identification of COBOL source statements which exceed the specified FIPS language level.
  - Generalized CALL facility allows access to programs written in Assembler language, PL/I and FORTRAN.

**I/O Capabilities in COBOL**

Series/1 COBOL programs can work with SEQUENTIAL, RELATIVE and INDEX I/O files.

The data format for SEQUENTIAL files can be:

- fixed
- fixed blocked
- fixed blocked spanned
- variable
- variable blocked
- variable blocked spanned

RELATIVE files can be accessed sequentially or randomly by record number. INDEXED files can be accessed sequentially or directly by key associated with each record.

**Table Handling**

- Define and process fixed-length tables of up to three dimensions

**Sort/Merge**

- Sort one to eight data files
- Merge two to eight data files
- Sort/Merge files in ascending or descending order
- Facility to modify input and output records before or after sort processing

**Segmentation**

The Segmentation feature permits:

- Dividing the Procedure Division of a COBOL program into a series of segments.
- Specifying that some segments (fixed segments) must be resident in main storage while the program is running and cannot be overlaid, while others (independent segments) are loaded into an overlay area when needed.
- Reducing main storage requirements during program execution.

**Source Program Library**

This feature allows text (such as Configuration Section paragraphs, Input/Output Section paragraphs, FD and SD entries, record description entries, Procedure Division sections and paragraphs) to be copied into a source program from a library.

**Interprogram Communication**

This facility allows

- Transferring of control from one object program to another within a task set. Programs can access the same data.
- Use of the CALL verb to gain access to programs written in Assembler language, PL/I, and FORTRAN.

**Resident Library**

The Series/1 COBOL Resident Library consists of commonly used reentrant subroutines which are combined with a user's program through the Application Builder to form a task set for subsequent execution on Series/1. Resident Library routines can reside in a shared task set. The Resident Library consists of commonly used subroutines such as:

- Data conversion
- I/O routines
- ACCEPT/DISPLAY data to/from terminals

**Realtime Programming System COBOL (cont'd)**

- Arithmetic routines
- Sort/Merge interface
- Run-time error routines

**Transient Library**

The Series/1 COBOL Transient Library is used in conjunction with the execution of COBOL user programs. Routines in the transient library are loaded only when needed, thus allowing a more efficient utilization of primary storage. These routines are reentrant and can be executed from a shared task set. The principal functions in the Transient Library are:

- OPEN/CLOSE
- Program Termination/Initialization
- ACCEPT - Date/Time
- I/O Error Handling Routines
- Execution-Time Messages

**Compilation**

The Series/1 COBOL Compiler takes advantage of the features of the Realtime Programming System for computations. If the timer is supported on the user system, timer facilities are used to generate date and time-of-day information on compiler output and to provide elapsed time recording of a compilation.

COBOL is dependent on Application Builder facilities to build task sets for subsequent execution on the operating system. The SEGMENTATION feature of COBOL allows users to optimize storage requirements for their applications through use of overlays.

**Execution**

Object programs are executed under the Realtime Programming System. COBOL data sets can be declared SEQUENTIAL, RELATIVE or INDEXED and require the operating system data management facilities.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

In addition to the minimum requirement for IBM Series/1 Version 3 or 4 of the Realtime Programming System and Version 3 or 4 of the Program Preparation Subsystem, the storage requirements are:

- For compilation, a minimum 34K byte partition for the compiler.
- For execution, a minimum partition size of 8K bytes for small programs; actual partition size is a function of the COBOL source program.

Usage of shared task set in COBOL is optional. The shared task set can be used to reduce main and secondary storage requirements for application programs.

For details on system requirements for the IBM Series/1 Realtime Programming System Version 3 or 4 and the IBM Series/1 Program Preparation Subsystem Version 3, see the appropriate pages.

**SOFTWARE REQUIREMENTS**

The following licensed programs are required if the associated functions are used:

- IBM Series/1 Realtime Programming System Sort/Merge (5719-SM1): Required support for Sort and Merge verbs
- IBM Series/1 Indexed Access Method PRPQ (5799-TCB), or IBM Series/1 Indexed Access Method Licensed Program (5719-AM1) for Realtime Programming System Version 3 or 4: Required support for Indexed I/O
- IBM Series/1 Multiple Terminal Manager PRPQ (5799-TCY): For Application/terminal I/O and screen support
- IBM Series/1 4969 Magnetic Tape Subsystem Support Program (5719-TA4): Required support for IBM 4969 tape device

**COMPATIBILITY**

Series/1 COBOL at the source statement level is a compatible subset of the OS/VS COBOL Compiler and Library - Release 2. Programmers can develop COBOL programs on larger systems for use on Series/1 provided those programs do not use any language, implementation or hardware features the Series/1 product does not support.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System COBOL Compiler and Resident Library Licensed Program Specifications (GC34-0236) ... IBM Series/1 Realtime Programming System COBOL Introduction (GC34-0233) ... IBM Series/1 Realtime Programming System COBOL Language Reference (GC34-0234) ... IBM Series/1 Multiple Terminal Manager User's Guide (SC34-1658) ... IBM Series/1 Realtime Programming System COBOL Programmer's Guide (SC34-0235) ... IBM Series/1 System Programming Summary (GC34-0285) ... IBM Series/1 Transient Library Licensed Program Specifications (GC34-0237)*

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE  
COBOL COMPILER and RESIDENT LIBRARY (5719-CB3)  
COBOL TRANSIENT LIBRARY (5719-CB4)**

**PURPOSE**

IBM offers COBOL under the Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1). The compiler and library can be diskette- or disk-based as supported by the operating system. The compiler requires as input a COBOL source program and produces object modules which are combined by the Event Driven Executive linkage editor into a Series/1 executable machine language program.

The language offers a wide range of commercial features, plus extensive facilities for handling input and output, sorting and merging data files, index capability for faster and simpler access to data files, structuring the source and object programs, and trace facilities for debugging COBOL programs. The Series/1 COBOL product also supports local communication functions, enabling users to accept data from and display data to Series/1 interactive devices.

COBOL programs can be used with the Event Driven Executive Multiple Terminal Manager licensed program (5719-MS1). With these facilities COBOL programs can execute in an interactive environment where one or more applications can run concurrently with more than one terminal. Users can write interactive terminal handling applications and develop screen-oriented programs to accept and display data from predefined fields on screens.

COBOL is suited to an interactive commercial environment where users can develop transaction processing applications such as order entry, data collection, and file update, as well as applications that run in a batch environment.

**DESCRIPTION**

Series/1 Event Driven Executive COBOL is offered as two licensed programs:

- Event Driven Executive COBOL Compiler and Resident Library (5719-CB3) for compilation of user programs.
- Event Driven Executive COBOL Transient Library (5719-CB4) for execution of user programs.

**COBOL Language**

The 1974 American National Standard COBOL processing modules supported include all of Level 1 for the:

Nucleus	Language elements needed for internal processing of data
Table Handling	Define and process fixed-length tables
Sequential I/O	Define and access sequential files*
Relative I/O	Define and access relative files*
Indexed I/O	Access indexed files*
Sort/Merge	Sorting of data files
Segmentation	Specify overlay of the Procedure Division at execution time
Library	Inclusion of pre-defined COBOL text into a COBOL source program
Debug	Convenient access for monitoring program execution
Interprogram Communication	Ability to transfer control from one object program to another

\* RERUN clause is checked for syntactic correctness only.

In addition to the above, the following features are also supported:

- MERGE feature of Sort/Merge Level 2
- NUCLEUS LEVEL 2 features:
  - COMPUTE statement
  - Qualification
  - Arithmetic operators
  - CORRESPONDING phrase
  - ACCEPT and DISPLAY statements
  - Multiple operand support for arithmetic statements
  - Nested IF statements
  - PERFORM UNTIL phrase
  - 01 through 49 level numbers

**HIGHLIGHTS**

- Language
 

Event Driven Executive COBOL is designed according to specifications for American National Standard (ANS) COBOL X3.23-1974 as understood and interpreted by IBM as of March, 1979, with the exception of the RERUN clause.

Event Driven Executive COBOL exceeds the Low Intermediate Level COBOL as defined by FIPS 21-1.

- Extensive User Options
  - Source listings
  - Cross reference
  - Storage map of variables
  - Statement offset listing
  - Object listing
  - MAP 370 option
- Program Development and Productivity Aids
  - Symbolic debug, which makes storage maps and snapshots of data areas available in COBOL format
  - Flow trace, which identifies the last statement executed before an abnormal termination
  - Extensive error checking and error messages at five severity levels, ranging from source program fix-up, to warning messages, to serious and fatal errors
  - FIPS flagger enables quick and easy identification of COBOL source statements which exceed the specified FIPS language level
  - Generalized CALL facility allows access to programs written in Assembler language or FORTRAN.

**Resident Library**

The Event Driven Executive COBOL Resident Library consists of commonly used subroutines which are combined with a user's program through the linkage editor to form an executable load module for subsequent execution under the Event Driven Executive Basic Supervisor and Emulator. The Resident Library includes subroutines such as:

- Data conversion
- I/O routines
- ACCEPT/DISPLAY data to/from terminals
- Arithmetic routines
- Sort/Merge interface
- Run-time error routines

**Transient Library**

The Event Driven Executive COBOL Transient Library is used in conjunction with the execution of COBOL user programs. Routines in the transient library are loaded only when needed, thus allowing a more efficient utilization of primary storage. The principal functions in the transient library are:

- OPEN/CLOSE
- Program Termination/Initialization
- ACCEPT - Date/Time
- I/O Error Handling Routines
- Execution time messages

**Compilation**

The Event Driven Executive COBOL Compiler operates in the environment of the Event Driven Executive Basic Supervisor and Emulator (5719-XS1). The COBOL-generated object code is combined with library routines by the Event Driven Executive linkage editor and can run as a program under the control of the Event Driven Executive system. The Event Driven Executive Utilities (5719-UT3) provide powerful program editing and program management capabilities for the COBOL development process.

**Execution**

Object programs are executed under the Event Driven Executive operating system. COBOL data sets can be declared SEQUENTIAL, RELATIVE or INDEXED, and require the operating system data management facilities. The SEGMENTATION feature of COBOL allows users to optimize storage requirements for their application through use of overlays.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:



## PROGRAM PRODUCTS

## EDX COBOL (cont'd)

## HARDWARE REQUIREMENTS

In addition to the minimum requirement for the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator, and the Event Driven Executive Program Preparation Facility, the storage requirements are:

- For compilation, a minimum 32K byte partition for the compiler.
- For execution, a minimum partition size is 8K to 10K bytes for small programs; partition size is a function of the COBOL source program.

For details on system requirements for the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator and the IBM Series/1 Event Driven Executive Program Preparation Facility, see the respective pages.

## SOFTWARE REQUIREMENTS

Licensed programs required for:

## Compilation

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1)
- IBM Series/1 Event Driven Executive COBOL Compiler and Resident Library (5719-CB3)

## Program Preparation

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1)
- IBM Series/1 Event Driven Executive Program Preparation Facility (5719-XX2)
- IBM Series/1 Event Driven Executive Utilities (5719-UT3)

## Program Execution

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1)
- IBM Series/1 Event Driven Executive COBOL Transient Library (5719-CB4)

## Additional Licensed Programs

The following licensed programs are required if the associated functions are used:

- IBM Series/1 Event Driven Executive Sort/Merge (5719-SM2): Required support for SORT and MERGE verbs
- IBM Series/1 Event Driven Executive Indexed Access Method (5719-AM3): Required support for indexed file I/O
- IBM Series/1 Event Driven Executive Multiple Terminal Manager (5719-MS1): Required support for interactive terminal I/O and screen support

## COMPATIBILITY

- Series/1 Event Driven Executive COBOL at the source statement level is a compatible subset of OS/VS COBOL Compiler and Library Release 2. Programmers can develop COBOL programs on larger systems for use on Series/1, provided those programs do not use any language or hardware features the Series/1 product does not support.
- Series/1 COBOL programs are compatible at the Source level between the Realtime Programming System and the Event Driven Executive Basic Supervisor and Emulator (5719-XS1) except for the File Select statement.
- COBOL data files in fixed-block unspanned format are compatible between Event Driven Executive and the Realtime Programming System through the Basic Exchange data format.

## DOCUMENTATION

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive COBOL Compiler and Resident Library; Licensed Program Specifications (GL23-0012) ... IBM Series/1 COBOL Language Reference (GC34-0234) ... IBM Series/1 Event Driven Executive COBOL Programmer's Guide (GL23-0014) ... IBM Series/1 Programming System Summary (GC34-0285) ... IBM Series/1 Event Driven Executive COBOL Transient Library Program Specifications (GL23-0013).*

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE  
COBOL COMPILER and RESIDENT LIBRARY VERSION 2  
5719-CB5  
COBOL TRANSIENT LIBRARY VERSION 2 (5719-CB6)**

**PURPOSE**

IBM offers COBOL Version 2 (see "Language" section below) operating in the environment provided by the Series/1 Event Driven Executive Basic Supervisor and Emulator Version 3.1 (5719-XS3). The compiler and library can be diskette- or disk-based as supported by the operating system. The compiler requires as input a COBOL source program and produces object modules which are combined by the Event Driven Executive linkage editor into a Series/1 program.

The language offers a wide range of commercial features, plus extensive facilities for handling input and output, sorting and merging data files, index capability for faster and simpler access to data files, structuring the source and object programs, and trace facilities for debugging COBOL programs. Series/1 COBOL also supports local communication functions, enabling users to accept data from and display data to Series/1 interactive devices.

COBOL programs can be used with the Event Driven Executive Multiple Terminal Manager Version 2 licensed program (5719-MS2). With these facilities, COBOL programs can execute in an interactive environment, where one or more applications can run concurrently with more than one terminal. Users can write interactive terminal handling applications and develop screen-oriented programs to accept and display data from predefined fields on screens dedicated to multiple applications.

COBOL is suited for an interactive commercial environment where users can develop transaction processing applications such as order entry, data collection, and file update, as well as applications that run in a background batch environment.

**HIGHLIGHTS**

The Series/1 Event Driven Executive COBOL Compiler is offered as two licensed programs:

- Event Driven Executive COBOL Compiler and Resident Library Version 2 (5719-CB5) for compiling and building of user programs.
- Event Driven Executive Transient Library Version 2 (5719-CB6) for execution of user programs.

The COBOL Version 2 licensed programs contain all of the functions currently available in the respective COBOL Version 1 programs and, in addition, contain the following language features and new I/O support:

- Logical connectives (AND, OR, NOT operators)
- START and READ NEXT verbs from relative or index I/O
- VALUE OF IS dataname clause
- COMP-3 data type (packed decimal) and COMP-4 data type (binary)
- Level 88
- OPEN EXTEND
- LINAGE clause
- Blocked Relative File Support

The Series/1 COBOL Compiler Version 2 executes in the operating environment provided by the Event Driven Executive Basic Supervisor and Emulator Version 3.1 (5719-XS3) and requires the Event Driven Executive Utilities Version 3.1 (5719-UT5).

**COBOL Language**

The 1974 American National Standard COBOL processing modules supported include all of Level 1 for the:

Nucleus	Language elements needed for internal processing of data
Table Handling	Define and process fixed-length tables
Sequential I/O	Define and access sequential files*
Relative I/O	Define and access relative files*
Indexed I/O	Access indexed files*
Sort/Merge	Sorting of data files
Segmentation	Specify overlay of the Procedure Division at execution time
Library	Inclusion of pre-defined COBOL text into a COBOL source program
Debug	Access for monitoring program execution
Interprogram Communication	Ability to transfer control from one object program to another

\* RERUN clause is checked for syntactic correctness only.

In addition to the above, the following Level 2 features are also supported:

- NUCLEUS Level 2 features:
  - COMPUTE statement
  - Qualification
  - Arithmetic operators
  - CORRESPONDING phrase
  - ACCEPT and DISPLAY statement
  - Multiple operand support for arithmetic statements
  - Nested IF statements
  - PERFORM UNTIL phrase
  - 01 through 49 and 88 level numbers
  - Nested REDEFINES
  - Logical Operators
- Sequential I/O Level 2 features:
  - VALUE OF clause
  - OPEN EXTEND
  - LINAGE clause
- Relative I/O Level 2 features:
  - START and READ NEXT verbs
  - VALUE OF clause
  - DYNAMIC access mode
- INDEXED I/O Level 2 features:
  - START and READ NEXT verbs
  - VALUE OF clause
  - DYNAMIC access mode
- MERGE feature of SORT/MERGE

**Resident Library:** The Series/1 COBOL Resident Library Version 2 consists of commonly used reentrant subroutines which are combined with a user's program through the linkage editor for subsequent execution on Series/1. The Resident Library includes subroutines such as:

- Data conversion
- I/O routines
- ACCEPT/DISPLAY data to/from terminals
- Arithmetic routines
- Sort/Merge interface
- Run time error routines

**Transient Library:** The COBOL Transient Library Version 2 is used in conjunction with the execution of COBOL user programs. Routines in the transient library are reentrant and loaded only when needed, thus allowing a more efficient utilization of storage. The principal functions in the transient library are:

- OPEN/CLOSE
- Program Termination/Initialization
- ACCEPT Date/Time
- I/O Error Handling Routines
- Execution Time Messages

**Compilation:** The Series/1 COBOL Compiler Version 2 operates in the environment provided by the Event Driven Executive Basic Supervisor and Emulator Version 3.1 (5719-XS3). The COBOL-generated object code is combined with library routines by the Event Driven Executive linkage editor and can run as a program under the control of the Event Driven Executive. The Event Driven Executive Utilities Version 3.1 (5719-UT5) provide powerful program editing and program management capabilities for the COBOL development process.

**Execution:** Object programs are executed in the environment provided by the Event Driven Executive Basic Supervisor and Emulator Version 3.1 (5719-XS3). COBOL data sets can be declared SEQUENTIAL, RELATIVE or INDEXED, and require the operating system data management facilities. The SEGMENTATION feature of COBOL allows users to optimize storage requirements for their applications through use of overlays.

**DESCRIPTION**

- Language
 

Series/1 COBOL Version 2 is designed according to specifications for American National Standard (ANS) COBOL X3.23-1974 as understood and interpreted by IBM as of August, 1981. Series/1 COBOL Version 2 exceeds the Low Intermediate Level COBOL as defined by FIPS 21-1, with the exception of the RERUN Clause.

**EDX COBOL V2 (cont'd)**

- New COBOL Version 2 Language features:
  - 'AND' and 'OR' operators allows formation of complex conditionals by combining simple conditions
  - 'NOT' operator reverses the logical value (true or false) of an existing condition.
  - START and READ NEXT verbs allow easier file accessing of relative and index files; users can now specify a generic key to logically position to a record in the file and then proceed to read the file from that record to the end of the file.
  - COMP-3 data type is an extension beyond the ANS COBOL language support and enhances data interchange with System/370 applications which use this data type extensively. The COMP-3 data type is for arithmetic expressions in packed decimal format. With this data type, users can read and write in COMP-3 format, perform arithmetic calculations and convert COMP-3 to different data types. COMP-4 is treated as a synonym for COMP, which stores data in binary format.
  - Level 88 is used to identify entries for condition-names that will be used in conditional expressions.
  - OPEN EXTEND is part of sequential I/O for Level 2 ANS COBOL. This statement indicates the processing of a file will begin by writing the first record at the end-of-data marker. This increases usability so that records can be added to an existing file. This support is provided for files existing on disk or diskette.
  - LINAGE clause allows users to handle special forms from COBOL programs; this also gives users more dynamic capability to specify form layouts for different files. The LINAGE clause provides a means for specifying the depth of a logical page in terms of number of lines. It also provides for specifying the size of the top and bottom margins on the logical page and the line number, within the page body, at which the footing area begins.
  - Blocked Relative file support allows blocking of fixed length records. Block size must be an integer multiple of the record size.
  - VALUE OF IS data name clause which is a part of sequential, relative and indexed I/O and describes items in the label records associated with a file. In this implementation, the VALUE OF clause serves only as documentation.

- Extensive User Options

- Source listings
- Cross reference
- Storage map of variables
- Statement offset listing
- Object listing
- MAP 370 listing option

- Program Development and Productivity Aids

- Symbolic debug, which makes storage maps and snapshots of data areas available in COBOL format
- Flow trace, which identifies the last statement executed before an abnormal termination
- Extensive error checking and error messages at five severity levels, ranging from source program fix-up, to warning messages, to serious and fatal errors
- Generalized CALL facility allows access to programs written in Event Driven assembler language (EDL)
- FIPS Flagger enables quick and easy identification of COBOL source statements which exceed the specified FIPS language level

- Full Screen Support

Full screen facilities to support high level languages including COBOL are available in the Event Driven Executive Basic Supervisor and Emulator Version 3. These facilities are oriented towards the application programmer with minimal knowledge of the system. The screen functions can be accessed via direct CALL from COBOL to provide full screen control for the 4979, 4978 and 3101 models 20, 22, and 23 Display Stations. These functions include:

- Retrieve and display screen formats
- Display unprotected data
- Read all unprotected data
- Cursor positioning
- Tone control
- Erase display
- Wait on PF key interrupt

The screen formats can be built and stored on a disk(ette) data set using the \$IMAGE utility.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

In addition to the minimum requirement for the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Version 3.1 (5719-XS3), the storage requirements are:

- For compilation, a minimum 32K byte partition for the compiler.
- For execution, the minimum partition size is 8K to 10K bytes for small programs; partition size is a function of the COBOL source program.

For details on system requirements for the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Version 3.1 (5719-XS3) and the Event Driven Executive Utilities Version 3.1 (5719-UT5), see the respective pages.

**SOFTWARE REQUIREMENTS**

Licensed programs required for:

- Compilation
  - IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Version 3.1 (5719-XS3)
  - IBM Series/1 Event Driven Executive COBOL Compiler and Resident Library (5719-CB5)
- Program Preparation
  - IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Version 3.1 (5719-XS3)
  - IBM Series/1 Event Driven Executive Utilities Version 3.1 (5719-UT5)
  - IBM Series/1 Event Driven Executive COBOL Compiler and Resident Library (5719-CB5)
- Program Execution
  - IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Version 3.1 (5719-XS3)
  - IBM Series/1 Event Driven Executive COBOL Transient Library (5719-CB6)

**Additional Licensed Programs**

The following licensed programs are required if the associated COBOL language and auxiliary function are used:

- Sort/Merge (5719-SM2): Required support for SORT and MERGE verbs
- Indexed Access Method Versions 1 (5719-AM3) or 2 (5719-AM4): Required for indexed I/O.
- Multiple Terminal Manager Version 2 (5719-MS2): Optional support for application/terminal I/O and screen support for IBM 4978, IBM 4979, and IBM 3101.

**COMPATIBILITY**

- Series/1 Event Driven Executive COBOL Version 2 source statement level is a compatible subset of OS/VS COBOL Compiler and Library Release 2. Programmers can develop COBOL programs on larger systems for use on Series/1 provided those programs do not use any language implementation or hardware features the Series/1 product does not support.
- Series/1 COBOL Version 2 offerings for the Realtime Programming System Version 5 and Event Driven Executive Basic Supervisor and Emulator Version 3 are compatible at the source level with possible changes to the ENVIRONMENT DIVISION. Programs are also compatible at the source level provided hardware features are supported by both operating systems.
- Series/1 COBOL Version 1 is a compatible subset of COBOL Version 2.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Programming System Summary (GC34-0285) ... IBM Series/1 Event Driven Executive COBOL Version 2 Compiler and Resident Library Licensed Program Specification (GC34-0388) ... IBM Series/1 Event Driven Executive COBOL Version 2 Transient Library Licensed Program Specification (GC34-0389) ... IBM Series/1 COBOL Version 2 Language Reference Manual (GC34-0392) ... IBM Series/1 Event Driven Executive COBOL Version 2 Programmer's Guide (SC34-0393)*

**TERMS and CONDITIONS:** See PP Index

**REALTIME PROGRAMMING SYSTEM  
COBOL COMPILER and RESIDENT LIBRARY VERSION 2  
5719-CB7  
COBOL TRANSIENT LIBRARY VERSION 2 (5719-CB8)**

**PURPOSE**

IBM Series/1 COBOL Version 2 operates in the environment provided by the Series/1 Realtime Programming System (5719-PC5). The compiler and library can be diskette- or disk-based as supported by the operating system. The compiler requires as input a COBOL source program and produces object modules which are combined by the Application Builder into a Series/1 executable machine language program.

The language offers a wide range of commercial features, plus extensive facilities for handling input and output, sorting and merging data files, index capability for faster and simpler access to data files, structuring the source and object programs, and trace facilities for debugging COBOL programs. Series/1 COBOL also supports local communication functions enabling users to accept data from and display data to Series/1 interactive devices.

COBOL programs can be used with the Realtime Programming System Multiple Terminal Manager Version 2. With these facilities, COBOL programs can execute in an interactive environment where one or more applications can run concurrently with more than one terminal. Users can write interactive terminal handling applications, and develop screen-oriented programs to accept and display data from predefined fields on screens dedicated to multiple applications.

COBOL is suited for an interactive commercial environment where users can develop transaction processing applications such as order entry, data collection, and file update, as well as applications that run in a background batch environment.

**HIGHLIGHTS**

The Realtime Programming System COBOL Compiler is offered as two licensed programs:

- Realtime Programming System COBOL Compiler and Resident Library Version 2 (5719-CB7) for compilation and building of user programs.
- Realtime Programming System COBOL Transient Library Version 2 (5719-CB8) for execution of user programs.

The COBOL Version 2 licensed programs contain all of the functions currently available in the respective COBOL Version 1 programs and, in addition, contain the following language features and new device support:

- Logical Connectives (AND, OR, NOT operators)
- START and READ NEXT verbs from Relative or Index I/O
- VALUE OF IS data name clause
- Computational-3 data type (packed decimal) and Computational-4 data type (binary)
- Level 88
- OPEN EXTEND
- LINAGE clause
- Fixed Block Relative Support
- Device Support for 4975 printer, models 1 and 2
- Capability for a COBOL program to send/receive messages through the Communication Monitor network for Series/1, using CALL subroutines provided by the Communication Monitor.

The Series/1 COBOL compiler Version 2 executes in the environment provided by the Realtime Programming System Version 5 and the Programming Preparation Subsystem Version 5.

**COBOL Language**

- Series/1 COBOL Version 2 is designed according to specifications for American National Standard (ANS) COBOL X3.23-1974 as understood and interpreted by IBM as of August, 1981. Series/1 COBOL Version 2 exceeds the Low Intermediate Level COBOL as defined by FIPS 21-1, with the exception of the RERUN Clause.

The 1974 American National Standard COBOL processing modules supported include all of Level 1 for the:

- Nucleus - Language elements needed for internal processing of data
- Table Handling - Define and process fixed length tables
- Sequential I/O - Define and access sequential files \*
- Relative I/O - Define and access relative files \*
- Indexed I/O - Access indexed files\*
- Sort/Merge - Sorting of data files

- Segmentation - Specify overlay of the Procedure Division at execution time
- Library - Inclusion of predefined COBOL text into a COBOL source program
- Debug - Access for monitoring program execution
- Interprogram Communication - Ability to transfer control from one object program to another
  - \* RERUN clause is checked for syntactic correctness only.

In addition to the above, the following Level 2 features are also supported:

- NUCLEUS Level 2 features:
  - COMPUTE statement
  - Qualification
  - Arithmetic operators
  - CORRESPONDING phrase
  - ACCEPT and DISPLAY statement
  - Multiple operand support for arithmetic statements
  - Nested IF statements
  - PERFORM UNTIL phrase
  - 01 through 49 and 88 level numbers
  - Nested REDEFINES
  - Logical Operators
- Sequential I/O Level 2 features:
  - VALUE OF clause
  - OPEN EXTEND
  - LINAGE clause
- Relative I/O Level 2 features:
  - START and READ NEXT verbs
  - VALUE OF clause
  - DYNAMIC access mode
- INDEXED I/O Level 2 features
  - START and READ NEXT verbs
  - VALUE OF clause
  - DYNAMIC access mode
- MERGE Level 2 feature (of SORT/MERGE)

**Resident Library:** The Series/1 COBOL Resident Library Version 2 consists of commonly used reentrant subroutines which are combined with a user's program through the Application Builder to form a task set for subsequent execution on Series/1. The Resident Library includes subroutines such as:

- Data conversion
- I/O routines
- ACCEPT/DISPLAY data to/from terminals
- Arithmetic routines
- Sort/Merge interface
- Run-time error routines

**Transient Library:** The Series/1 COBOL Transient Library Version 2 is used in conjunction with the execution of COBOL user programs. Routines in the transient library are loaded only when needed, thus allowing a more efficient utilization of primary storage. These routines are reentrant and can be executed from a shared task set. The principal functions in the transient library are:

- OPEN/CLOSE
- Program Termination/Initialization
- ACCEPT Date/Time
- I/O Error Handling Routines
- Execution Time Messages

**Compilation:** The Series/1 COBOL Compiler Version 2 operates in the environment provided by the Realtime Programming System Version 5 (5719-PC5). The COBOL-generated object code is combined with library routines by the Application Builder available with the Program Preparation Subsystem Version 5 (5719-AS5). The Program Preparation Facility provides a new text editor and program management capabilities for the COBOL development process.

**Execution:** Object programs are executed in the environment provided by the Realtime Programming System. COBOL data sets can be declared sequential, relative or indexed, and require the operating system data management facilities. The segmentation feature of COBOL allows users to optimize storage requirements for their applications through use of overlays.

**Realtime Programming System COBOL V2 (cont'd)**

**DESCRIPTION**

- Language
  - Series/1 COBOL Version 2 is designed according to specifications for American National Standard (ANS) COBOL X3.23-1974 as understood and interpreted by IBM as of August, 1981. Series/1 COBOL Version 2 exceeds the Low Intermediate Level COBOL as defined by FIPS 21-1, with the exception of the RERUN Clause.
- New COBOL Version 2 Language features:
  - 'AND' and 'OR' operators allows formation of complex conditionals by combining simple conditions.
  - 'NOT' operator reverses the logical value (true or false) of an existing condition.
  - START and READ NEXT verbs allow easier file accessing of relative and index files; users can now specify a generic key to logically position to a record in the file, and then proceed to read the file from that record to the end of the file.
  - COMP-3 data type is an extension beyond the ANS COBOL language support, and enhances data interchange with System/370 applications which use this data type extensively. The COMP-3 data type is for arithmetic expressions in packed decimal format. With this data type, users can read and write in COMP-3 format, perform arithmetic calculations and convert COMP-3 to different data types. COMP-4 is treated as a synonym for COMP which stores data in binary format.
  - Level 88 is used to identify entries for condition-names that will be used in conditional expressions.
  - OPEN EXTEND is part of sequential I/O for Level 2 ANS COBOL. This statement indicates the processing of a file will begin by writing the first record at the end-of-data marker. This increases usability so that records can be added to an existing file. This support is provided for files existing on disk or diskette.
  - LINAGE clause allows users to handle special forms from COBOL programs; this also gives users more dynamic capability to specify form layouts for different files. The LINAGE clause provides a means for specifying the depth of a logical page in terms of number of lines. It also provides a means for specifying the size of the top and bottom margins on the logical page, and the line number, within the page body, at which the footing area begins.
  - Blocked Relative file support allows blocking of fixed length records. Block size must be an integer multiple of the record size.
  - VALUE OF IS data name clause is part of sequential, relative and indexed I/O, and describes items in the label records associated with a file. In this implementation, the VALUE OF clause serves only as documentation.
- New Device Support:
  - 4975 Model 2 Printer Support
 

COBOL Version 2 provides support for the 4975 model 2 printer when attached to the Multifunction Attachment (#1310) as:

    - In the 4974 emulation mode (this is transparent to the COBOL user) and
    - New extended capability support that includes Text Mode selection with proportional spacing.
  - 4975 Model 1 Printer Support
    - COBOL Version 2 provides the user with the same support for the 4975 model 1 when attached to the Multifunction Attachment (#1310) similar to the model 2 with the exception that the model 1 does not use Text Mode.
    - COBOL programs can interface with the Communication Monitor (5719-CM1) through a CALL interface. This provides users with the ability to access, create and send messages to and from local and remote communication devices in a network.
- Extensive User Options
  - Source listings
  - Cross reference
  - Storage map of variables
  - Object listings
  - Statement offset listing
  - MAP 370 listing option
- Program Development and Productivity Aids
  - Symbolic debug, which makes storage maps and snapshots of data areas available in COBOL format
  - Flow trace, which identifies the last statement executed before an abnormal termination
  - Extensive error checking and error messages at five severity levels, ranging from source program fix-up, to warning messages, to serious and fatal errors

- Generalized CALL facility allows access to programs written in Assembler language
- FIPS flagger enables quick and easy identification of COBOL source statements which exceed the specified FIPS language level

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

In addition to the minimum requirement for the IBM Series/1 Realtime Programming System Version 5 and the Program Preparation Subsystem Version 5, the storage requirements are:

- For compilation, a minimum 32K byte partition for the compiler.
- For execution, a minimum partition size is 8K to 10K bytes for small programs; partition size is a function of the COBOL source program.

For details on system requirements for the IBM Series/1 Realtime Programming System Version 5 and the IBM Series/1 Program Preparation Subsystem Version 5, see the respective pages.

**SOFTWARE REQUIREMENTS**

Compilation and Application Build

- IBM Series/1 Realtime Programming System Version 5 (5719-PC5)
- IBM Series/1 Program Preparation Subsystem Version 5 (5719-AS5)
- IBM Series/1 COBOL Compiler and Resident Library Version 2 (5719-CB7)

Execution in a Foreground Environment

- IBM Series/1 Realtime Programming System Version 5 (5719-PC5)
- IBM Series/1 COBOL Transient Library Version 2 (5719-CB8)

Execution in a Batch Environment

- IBM Series/1 Realtime Programming System Version 5 (5719-PC5)
- IBM Series/1 Program Preparation Subsystem Version 5 (5719-AS5) or IBM Series/1 Job Stream Processor PRPQ (5799-TEC)
- IBM Series/1 COBOL Transient Library Version 2 (5719-CB8)

**Additional Licensed Programs:** The following licensed programs are required if the associated COBOL language and auxiliary functions are used:

- Sort/Merge (5719-SM1) - Required support for Sort and Merge verbs
- Indexed Access Method Versions 1 (5719-AM1) or 2 (5719-AM2) - Required for indexed I/O
- Multiple Terminal Manager Version 2 PRPQ (5799-TDX) - Optional support for application/terminal I/O and screen support for IBM 4978, IBM 4979, IBM 5251, and IBM 3101
- Communications Monitor for Series/1 (5719-CM1) - Optional support for sending data to remote communication devices

**COMPATIBILITY**

- Series/1 Realtime Programming System COBOL Version 2 source statement level is a compatible subset of OS/VS COBOL Compiler and Library Release 2. Programmers can develop COBOL programs on larger systems for use on Series/1 provided those programs do not use any language implementation or hardware features the Series/1 product does not support.
- Series/1 COBOL Version 2 offerings for the Realtime Programming System Version 5 and Event Driven Executive Basic Supervisor and Emulator Version 3 are compatible at the source level with possible changes to the ENVIRONMENT DIVISION.
- Series/1 COBOL Version 1 is a compatible subset of COBOL Version 2.



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PP 5719-CB7.3

May 83

Major Revision

PROGRAM PRODUCTS

**Realtime Programming System COBOL V2 (cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Programming System Summary (GA34-0285) ... IBM Series/1 Realtime Programming System COBOL Version 2 Compiler and Resident Library Licensed Program Specification (GC34-0390) ... IBM Series/1 Realtime Programming System COBOL Version 2 Transient Library Licensed Program Specification (GC34-0391) ... IBM Series/1 COBOL Version 2 Language Reference Manual (GC34-0392) ... IBM Series/1 Realtime Programming System COBOL Version 2 Programmer's Guide (SC34-0394)*

**TERMS and CONDITIONS:** See PP Index

## EVENT DRIVEN EXECUTIVE COMMUNICATIONS FACILITY 5719-CF1

### PURPOSE

The IBM Series/1 Event Driven Executive Communications Facility Licensed Program is an enhancement to the existing Event Driven Executive Communications Facility - II FDP (5798-RDT), and contains all the functions provided by the FDP plus additional support.

The Communications Facility:

- Manages communication between Series/1s; between Series/1s and other computers; and between Series/1s and various input/output devices.
- Supports various devices and communication links, and accommodates user-written support for other devices.
- Manages user-supplied application programs.
- Includes various aids to assist programmers in writing interactive application programs.
- Includes various aids to assist the operator in defining and controlling an interconnected environment consisting of Series/1s, host computers, and devices.
- Provides various means of maintaining the entire network from a central site.

### HIGHLIGHTS

Support for:

- Series/1 Local Communications Controller (LCC) (#1400). This support allows the attachment of multiple Series/1 (maximum 16) in a ring data link for peer-to-peer, high-speed data communication. Support for LCC will be provided via a Communications Facility Input/Output Control Program (IOCP) and a device handler. Remote IPL is supported.
- A message level interface capability between the Communications Facility and:
  - Systems supported by the Communications Monitor for the Series/1 (5719-CM1) when the systems are interconnected via the Series/1 Local Communications Controller (#1400). Also, the Communications Facility accepts the following Communications Monitor commands: START, STOP, HALT, and DISPLAY.
  - Application programs running under control of the Series/1 Event Driven Executive Multiple Terminal Manager (5719-MS2), which use the Multiple Terminal Manager capability for programs to send/receive Communications Facility messages.
- Series/1 Multifunction Attachment (#1310) with attached 3101 Display Terminals, 4975 Printers, and/or Binary Synchronous Communications.
- An Input/Output Control Program (IOCP) which provides an interface between the Communications Facility and the Event Driven Executive Systems Network Architecture Licensed Program (5719-SX1). This interface provides a Type 2 Logical Unit (LU2) as defined in IBM's Systems Network Architecture (SNA) for support of display devices, and a Type 3 Logical Unit (LU3) for support of printer devices. To users and devices controlled by the Communications Facility, it appears similar to the 3271 Emulation interface.
- Support for the Series/1 - System/370 Channel Attachment (4993 and feature #1200) is provided by a Communications Facility Input/Output Control Program (IOCP).
  - To the System/370, the Channel Attachment feature appears as a locally attached 3272 Control Unit with up to 32 devices. Multiple Channel Attachment features, to the same or different hosts, are supported. Attachment to either selector or block multiplexer channel is supported. To users and devices controlled by the Communications Facility, this support appears similar to that of the 3271 emulation support.
- Attachment to multipoint binary synchronous communications lines, emulating a 3271 Control Unit, using basic polling select addressing with standard 3270 protocol. This IOCP allows Series/1s to be interconnected in a multipoint hierarchy. Transparency is provided to allow the single BSC network to transmit/receive a mix of messages (standard 3270 screens, file data, program modules, and control/transactions).
- Control of multipoint 3271 model 2 Control Units, with attached 3277 model 2 Display Stations and 3284, 3286 model 2, 3287, and 3288 Printers.
- Control of the following (as 3271 model 2 Control Units):
  - 3274 Control Units models 1C and 51C, using BSC protocol, with attached 3278 model 2 Display Units, 3284, 3286, 3287 model 2, 3288, and 3289 Printers, and 3279 model 2A Color Displays.
  - 3276 Display Stations model 2 using BSC protocol, with attached 3278 model 2 Display Units, 3287 model 2, and 3289 Printers, and 3279 model 2A Color Display Stations.

- Simulation of a 3277 model 2 Display Station on a 4978 and all models of 3101 Display Terminals, in character mode.
- Support for the Series/1 4978 Data Stream Control Store Diskette (RPQ D02428). This RPQ for the 4978 can in certain application situations yield improved performance when doing 3270 emulation and passthru. Note: See RPQ D02428 for restrictions of this RPQ compared with the standard 4978 (RPQ D02056).
- Simulation of 3286 model 2 Printers on 4973/4974/4975 printers.
- Control over a 5280 Distributed Data System using 3270 device emulation over a multipoint BSC line.
- Series/1 to Series/1 communication over a point-to-point BSC line using a full conversational protocol.
- Connection with the 6640 Document Printer, the 6670 Information Distributor, the 5520 Administrative System, the Displaywriter System, and/or the Office System 6 Information Processor with its associated magnetic card reader or diskette reader over a point-to-point BSC line using 2770-like BSC protocol.
- Connection with the System/23 Datamaster and/or the 5280 Distributed Data System over a point-to-point BSC line using 3741-like BSC.
- Management and routing of messages between system facilities; that is, programs, terminals, lines.
- Extensive support utilities.
- Communications with multiple non-Series/1 host systems.
- Online interconnection configuration and modification.
- Automatic startup.
- Main storage and, optionally, disk queuing of messages.
- Ability to shut down and restart all or portions of the Communications Facility.
- Routing undeliverable messages to a disk file. Utilities provided can retrieve and resend these messages.
- Management and routing of transactions by a program dispatcher. Routes transaction messages anywhere in an interconnected Series/1 environment, including non-Series/1 host systems, for processing. Provides high speed loader facility for putting transaction programs into execution.
- Control and management of EDX terminals in conjunction with the program dispatcher so that transaction programs and terminals can communicate and interact across physical boundaries.
- Integration of the EDX Remote Management Utility with a Communications Facility Host Management Utility to provide within a single interconnected environment (either multipoint or point-to-point) the functions of reverse passthru, program execution, file transfers, etc., for maintaining the remote systems.
- Remote Initial Program Load (IPL) capability allows one Series/1 to IPL another Series/1 connected as a binary synchronous tributary. (Also note that remote IPL capability via the Local Communications Controller is mentioned above.)
- Screen design utility for laying out/formatting 3277 model 2 display screens.
- Remote disk support provides a means for a Series/1 in an interconnected system to have its data base volumes reside on a physical drive of another Series/1.

### Basic Structure Of The Communications Facility

- The Communications Facility incorporates a modular design allowing a system configuration that contains only the programming modules required for the specific user application. The program design is open-ended to allow a user knowledgeable in communications protocol to write additional I/O modules. These modules can be written in the Event Driven Executive language.
- The Communications Facility is written primarily in the Event Driven Executive language and operates as a group of application programs using an Event Driven Executive supervisor. The advantage of using the Event Driven Executive language is that the code is self-documenting, easier to maintain and modify. The Communication System Extensions to the Event Driven Executive Supervisor represent a small part of the Communications Facility and are written in Series/1 Assembler language.
- The Communications Facility provides basic message routing and handling between stations, including the ability to communicate between programs across partition and physical boundaries. Stations represent origins and destinations of messages such as terminals, devices, communication lines and programs.

PROGRAM PRODUCTS

**Event Driven Executive Communications Facility (cont'd)**

- User application programs can operate concurrently with the Communications Facility.
- The Communication System Extensions provide a capability to write serially reusable programs which can manage messages from several stations. Only a single copy of the program is required in storage to handle multiple terminals, devices, or lines.

- Printers
  - One IBM 4973 Line Printer, or
  - One IBM 4974 Printer, or
  - One IBM 4975 Printer

**SOFTWARE REQUIREMENTS**

The following IBM licensed programs are prerequisites for the installation of the IBM Series/1 Event Driven Executive (EDX) Communications Facility Licensed Program (5719-CF1):

- IBM Series/1 EDX Basic Supervisor and Emulator Licensed Program Version 3 (5719-XS3)
- IBM Series/1 EDX Utilities Licensed Program Version 3 (5719-UT5)
- IBM Series/1 EDX Program Preparation Facility Licensed Program Version 3 (5719-XX4)
- IBM Series/1 EDX Macro Assembler (5719-ASA) is required if the installation of this product requires the assembling or reassembling of the communication system extensions.
- IBM Series/1 EDX Macro Library (5719-LM7) may be required to reassemble some of the Communication Facility Programs.
- The Event Driven Executive Systems Network Architecture Licensed Program (5719-SX1) is a prerequisite if the SNA IOCP is to be used.

**Execution Systems**

Potential applications for the Communication Facility include:

- Distributed Data Processing
- Data Concentration
- Terminal Controller
- 3270 Emulator

For further details pertaining to typical applications, see *IBM Series/1 Event Driven Executive Communications Facility: Introduction* (GL23-0070).

**User Environment Considerations**

The system requirements and the programming requirements needed to run communications programs depend on the customer installation. The following alternatives should be considered in planning the installation:

- The Series/1 Event Driven Executive Program Preparation Facility (5719-XX4) or optional program preparation products are required only on the user's development system(s) and are not required on the production systems.
- Most communication network applications can be implemented and supported centrally; therefore, the Series/1 Event Driven Executive Utility (5719-UT5) may not be required on the production systems.
- The Communications Facility can operate as a DASD-less system. Neither disk nor diskette is required in a production/user environment where no program preparation is required. Performance requirements should be carefully analyzed in a diskless and/or disketteless environment.
- It is recommended that a dedicated communications logging device be available on each Series/1. This could be a display, printer, or user program.
- It is recommended that a dedicated communications or systems operator's console (4978 or 4979) be available in the system for operator control. This can also be a logging device.
- The Communications Facility can coexist with all the Series/1 features supported by the Event Driven Executive, plus multiples of supported devices.
- The Communications Facility requires the Timer Adapter (#7840) on the 4955, or the integrated timer on the 4952, to operate.

**CUSTOMER RESPONSIBILITIES**

Installation of this licensed program, the prerequisite programming support, the data processing equipment that it requires and supports, and the required communications facilities, are the customer's responsibility. The environment in which the Communications Facility would be used are typically complex communications systems that must be carefully planned and managed.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The Series/1 Event Driven Executive Communications Facility requires the following hardware for Communications Facility installation and application development:

- Processors
  - Any IBM Series/1 Processor with at least 96K bytes of main storage
  - One Timer Adapter (#7840) is required on the IBM 4955
  - One Programmer's Console (#5650)
- Disk/Diskettes
  - One IBM 4962 model 1, 1F, or 3 Disk Storage Unit and one IBM 4964, 4965 or 4966 diskette unit, or
  - One IBM 4962 model 2, 2F, or 4 combined disk/diskette unit, or
  - One IBM 4963 Disk Storage Unit and one 4964, 4965 or 4966 diskette unit
- Display Stations
  - One IBM 4979 Display Station, or
  - One IBM 4978 Display Station (RPQ D02056)

**DOCUMENTATION**

(available from Mechanicsburg)

IBM Series/1 Event Driven Executive Communications Facility:

*Introduction* (GL23-0070) ... *Licensed Program Specifications* (GL23-0072) ... *Command Reference Summary* (GX23-0086) ... *Design and Installation Guide* (SL23-0073) ... *Programmer's Guide* (SL23-0074) ... *Operator's Guide* (SL23-0075) ... *Debugging Guide* (LL23-0076) ... *Work Session Controller High-Level Language Subroutines Programmer's Guide* (SL23-0090)

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**COMMUNICATIONS MONITOR FOR THE SERIES/1  
5719-CM1****PURPOSE**

The Communications Monitor for the Series/1 licensed program manages communication between a Series/1 and other Series/1s; between a Series/1 and other computers; and between a Series/1 and various input/output devices. It supports various devices and communication links, and accommodates user-written support for other devices and computers. It also manages user-supplied application programs.

**HIGHLIGHTS****A Message Management Program**

The Communications Monitor's function is to manage the flow of messages between computers, devices and application programs. A message can be any unit of information - from a record of a sales transaction to a large data set.

**Series/1-to-Series/1 Communication**

The Communications Monitor manages communication between Series/1s, at the same location or at geographically dispersed locations, that are connected by means of a point-to-point, binary synchronous communications (BSC) nonswitched line, a nonswitched High Level Data Link Control (HDLC) line (packet or frame level) or Local Communications Controller (#1400).

An interface for the connection of the Communications Monitor and the Event Driven Executive Communication Facility is supplied via the Series/1 Local Communications Controller. This interface allows messages to be exchanged from application to application.

**Series/1-to-Host-Processor Communication**

The Communications Monitor supports communication between a Series/1 and a host computer in four ways: BSC (transparent or nontransparent), 3271 emulation, Series/1-System/370 Channel Attachment, or SDLC/SNA. The SDLC/SNA support provides the ability to tie a Series/1 into an SNA network communicating with IMS/VS through the Type P Secondary Logical Unit (SLU-P) support and with CICS/VS using the 3790 Full Function Logical Unit. The BSC support has been verified to a System/3 by means of CCP on a nonswitched point-to-point or multipoint line. The Series/1 appears to the System/3 as a 3271 Control Unit.

**Series/1-to-3270 Communication**

The Communications Monitor manages communication between a Series/1 and 3277 displays and 3286 printers. The 3277s are attached to a 3271 control unit. The 3271 units communicate over multipoint BSC leased lines attached to the Series/1 4987 Programmable Communications Subsystem. Multiple control units can be attached to each line. This support may also be used with either:

- 3276 Control Unit Display Station models 1, 2, 3 and 4 with attached
  - 3278 Display Stations
  - 3279 Color Display Stations
  - 3287 Printers
  - 3289 Printers
- or
- 3274 Control Unit, models 1C and 51C with attached
  - 3277 Display Stations
  - 3278 Display Stations
  - 3279 Color Display Stations
  - 3284, 3286, 3287, 3288 and 3289 Printers.
- 5280 Distributed Data System, operating in BSC 3270 mode

**Series/1-to-Other Systems Communications**

The Communications Monitor supports the following as teletypewriters via the 4978 Programmable Communications Subsystem:

- Personal Computer
- System/23 Datamaster
- Displaywriter System

The Communications Monitor supports connection with the following systems using 2770-like BSC:

- Displaywriter
- 6670 Information Distributor
- 5520 Administrative System

The Communications Monitor supports connection with the following systems using 3741-like BSC:

- System/23 Datamaster
- 5280 Distributed Data System

**Printers, Display Units, Teletypewriters, Disks, Diskettes and Magnetic Tape Units**

Other devices the installation can make part of its Communications Monitor configuration are:

- 4955 Processor with minimum 128K bytes of storage
- 4962 and 4963 disk units
- 4964 diskette units and the diskette drives in 4962 model 2, 2F, and 4 disk units
- 4965 Diskette Drive and I/O Expansion Unit
- 4966 diskette units
- 4969 magnetic tape system
- 4973 line printers
- 4974 matrix printers
- 4975 matrix printers
- 4979 display stations, and 4978 display stations in 4979 mode with RPQ D02055
- Teletypewriter attachment (#7850) with Teletype® Models 33/35, or ASCII equivalent, or 3101 display terminal.
- 6733 Typewriter Communication Module (with attached IBM Electronic Typewriter 85) as a Teletype® Model 33/35.

**Other Devices**

The Communications Monitor makes it convenient to add support for devices such as specialized terminals to the product as supplied by IBM. The additional devices can be attached to the Series/1 through the Programmable Communications Subsystem or through native adapters.

**A Base for Applications**

The Communication Monitor manages the communication of messages to and from user-supplied application programs. Applications can take many forms:

- Data entry
- Message routing
- Distributed processing
- Store-and-forward
- Line concentration

**Program Development**

The Communications Monitor includes a set of assembler language macro instructions for the use of programmers writing Communications Monitor applications or message path programs.

The macro instructions allow programmers to:

- Create, send, receive, retrieve, and cancel messages
- Control the operation of stations (the device communications links and application programs that make up the communications configuration)
- Get and free blocks of storage
- Create new operator commands

The Communication Monitor applications may also be written in COBOL and PL/I and reside in any Realtime Programming System partition. Realtime Programming System Multiple Terminal Manager users can also send and receive messages using the Communications Monitor facilities.

**Commands for Online Control**

The Communications Monitor includes a set of operator commands to allow computer operators and terminal operators online control of the configuration.

A command log is available to allow all commands to be logged on a primary and/or secondary station to improve network awareness.

The Realtime Programming System Command Reader interface is supported to allow the sending of operating system commands to any node in the network with the responses returned to the originating station.

The commands allow operators to:

- Start and stop the Communications Monitor
- Define and delete stations and change their attributes

PROGRAM PRODUCTS

**Communications Monitor for the S/1 (cont'd)**

- Hold messages intended for a station, release held messages, and cancel messages pending for a station
- Display status information and error counts that pertain to a station
- Retrieve single or multiple messages for a station
- Warmstart the system
- IPL Remote Systems

**Orderly System Definition**

Each Series/1 in a Communications Monitor configuration is called a node. At each node, the installation does a system definition process that defines the Communications Monitor configuration as viewed by that node, all the other nodes it communicates with, and all the stations at other nodes (remote stations) that it is going to communicate with directly. Once the system definition has been done, users at a local node can treat remote stations as if they were local stations for most services.

**A System Generation Answer File**

The Communications Monitor is supplied to the installation with a system generation answer file. When used as input to the Realtime Programming System generation process, the answer file produces a Realtime Programming System with the Communications Monitor integrated. The resulting system supports:

- One BSC attachment
- One 4979 display
- One 4973 line printer
- One 4974 or 4975 matrix printer
- One teletypewriter adapter (#7850)
- Two 4962 or 4963 disk units
- Two 4964 or 4966 diskette drives or 4965 diskette drive and I/O expansion unit
- One timer attachment (#7840)

**Aids for Operators**

The Communications Monitor issues various error messages. The installation can designate a primary and a secondary station where those messages are to be logged.

For each station that sends or receives messages, the Communications Monitor maintains a count of messages and characters sent from and received by the station. Operator commands allow operators to display and reset the values of each message queue associated with a station.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

- A Series/1 4955 processor with at least 128K bytes of processor storage and the address translator
- A Realtime Programming System-supported disk unit
- A Realtime Programming System-supported diskette drive (required for installation only)
- An IBM 4973, and IBM 4974 or IBM 4975 printer
- An IBM 4979 display station, an IBM 4978 display station in 4979 mode with RPQ D02055, or a teletypewriter adapter (#7850) with Teletype® mdl 33/35 teletypewriter ASCII equivalent device attached or the 3101 display terminal.
- An IBM 6733 Typewriter Communication Module as a Teletype® mdl 33/35 (with attached IBM Electronic Typewriter 85)

**SOFTWARE REQUIREMENTS**

The Communications Monitor runs under control of the Realtime Programming System Version 5.1 (5719-PC5). For preparation of user-written programs, the Program Preparation Subsystem, Version 5.1 (5719-AS5) is required. If the installation is going to add unsupported devices attached through the Programmable Communications Subsystem or use the IBM-supplied device support that uses the Programmable Communications Subsystem, the Programmable Communications Subsystem Extended Execution Support (5719-CS2) is required.

To add unsupported devices through the Programmable Communications Subsystem, the Programmable Communications Subsystem Preparation Facility (5719-CS0) is required.

To use the SDLC/SNA support, Systems Network Architecture Extended (5719-SN1) is required. To use the IBM 4969 Magnetic Tape Subsystem support, the IBM 4969 Magnetic Tape Subsystem (5719-TA4) is required. To use the IBM Series/1-System/370 Channel Attachment support, Series/1-System/370 Channel Attachment (5719-CA1) is required. To use the HDLC support, the Packet Network Support (5799-TCP) is required.

**COMPATIBILITY**

This program is compatible with the licensed programs which are identified in the Software Requirements section.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Communications Monitor for Series/1 Licensed Program Specifications (GS23-0050) ... IBM Communications Monitor for Series/1 Introduction Manual (GL23-0049) ... IBM Communications Monitor for Series/1 Design and Installation Guide (SL23-0051) ... IBM Communications Monitor for Series/1 Assembler Language Programmer's Guide (SL23-0052) ... IBM Communications Monitor for Series/1 COBOL and PL/I Programmer's Guide (SL23-0053) ... IBM Communications Monitor for Series/1 Operator's Guide (SL23-0054) ... IBM Communications Monitor for Series/1 Debugging Guide (SL23-0055) ... IBM Communications Monitor for Series/1 Command Reference Summary (GX23-0056)*



## PROGRAM PRODUCTS

**SERIES/1 REALTIME PROGRAMMING SYSTEM  
 COMMUNICATIONS MANAGER  
 VERSION 2 (5719-CM2)**
**PURPOSE**

The Series/1 Communications Manager (formerly named the Communications Monitor) significantly strengthens the communications capabilities of the Series/1 by addressing front end processing, distributing applications, and providing full networking functions with major enhancements. The Remote Manager for management of non-SNA networks from the SNA host using the host CNM products will also be available.

The Communications Manager supports the Realtime Programming System Version 6 Multiprocessing feature which provides horizontal growth, improved processing capability and system availability through multiple processor configurations.

Further enhancements are intended for the Communications Manager to strengthen the existing Series/1 SNA host affinity with new passthrough and host connections.

It is also intended that the Communications Manager will address the evolving International Standards by giving the ability to operate an in-house X.25 network consisting of several Series/1s. Additionally, this support will allow connecting to public X.25 packet switching networks to communicate Series/1-to-Series/1 or Series/1-to-host. X.25/HDLC Communications Support program product with DCE and DTE will also be available.

**HIGHLIGHTS**
**Networking**

- Peer-to-Peer
- Flexibility
- Variety of Protocols
- Alternate Routing
- Dynamic Online Configurability

**Network Management**

- Centralized SNA or Decentralized Series/1 Control
- Tie into NCCF, NPDA, DSX and HCF on SNA hosts
- Local/Remote Operator Transparency

**Host Affinity (SNA and non-SNA)**

- SNA/SDLC
- BSC and ASYNC
- S/370 Channel Attach

**Device Support**

- 3270 Controllers and Attached Devices
- Office Automation Equipment
- RJE Devices
- Personal Computer

**OEM Attachment**

- Access to all Communications Manager functions
- Easy Attachment of OEM Terminals and Hosts
- Protocol Conversion between Terminals and Hosts

**Distributed Application Support**

- Languages - COBOL, PL/I, Pascal, Assembler
- Multiprocessor Support through Realtime Programming System Version 6
- Transaction Processing through Terminal Managers

**Local Area Networks**

- Connection of up to 16 Series/1s on Each Ring
- Multiple Interconnected Establishment Rings
- Bridge to Event Driven Executive/Communications Facility Systems

**DESCRIPTION**

The Communications Manager Version 2 provides a wide range of functions and significant flexibility in addressing communication problems ranging from simple front end processing to supported distributed applications to a full networking facility.

**Networking:** The Communications Manager allows various types of networks to be implemented. As a peer-to-peer Series/1 network, it can attach to hosts (OEM and/or IBM), devices, terminals and applications, and make the data being sent or received by them transparent to network connections. Maximum flexibility and control is emphasized.

The network provides capabilities that allow online configuration so that terminals, devices or nodes can be added without stopping the network or affecting normal traffic. Message integrity is provided by allowing messages to be disk-queued as they traverse the network so none will be lost. Alternate routing allows a message to be delivered even though the primary path to the destination is broken.

Messages can have up to 255 different priorities to ensure that interactive or other critical response time activity flows ahead of long

batch-type data. Messages are assigned a significance that indicates what action occurs when the destination is unable to receive them. The Communications Manager automatically blocks and segments messages between nodes to maximize network throughput.

Network operator control is available from each node in the network, or only from a central site either on the Series/1 or on a host system. The operator controls the network definition, starting and stopping part or all of the network, checking on traffic and error statistics. The Communications Manager also provides application interfaces for all of these functions.

**Network Management:** The Communications Manager allows the user to control the network centrally from an SNA Host (when used in conjunction with the Remote Manager) or to distribute control throughout the Series/1 network. The Communications Manager allows the user to choose the network control points based on unique installation requirements.

The Communications Manager significantly strengthens and expands the SNA control facilities by extending network management to non-SNA networks. Network Management through an SNA Host is achieved with the standard SNA control and diagnostic products, namely NPDA, NCCF, HCF and DSX.

Alternatively, network management is achieved through unique, straightforward commands which can originate from any point(s) within the Series/1 network to control any other Series/1. Updates and reconfigurations to the Series/1 network occur dynamically and non-disruptively. A four-level security scheme limits the scope of control for any access point.

**Host Affinity:** The Communications Manager supports a variety of hosts and host protocols. The Series/1 emulates host devices (such as control units) and allows host applications to transparently communicate, through a Communications Manager network, with remote hosts, terminals, and applications. The Communications Manager attaches to host systems in these ways:

1. SNA/SDLC - As an SNA gateway, the Series/1 emulates a 3274 control unit conducting LU-2 and LU-3 sessions with Host applications such as CICS and IMS. Series/1 applications can also communicate with host applications over LU-0 sessions to CICS(LUP) or IMS(SLUP).
2. BSC - Three types of BSC connections are provided: 3271 emulation on a nonswitched multipoint line, Host BSC support in transparent or non-transparent modes on a point-to-point line, and BSC RJE passthrough where the Series/1 routes batch data between a host system and an RJE station over switched or leased lines.
3. S/370 Channel Attach - With this feature, the Series/1 appears as a control unit with up to 32 ports. The Series/1 can be used to route terminal traffic or serve as a high-speed pipeline for application data traffic.

**Device Support:** The Communications Manager supports a wide range of devices.

The 3270-family devices which are supported include 3271 and 3274 controllers on multipoint BSC leased lines with attached displays and printers.

The office automation equipment supported includes: System/23 Datamaster, Displaywriter, 6670 Information Distributor, 5280 Distributed Data System, and 5520 Administrative System using BSC protocol over nonswitched lines; Displaywriter and System/23 Datamaster using asynchronous ASCII communications over switched or nonswitched lines.

The IBM Personal Computer may be attached to a Communications Manager network using asynchronous ASCII protocol over switched or nonswitched lines. 3277 emulation on the IBM Personal Computer is provided by using the Communications Manager support for 3277 emulation on 3101 terminals in conjunction with the IBM Personal Computer Program (P/N 6024042) to emulate a 3101.

2780 and 3780 RJE devices may be attached to a Communications Manager network over switched or nonswitched lines to pass data through to a host.

**OEM Attachment:** Anticipating the need for OEM device attachment, the Communications Manager provides several options to the user. The user may attach OEM devices to the Series/1 using either native adapters or the Programmable Communications Subsystem (PCS). The OEM device support can be written as either a high-level language application for ease of development and test, or as an Assembler language program to gain the greatest performance and complete access to the Communications Manager's services.

**Distributed Application Support:** The Communications Manager provides a powerful base for message/transaction-oriented application programs. User-written applications can send, receive or interrupt

PROGRAM PRODUCTS

Series/1 RPS Communications Manager V2 (cont'd)

messages to accomplish functions such as input verification, transaction pre-processing and message switching. Applications can be written in COBOL, PL/I, Pascal and Series/1 Assembler language. They are dynamically loaded and controlled through a central SNA Host or through any Series/1 within the network. Through the Realtime Programming System Multiprocessor feature, applications can execute anywhere on the local area network transparent to the user.

**Local Area Networks:** Local area networks can be established with the Communications Manager using the Series/1 local Communications Controller. Up to 16 Series/1 systems may be connected in a ring configuration. Larger local area networks may be configured with multiple, interconnected rings. The ring also provides a bridge to pass messages to and from Event Driven Executive/Communications Facility networks.

HIGHLIGHTS of VERSION 2 ENHANCEMENTS

- Remote Manager Support
- 3274 SNA Emulation
- 3277 Emulation on 3101 Terminals
- Realtime Programming System Version 6 Multiprocessing Feature Support
- 2780/3780 Remote Job Entry Interface
- Enhanced Message Queuing
- Realtime Programming System Spooling Facility Support
- Pascal Support

In addition, the X.25 networking support and SDLC passthrough support are planned to be included in the Communications Manager Version 2 by 4Q83.

DESCRIPTION of VERSION 2 ENHANCEMENTS

**Remote Manager Support:** This support allows the Communications Manager's networks to be controlled from an SNA host using the host CNM products, NCCF, NPDA, DSX and HCF. Only the connection point node directly attached to the SNA host need have SNA support. All passthrough of alerts and commands are handled with normal Communications Manager support.

**3274 SNA Emulation:** The support allows a Series/1 to attach to a host system as a 3274 control unit using the SNA/SDLC protocol. This allows LU type 2 and 3 sessions to be established between the host and real or emulated 3270 devices attached to the Series/1.

**3277 Emulation on 3101 Terminals:** This support allows a 3101 display to be used as a 3277 device. All functions of a 3277 display station are supported except ITB and TEST REQUEST key. This can be used in conjunction with the 3274 SNA emulation, 3271 emulation, or S/370 channel attach for host 3270 applications.

**Realtime Programming System Version 6 Multiprocessing Feature Support:** This support allows the Communications Manager to use the Realtime Programming System multiprocessing support to communicate with other Communications Manager nodes in the multiprocessor system. This permits applications to be distributed across Series/1s, and the use of duplex volumes for high integrity, all transparent to the user.

**2780/3780 Remote Job Entry Interface:** This support provides a 2780 or 3780 RJE station with the ability to connect to a host system through a Series/1 network in passthrough mode. The connection to the network may be on a leased or switched line with auto-answer or manual call.

**Enhanced Message Queuing:** This support allows a Series/1 to make more effective use of the larger CPU sizes by having up to five partitions (previously limited to one) containing main storage messages and buffers.

**Realtime Programming System Spooling Facility Support:** This support allows the Communications Manager to use the Realtime Programming System Version 6 spooling facility.

**Pascal Support:** This gives additional language support for application programmer using the Communications Manager by providing subroutines which allow Pascal programs to invoke Communications Manager functions.

**INSTALLATION AIDS:** The Communications Manager is supplied to the installation with a system generation answer file. When used as input to the Realtime Programming System generation process, the answer file produces a Realtime Programming System with the Communications Manager integrated. The resulting system supports:

- One BSC attachment
- One 4979 display
- One 4973 line printer
- One 4974 matrix printer

- One teletypewriter adapter (#7850)
- Two 4962 or 4963 disk units
- Two 4964 or 4966 diskette drives
- One timer attachment

**SERIES/1 to SERIES/1 CONNECTIONS:** The following table describes the connections that may be established between Series/1 nodes in a Communications Manager network.

Protocol	Linespeed	Card	Software Requirements/Notes
LCC	2M bps	1400	Local Area Network,
LCC	2M bps	1400	Multiprocessor Feature
BSC	56K bps	2075	BSC Point-to-Point
BSC	19K bps	2095/6	Protocol, No additional
BSC	9.6K bps	2074	software is required.
BSC	9.6K bps	2093/4	

**SERIES/1 to 3270 DEVICE CONNECTIONS:** The following table describes the 3270 controllers and terminals that can be attached to a Series/1. All terminal attachments are through the Programmable Communications Subsystems.

Controller	Attached Device	Protocol	Notes
3271		BSC-MTP	Multipoint, Leased Line Display Printer Printer
	3277		
	3284		
	3286		
3276		BSC-MTP	Multipoint, Leased Line Display Display Printer Printer
	3278		
	3279		
	3287		
3274		BSC-MTP	Multipoint, Leased Line Display Display Display Printer Printer Printer Printer
	3277		
	3278		
	3279		
	3284		
	3286		
	3287		
	3288		
3289			

**SERIES/1 to OTHER TERMINAL DEVICES:** The following table describes the types of terminals, and other IBM devices that may attach to a Communications Manager network, excluding the Series/1 family of devices:

Device	PCS/Native	Protocol	Function/Notes
3101-1X,2X	PCS	ASC	3277 Emulation
	PCS	KSR 33/35	ASCII Terminal
	Native	ASC	Operator Station
5280	PCS	BSC-MTP	3271 Emulation
	Native	BSC-PTP	File Transfer
6670	Native	BSC-PTP	File Transfer
IBM PC	PCS	KSR 33/35	ASCII Terminal
	PCS	ASC	3101 Emulation Program
Display-writer	Native	BSC-PTP	File Transfer
	PCS	KSR 33/35	ASCII Terminal
S/23	Native	BSC-PTP	File Transfer
Data-master	PCS	KSR 33/35	ASCII Terminal
5520	Native	BSC-PTP	File Transfer

The Communications Manager has been verified using various Broadband modems (i.e., SYSTEK, 3M, Amdek) to connect asynchronous and bisynchronous terminals

PROGRAM PRODUCTS

**Series/1 RPS Communications Manager V2 (cont'd)**

**SERIES/1 to HOST CONNECTIONS:** This table shows the various host systems and subsystems which may attach to a Communications Manager network:

Host	Subsystem Access Methods	Protocol	Software Requirements/ Notes
S/370, 4300, 303X, 308X	VTAM, BTAM, VM, TCAM, TSO, CICS, IMS	SNA, BSC, Chann Att BSC	3274 EMUL (LU-2/3) LU-0 Point-to-Point with Native Card 5719-CA1 3271 Emul thru PCS
8100	DPCX/DPPX	SNA	3274 EMUL (LU-2/3)
S/34	SSP, ICF	BSC, BSC	Point-to-Point 3271 Control thru PCS
S/38	CPF, CPF	BSC, BSC	Point-to-Point 3271 Control thru PCS
S/3	CCP, CCP	BSC, BSC	Point-to-Point 3271 Control thru PCS

**SERIES/1 DEVICE SUPPORT:** This table shows the Series/1 devices which the Communications Manager supports.

Device	Description
4973	Line Printer
4974	Matrix Printer
4975	Matrix Printer
4979	Display Station as 4979 with RPQ D02038
4978	
TTY 33/35	ACSI Teletypewriter
4962	Disk
4963	Disk
4967	Disk
4969	Tape Unit
4964	Diskette
4962-2,2F,4	Diskette in Disk Drive Unit

**SERIES/1 and PCS ATTACHMENT CARDS:** This table shows the various Series/1 and PCS attachment cards which may be used for particular devices and protocols.

Protocol/Device	PCS/Native	Attachment Protocol	Function/Notes
BSC-PTP	Native	2074/5, 2093/4, 2095/6	BSC Point-to-Point, Leased Series/1-Series/1 Series/1-Host Series/1-2780 or 3780 RJE
BSC-MTP	PCS	4710, 4730/1, 4740, 4750/1/2/3	BSC Multipoint, Leased 3271 Emulation 3277 Control
SDLC	Native	2090, 2080	SNA 3274 Emulation LU-0
LCC	Native	1400	Local Area Network Multiprocessor Feature
Chan Att	Native	1200	S/370 Channel Attach (3272)
KSR 33/35	PCS	4730/1/9, 4746/7/8	ASCII Terminal
ASC	PCS	4730/1/9, 4746/7/8	3277 Emul on 3101, ASCII Terminal
	Native	1310, 1610, 7850, 2091/2, 2095/6	Operator Station

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum system requirement for program development or execution is an IBM 256K Series/1 processor, including IBM 4954, 4955 and 4956.

**SOFTWARE REQUIREMENTS**

The Communications Manager runs under control of the IBM Realtime Programming System, Version 6 (5719-PC6). For installation, the Program Preparation Subsystem, Version 6 (5719-AS6) is required.

If the installation is going to add unsupported devices attached through the Programmable Communications Subsystem, or use the IBM-supplied device support that uses the Programmable Communications Subsystem, the Programmable Communications Subsystem Extended Execution Support (5719-CS2) is required. To add unsupported devices through the Programmable Communications Subsystem, the Programmable Communications Subsystem Preparation Facility (5719-CS0) is required as well.

To use the IBM 3272 channel attach feature, the IBM Series/1-System/370 Channel Attach licensed program (5719-CA1) is required.

**COMPATIBILITY**

This program is compatible with the licensed programs which are identified in the "Software Requirements" section.

**SECURITY/INTEGRITY**

The Communications Manager utilizes the security and auditability features of the Realtime Programming System, as well as providing levels of security for operator control and terminal access. User management is responsible for evaluating, selecting, applying and implementing such features for the appropriate administrative and application controls.

For applications in which sensitive data is sent over external communication facilities, user management may wish to augment those facilities with the application of cryptography.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Communications Manager for the Series/1 Command Reference Summary (GX23-0067) ... IBM Communications Manager for the Series/1 Licensed Program Specifications (GL23-0061) ... IBM Communications Manager for the Series/1 Introduction (GL23-0060) ... IBM Communications Manager for the Series/1 Design and Installation Guide (SL23-0062) ... IBM Communications Manager for the Series/1 Assembler Language Programmer's Guide (SL23-0063) ... IBM Communications Manager for the Series/1 COBOL, PL/I and Pascal Programmer's Guide (SL23-0064) ... IBM Communications Manager for the Series/1 Operator's Guide (SL23-0065) ... IBM Communications Manager for the Series/1 Debugging Guide (LL23-0066) ... IBM Communications Manager for the Series/1 Assembly Listing Microfiche (LB23-0067).*

**RPQs ACCEPTED:** Yes

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**STRUCTURED PROGRAM FACILITY (SPF)  
MVS/VTAM APPLICATION (5719-CR1)****PURPOSE**

The IBM Series/1 Structured Program Facility (SPF) MVS/VTAM Application Program provides the software necessary to service requests from the Series/1 SPF licensed program (5719-ED1) to read and write messages, and to attach service tasks in the System/370.

**HIGHLIGHTS**

The SPF MVS/VTAM interface consists of three System/370-resident programs: Series/1 SPF MAIN, Series/1 SPF Service Program, and SPF Queue Service Program. SPF MAIN reads and writes messages, and attaches multiple Series/1 SPF service tasks.

The Series/1 SPF Service Program handles the following requests from the SPF program resident in the Series/1:

- Retrieve Data - From the System/370 direct access storage and send it to the Series/1. Retrievable information includes sequential, member of a partitioned data set, or directory information of a partitioned data set.
- Store Data - From the Series/1 to the System/370 direct access storage. The data from the Series/1 is sequential, and is stored in a System/370 partitioned data set or a sequential data set. The SPF Queue Service Program handles the enqueue and dequeue requests for all System/370 functions.
- Remote Job Entry - Request from the Series/1 will write JCL to JES2 or JES3 from the Series/1 or from an existing member of a partitioned data set or sequential data set.
- Retrieve Background Job Status - From JES2 by job name or by user ID. This program can handle up to ten (10) such requests at one time.

**LIMITATIONS**

This software offering is designed to operate in a System/370 OS MVS/VTAM environment. This program has been verified using MVS Release 3.7, VTAM 2 and NCP 5. The number of Series/1s which can be supported depends on the overall system activity, including number of terminals attached and active per Series/1, and overall request rate from the Series/1s.

If TSO is to be used in conjunction with Series/1 SPF, it must be defined as a shared application.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The hardware requirements for the use of this product on the System/370 are dependent on the overall system activity (see "Limitations"). In any event, the Series/1 is attached to the System/370 via a binary synchronous communications line as a 3271 terminal control unit. The System/370 must meet the configuration requirements of OS/VS2 (MVS) with VTAM.

**SOFTWARE REQUIREMENTS**

This licensed program operates under control of, and has a prerequisite, IBM System/370 OS/VS2 MVS, (5725-VS2) with VTAM2 (SU1).

The use of this product does not require the use of System/370 TSO/SPF as a prerequisite. However, the Series/1 SPF MVS/VTAM Application program does not provide any library control facilities. It is recommended that the user of this product make use of System/370 TSO/SPF or some similar product to perform library control functions. See "Limitations" for further information.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Structured Programming Facility User's Guide (SC34-1627) ... IBM Series/1 Structured Programming Facility MVS/VTAM Application Program (5719-CR1) Licensed Program Specification (GC34-1636) ... IBM Series/1 Structured Programming Facility Reference Summary (GX34-0031).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**STRUCTURED PROGRAM FACILITY (SPF)  
MVS/TCAM APPLICATION (5719-CR2)****PURPOSE**

The IBM Series/1 Structured Program Facility (SPF) MVS/TCAM Application Program provides the software necessary to service requests from the Series/1 SPF licensed program (5719-ED1) to read and write messages, and to attach service tasks in the System/370.

**HIGHLIGHTS**

The SPF MVS/TCAM interface consists of three System/370-resident programs: Series/1 SPF MAIN, Series/1 SPF Service program, and SPF Queue Service program. In addition, new macros are provided for inclusion in the user's TCAM message control program. SPF MAIN reads and writes messages, and attaches multiple Series/1 SPF service tasks.

The Series/1 SPF Service program handles the following requests from the Series/1 SPF program resident in the Series/1:

- Retrieve Data - From the System/370 direct access storage and send it to the Series/1. Retrievable information includes sequential, member of a partitioned data set, or directory information of a partitioned data set.
- Store Data - From the Series/1 to the System/370 direct access storage. The data from the Series/1 is sequential, and is stored in a System/370 partitioned data set or a sequential data set. Series/1 SPF Queue Service program handles the enqueue and dequeue requests for all System/370 functions.
- Remote Job Submission - Request from the Series/1 will write JCL to JES2 or JES3 from the Series/1 or from an existing member of a partitioned data set or sequential data set.
- Retrieve Background Job Status - From JES2 or JES3 by job name or by user ID. This program can handle up to ten (10) such requests at one time.

**LIMITATIONS**

This software offering is designed to operate in a System/370 OS MVS/TCAM environment. This program has been verified using MVS Release 3.7 with TCAM 10 and NCP 5. The number of Series/1s which can be supported depends on the overall system activity, and number of terminals attached and active per Series/1, and overall request rate from the Series/1s.

If TSO is to be used in conjunction with Series/1 SPF, it must be defined as a shared application.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The hardware requirements for the use of this product on the System/370 are dependent on the application (see "Limitations"). In any event, the Series/1 is attached to the System/370 via a binary synchronous communications line through a 3270 terminal control unit.

**SOFTWARE REQUIREMENTS**

This licensed program operates under control of, and has as a prerequisite, IBM System/370 OS/VS2 MVS (5725-VS2), with TCAM 10 (SU36).

The use of this product does not require the use of System/370 TSO/SPF as a prerequisite. However, the Series/1 SPF MVS/TCAM Application program does not provide any library control facilities. It is recommended that the user of this product make use of System/370 TSO/SPF or some similar product to perform his library control functions. See "Limitations" for further information.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Structured Programming Facility User's Guide (SC34-1627) ... IBM Series/1 Structured Programming Facility MVS/TCAM Application Program (5719-CR2) Licensed Program Specification (GC34-1637) ... IBM Series/1 Structured Programming Facility Reference Summary (GX34-0031).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**4987 PROGRAMMABLE COMMUNICATIONS  
SUBSYSTEM PREPARATION FACILITY  
5719-CS0**

**PURPOSE**

The IBM Series/1 Programmable Communications Subsystem Preparation Facility licensed program is a macro library that is used to support the generation of controller storage image programs for the IBM Series/1 Programmable Communications Subsystem. This macro library is used with either the IBM Series/1 Base Program Preparation Facility (5719-PA1) or the IBM Series/1 Program Preparation Subsystem Versions 1, 2, 3, and 4 (5719-AS1, 5719-AS2, 5719-AS3, and 5719-AS4).

**HIGHLIGHTS**

- Provides the user with a protocol level instruction set for his subsystem.
- Provides the capability of customizing the subsystem to some line type, protocol, and functional level.
- Provides parameter build capability for management of the subsystem.

**DESCRIPTION**

The macro library provides the Series/1 user with the capability of defining and customizing the total protocol for his Subsystem. It provides communications instructions for implementing his communications applications. It accomplishes this with two basic macro types.

- Communications Macro Instructions
- Communications Definition Macros

The Communications Macro Instructions are the vehicle used to code the customized communications programs (called function strings) for each line of the Subsystem. They are a highly specialized instruction set designed solely for the function strings of the Programmable Communications Subsystem. These instructions assemble into the orders defined by the Programmable Communications Subsystem.

The Communications Definition Macros are the vehicle used to define the tables and parameters used by the orders. They are used to define the control characters for each line or line type, the function strings to be used for each line or line type, and all the pointers necessary to set up the controller storage. These macros are also assembled.

The output from these two macro types is linked together into a load module by the standard facilities of the Series/1 Base Program Preparation Facility or the Series/1 Program Preparation Subsystem and placed onto a disk or diskette. This load module is referred to as the controller storage image program.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system required to install the IBM Series/1 Programmable Preparation Facility (5719-CS0) is specified for the IBM Series/1 Base Program Preparation Facility or for the Version of the IBM Series/1 Program Preparation Subsystem selected.

**SOFTWARE REQUIREMENTS**

- IBM Series/1 Base Program Preparation Facility (5719-PA1)  
or
- IBM Series/1 Program Preparation Subsystem, Version 1 (5719-AS1)  
or
- IBM Series/1 Program Preparation Subsystem, Version 2 (5719-AS2)  
or
- IBM Series/1 Program Preparation Subsystem, Version 3 (5719-AS3)  
or
- IBM Series/1 Program Preparation Subsystem, Version 4 (5719-AS4)

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Programmable Communications Subsystem Preparation Facility Reference (SC34-0119) ... IBM Series/1 Programmable Communications Subsystem Preparation Facility Licensed Program Specifications (GC34-0182)*

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**4987 PROGRAMMABLE COMMUNICATIONS SUBSYSTEM  
EXECUTION SUPPORT (5719-CS1)**

The IBM Series/1 4987 Programmable Communications Subsystem Execution Support Licensed Program runs under the control of the Realtime Programming System Versions 2, 3 and 4, and provides support for the 4987 Programmable Communications Subsystem. The licensed program consists of a controller storage utility and macros that enhance the EXIO commands in Realtime Programming System, Versions 2, 3 and 4, for operating with a 4987.

**DESCRIPTION**

## • Utility

The utility provides the user the capability to load his subsystem controller storage on line or dump his LCBs on line. The utility may be initiated from the system console or from the user's program, and executes in a user partition as a user task set.

The utility provides the following load functions:

- Verifies that the subsystem can be loaded by executing internal diagnostics.
- Reads the user's controller storage image program from disk or diskette.
- Loads the controller storage image program into the subsystem.
- Verifies the controller storage load.
- Notifies the user of any error via the operator console (if available).

**Macros**

The macros provide the user with an execution interface to EXIO commands in Realtime Programming System Versions 2, 3, and 4.

The macros and EXIO commands provide these functions:

- Provides the interface to and from the subsystem.
- Issues all physical I/O instructions to the subsystem.
- Fields the interrupts presented by the subsystem.
- Ensures that all subsystem errors and completion codes are returned to the user.
- Provides an interface to the Realtime Programming System trace facility for tracing all Programmable Communications Subsystem activity on the channel.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system required to install and to execute the IBM Series/1 4987 Programmable Communications Subsystem Execution Support is specified in the appropriate Version of the IBM Series/1 Realtime Programming System.

**SOFTWARE REQUIREMENTS**

IBM Series/1 Realtime Programming System Version 2 (5719-PC2)

or

IBM Series/1 Realtime Programming System Version 3 (5719-PC3)

or

IBM Series/1 Realtime Programming System Version 4 (5719-PC4)

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 4987 Programmable Communications Subsystem Execution Support Reference (SC34-0180) ... IBM Series/1 4987 Programmable Communications Subsystem Execution Support Licensed Program Specifications (GC34-0183)*

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**4987 PROGRAMMABLE COMMUNICATIONS SUBSYSTEM  
EXTENDED EXECUTION SUPPORT (5719-CS2)****PURPOSE**

The Series/1 4987 Programmable Communications Subsystem Extended Execution Support licensed program runs under the control of the Series/1 Realtime Programming System Version 4 and provides Read/Write level support as well as EXIO level support for the 4987.

**HIGHLIGHTS**

- Provides the user with a Read/Write level interface from the Realtime Programming System to the 4987 for supported terminals
- Provides the user with an EXIO level interface for supported and non-supported terminals
- Provides function strings for supported terminals
- Provides the user with 4987 Utility functions
- Provides the user with online RAS aids

**DESCRIPTION****Function Strings**

These strings are in source and object format and are the interpretive instructions, which may be used in the 4987 to support a specific protocol for supported terminals.

**Device Handler**

This provides the user a Read/Write interface to the list of supported devices and also an EXIO interface for all supported and non-supported terminals.

**Supported Terminals**

- 3271 models 1 and 2 BSC nonswitched, as a multipoint tributary with 3277, 3284, and 3286.
- 3274 Control Unit (BSC), mdl 1C and 51C, with attached 3277 and 3278 Display Stations, 3279 Color Display Stations, and 3284, 3286, 3287, 3288 and 3289 Printers on a nonswitched point-to-point or multipoint line.
- 3275 mdl 1 or 2 BSC switched, or multipoint.
- 3276 Control Unit Display Station (BSC), mdl 1, 2, 3 and 4, with attached 3278 Display Stations, 3279 Color Display Stations, and 3287 and 3289 Printers on a nonswitched point-to-point or multipoint line.
- Series/1 to Series/1 BSC switched or nonswitched, multipoint control or tributary.
- 2740 mdl 1 Start/Stop switched, nonswitched, or multipoint
- 2740 mdl 2 Start/Stop multipoint
- 2741 Start/Stop switched or nonswitched
- Teletype® Models 33/35 switched or nonswitched
- 3101 Display Terminal, mdl 10, 11, 12, 13, 20, 21, 22, and 23 in EIA RS-232-C/CCITT V.24 mode operating on point-to-point switched or nonswitched lines, and mdl 12 and 22 on a current loop. Supported as a Teletype® mdl 33/35 equivalent device.
- 6733 Typewriter Communication Module (with attached IBM Electronic Typewriter 85) in EIA RS-232-C mode operating on point-to-point switched or nonswitched lines. Supported as a Teletype® mdl 33/35 equivalent device.

**Macros**

These macros aid the user in preparing and defining his controller image program, application programs, and in installing the program product.

**Utility Functions**

These functions give the user the capability to:

- Load the 4987 storage
- Interface to the 4987 trace and dump features
- Print 4987 trace and dump output in a formatted mode

**Reliability, Availability and Serviceability (RAS) functions**

In addition to the RAS features that Realtime Programming System provides, this support provides:

- Protocol level retry features in the function strings
- Communications I/O trace
- Error retry, those not handled at a protocol level by the function strings
- Statistical Data Collection
- Execution time error detection

- Online terminal tests for the supported terminals
- Error logging

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**SYSTEM REQUIREMENTS**

The minimum system required to install the IBM Series/1 4987 Programmable Communications Subsystem Extended Execution Support (5719-CS2) is specified in the IBM Series/1 Realtime Programming System, Version 4 (5719-PC4).

**Note:** Realtime Programming System systems using this support in Series/1 with 64K of storage should be carefully reviewed to see that performance objectives can be achieved.

**SOFTWARE REQUIREMENTS**

IBM Series/1 Realtime Programming System Version 4 (5719-PC4) for execution. IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3) or Version 4 (5719-AS4) is required for installation and program preparation.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 4987 Programmable Communications Subsystem Extended Execution Support: Licensed Program Specifications (GC34-0185) ... General Information Manual (GC34-0186) ... Reference Manual (SC34-0187).*

**RPQs ACCEPTED:** Yes

## PROGRAM PRODUCTS

**EVENT DRIVEN EXECUTIVE  
SYSTEM/370 CHANNEL ATTACH (5719-CX1)****PURPOSE**

The IBM Series/1 Event Driven Executive (EDX) System/370 Channel Attach Program is a licensed program that runs under the control of Version 3.0 of the EDX Basic Supervisor and Emulator. This program, when used in conjunction with the 4993 model 1 Series/1-System/370 Termination Enclosure and the Series/1-System/370 Channel Attachment (feature #1200), provides the Series/1 user the ability to communicate with a System/370 over a Selector or Block Multiplexer Channel. (Wherever System/370 is used, it refers to one of the following processors: System/370 (models 135-168), the 3031, 3032 and 3033 Processors, and the 4331 and 4341 Processors.)

**HIGHLIGHTS**

This program provides the Series/1 user the ability of transferring data, under joint consent, between user application programs in a Series/1 and a System/370. The System/370 must be using either DOS/VS, OS/VS1 or OS/VS2 (SVS or MVS) and BTAM, or DOS/VSE with BTAM-ES. The support:

- Establishes, controls and terminates access between Series/1 application programs and the channel attach device.
- Manages input/output transfers between the Series/1 application programs and the channel attach device.
- Communicates with the System/370 over 32 ports (device addresses).
- Performs error logging.
- Handles interrupts from the channel attach device.
- Performs error recovery.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

32K bytes of Series/1 storage is required for execution of the IBM Series/1 EDX System/370 Channel Attach Program in conjunction with the minimum requirements for Version 3.0 of the IBM Series/1 EDX Basic Supervisor and Emulator.

**SOFTWARE REQUIREMENTS**

Basic Supervisor and Emulator Version 3 (5719-XS3) is a prerequisite, and the Supervisor must have EXIO support included at SYSGEN. EDX System/370 Channel Attach application programs require the following licensed programs:

- Event Driven Executive Basic Supervisor and Emulator Version 3 (5719-XS3)
- Event Driven Executive Utilities Version 3 (5719-UT5)
- Event Driven Executive Program Preparation Facility Version 3 (5719-XX4)

The Utilities and Program Preparation Facility are required only for the preparation and installation of EDX System/370 Channel Attach application programs, and are not required for execution.

In addition to the previously listed programs, the following licensed programs are required to assemble EDX System/370 Channel Attach application programs on a host system:

- Series/1 Event Driven Executive Macro Library/Host Version 3 (5740-LM4)
- System/370 Program Preparation Facilities for Series/1 FDP (5798-NNQ)
- System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH) [optional]

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive System/370 Channel Attach Licensed Program Specification (SC34-1701) ... IBM Series/1 Event Driven Executive Communications and Terminal Application User's Guide (SC34-1705)*

**TERMS and CONDITIONS:** See PP Index

**STRUCTURED PROGRAMMING FACILITY (SPF)  
5719-ED1****PURPOSE**

The IBM Series/1 Structured Programming Facility licensed program provides a resident programming editor in a Series/1, which communicates with a companion application program in a System/370 MVS/VTAM or MVS/TCAM system.

**HIGHLIGHTS**

Series/1 Structured Programming Facility is a programming editor that resides in a Series/1 and communicates with a companion application program on a System/370 MVS/VTAM or MVS/TCAM system. The connection of the Series/1 to the System/370 consists of a binary synchronous communications line using 3271 protocol. Series/1 SPF performs the following functions:

- Initiates request for transfer of data to and from the System/370.
- Initiates request for job submission and job status to System/370.
- Submits background jobs to JES2 or JES3 from the Series/1 or a data set on the System/370 direct access storage.
- Performs local editing of source data.
- Provides 3271 emulation for passthru to TSO or other System/370 subsystems.

The Series/1 SPF editor provides most of the editing functions which are provided by System/370 TSO/SPF in a format and mode of operation consistent with System/370 SPF. Editing functions provided by Series/1 SPF include the following:

- Full screen, context editing which allows multiple lines to be modified in a single interaction.
- Forward, backward and sideways scrolling of data through use of program function keys.
- Inserting and deleting of a line or a block of lines.
- Moving or copying of a line or a block of lines.
- Shifting data on a line or lines.

**LIMITATIONS**

The Series/1 SPF licensed program provides a subset of the editing functions available with the TSO 3270 Display Support and Structured Programming Facility program product (5740-XT8). Although most command formats in the Series/1 SPF program are compatible with the System/370 product, there are a few commands whose format is different and a few commands which are not supported by the Series/1 SPF product.

Should the user require access to the functions of an installed TSO or SPF system on the System/370, this is available from the Series/1 terminal in passthru mode (3271 emulation).

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The use of this licensed program requires the following IBM Series/1 hardware:

- IBM 4955 Processor (model B, D, or E) with 96K bytes of storage
- Storage Address Relocation Translator feature (#6335) required except on IBM 4955 model E and 4952
- Binary Synchronous Communications Single-Line Control feature (#2074)
- Timer feature (#7840)
- Programmer Console (#5650)
- Disk/Diskette
  - One IBM 4962 model 1 Disk Storage Unit and one IBM 4964 model 1 Diskette Unit; or
  - One IBM 4962 model 2 combined Disk/diskette Unit (the fixed heads available with 4962 model 1F and 4962 model 2F are not supported)

**Note:** The diskette is required for installation and maintenance but optional when executing

- Up to ten IBM 4978 Display Stations
- IBM 4973 or 4974 Printer

A printer is not required to run Series/1 Structured Programming Facility. A printer is required for system maintenance (dumps for diagnosis and APAR submissions).

- System Console (one of the following)
  - IBM 4979 Display Station
  - or

- #7850 Teletypewriter Adapter Teletype® Models ASR 33/35 or equivalent device must be provided to complete this configuration if you choose to use #7850

**SOFTWARE REQUIREMENTS**

The use of Series/1 Structured Programming Facility does not require any prerequisite programs. The product is distributed as a completely self-contained load module.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Structured Programming Facility User's Guide (SC34-1627) ... IBM Series/1 Structured Programming Facility Licensed Program Specification (LPS) 5719-ED1 (GC34-1623)*

**TERMS and CONDITIONS:** See PP Index

**FORTRAN IV COMPILER AND  
OBJECT SUPPORT LIBRARY (5719-FO1)  
FORTRAN IV REALTIME SUBROUTINE LIBRARY  
5719-FO3  
FORTRAN IV REALTIME SUBROUTINE LIBRARY  
VERSION 2 (5719-FO4)**

**PURPOSE**

The IBM Series/1 FORTRAN IV includes the compiler and execution time routines for the IBM Series/1 FORTRAN IV high-level language. Series/1 FORTRAN IV requires Mathematical Functional Subroutine Library, and also requires the floating-point emulator feature of the Realtime Programming System in those cases where the floating-point instructions are used and the floating-point hardware feature is not installed. The Realtime Subroutine Library is not a prerequisite of Series/1 FORTRAN IV, but may be used by FORTRAN IV users to facilitate access to sensor I/O and realtime functions. Source programs written in Series/1 FORTRAN IV can be used for plant and laboratory automation and process control application.

The prime purpose of the FORTRAN IV language is to aid in application programming productivity. For applications involving mathematical computations and other manipulation of numerical data, FORTRAN IV offers a major productivity enhancement over assembler coding, with the added benefit that its language is well known. In addition, FORTRAN IV is an established language, easily understood and easily learned. With FORTRAN IV, one can program applications without mastering the less familiar Assembler language. Thus, FORTRAN IV provides faster problem solution, since high-level languages require less coding than assemblers, macro-assemblers, etc.

**DESCRIPTION**

Series/1 FORTRAN IV with the prerequisite Mathematical and Functional Subroutine Library is a subset of American National Standard FORTRAN IV, X3.9-1966.

Series/1 FORTRAN IV provides interfaces to the Realtime Programming System to allow the user to control execution of tasks and manage resources. The Series/1 FORTRAN IV also meets the ISA S61.1 1976 standards for executive functions, process input/output, and time and date functions.

Series/1 FORTRAN IV Realtime extensions adapt FORTRAN IV to the Realtime Programming System environment. The FORTRAN IV statements, PROGRAM and GLOBAL, plus realtime extension routines, permit use of the realtime operating system environment. The PROGRAM statement allows a user to assign unique names to multiple main programs, thereby establishing multiple entry points for execution in response to interrupts.

The GLOBAL statement provides a data area which can be shared by main programs, thus establishing a vehicle for communication between main programs. The realtime extensions permit FORTRAN IV users to schedule execution of tasks and to delay further execution of tasks until a specified event has been completed.

**Specification Statements:**

**DIMENSION** (allowing arrays of up to 7 dimensions)

**IMPLICIT**

Explicit Specification Statements

**COMMON**, labeled, blank

**GLOBAL**, both blank and labeled

**DATA**

**EXTERNAL**

**PROGRAM**

**INVOKE**

Type statement, with or without length specification, and allowing data initialization and dimension information.

**EQUIVALENCE**

**DOUBLE-PRECISION**

**Relational and Logical Operators:**

<b>EQ</b>	equal to
<b>NE</b>	not equal to
<b>LT</b>	less than
<b>GT</b>	greater than
<b>LE</b>	less than or equal to
<b>GE</b>	greater than or equal to
<b>OR</b>	or
<b>AND</b>	and
<b>NOT</b>	not

**Control Statements:**

**GO TO**, unconditional

**GO TO**, computed

**GO TO**, assigned

**DO**

**CONTINUE**

**ASSIGN**

**IF**, arithmetic

**IF**, logical

**PAUSE**, with optional message or 5-digit identifying number

**STOP**, with optional 5-digit identifying number

**END**

**Assignment Statements:**

arithmetic assignment, allowing mixed-mode expression and multiple exponentiation  
logic assignment

**Input/Output Statements:**

**READ/WRITE**, list directed

**READ/WRITE**, sequential - optional (END =) and (ERR =) parameters on READ; optional (ERR =) parameter on WRITE

**READ/WRITE**, direct access - both formatted and unformatted, with optional ERR = parameter on READ and WRITE

**FIND**

**DEFINE FILE**

**BACKSPACE**

**REWIND**

**ENDFILE**

**FORMAT**, with these codes: A, D, E, F, I, H, L, P, T, X, Z, "literal"

**Subprograms and Statement Functions:**

**SUBROUTINE FUNCTION**, allowing type specification of function name and redefinition or arguments

**CALL**, allowing subprogram name and literal constants as arguments

**RETURN**

**ENTRY**, allowing multiple entry points in one subroutine

**BLOCK DATA**

**Constants:**

**INTEGER (INTEGER \*4)**

**INTEGER (INTEGER \*2)**

**LOGICAL**

**REAL \*4**

**REAL \*8**

**Additional Features:**

Carriage control for printed output

Static and dynamic debugging capability

Symbolic names of up to 6 characters

Statement labels of up to 5 digits

Continuation up to 19 cards

Generalized subscripts

Flexible ordering of specification statements

Various service subroutines (such as OVERFL) to handle error conditions

Array declarators available in COMMON, GLOBAL, and type statements

Several mathematical and conversion functions are performed by inline generated code in Series/1 FORTRAN IV programs. When integer argument data type is specified, a subroutine is supplied for 16 bit integer and a subroutine is supplied for 32-bit integer. Real variables are 32 bits, double precision variables are 64 bits. The following functions provided by FORTRAN IV are:

1) Absolute Value: Four functions are provided -

Argument Type	Function Value Type
Single word integer (16)	Single word integer (16)
Double word integer (32)	Double word integer (32)
Single precision-real	Single precision-real
Double precision	Double precision

2) Integer-to-Real Conversion: Four functions provided -

Argument Type	Function Value Type
Single word integer (16)	Single precision-real
Single word integer (16)	Double precision
Double word integer (32)	Single precision-real
Double word integer (32)	Double precision

3) Real-to-Integer Conversion: Four functions provided -

Argument Type	Function Value Type
Single precision-real	Single word integer (16)
Double precision	Single word integer (16)
Single precision-real	Double word integer (32)
Double precision	Double word integer (32)

4) Precision Decrease: Single function to reduce precision from double precision to single precision.

5) Precision Increase: Single function to increase precision from single to double precision.

PROGRAM PRODUCTS

**Realtime Programming System FORTRAN IV (cont'd)**

- 6) Find Storage Address: This function produces a value of the location of the argument in main storage at execution time. The function returns an absolute address.
- 7) ERRXIT and CLOSE are meaningful only to a FORTRAN IV programmer and are supplied by the FORTRAN IV object library. The CALL ERRXIT subroutine permits an error exit to a user written subroutine to be given control if an error occurs during execution of an I/O statement. CALL CLOSE is used in FORTRAN IV to close a data set by specifying a logical unit number of the data set to be closed.

**Product Content**

FORTRAN IV is available to the user in two parts:

- a) Series/1 FORTRAN IV Compiler and Object Support Library (5719-FO1)
- b) Series/1 FORTRAN IV Realtime Subroutine Library (5719-FO3)  
or  
Series/1 FORTRAN IV Realtime Programming Subroutine Library Version 2 (5719-FO4)

Series/1 FORTRAN IV Realtime Subroutine Library is a licensed program used with FORTRAN programs requiring realtime function. This library includes Realtime System Interfaces, the ISA Executive Function routines, the ISA Process I/O routines, the ISA Time and Date Routines.

Object programs require the Mathematical and Functional Subroutine Library (5719-LM1), or Mathematical and Functional Subroutine Library Version 2 (5719-LM2) to execute, as well as floating-point emulator routines of the operating system, if floating-point execution is called for and the floating-point hardware feature is not installed.

**Dynamic Debug Facilities**

The debug facility is a programming aid that enables the user to locate errors in a FORTRAN IV source program. The debug facility provides for tracing the flow within a program and between programs at execution time.

The specification statement (DEBUG) sets the conditions for operation of the debug facility and designates debugging operations that apply to the entire program unit (such as subscript checking). The debug packet identification statement (AT) identifies the beginning of the debug packet, and the statement in the program at which tracing is to begin. The two executable statements (TRACE ON and TRACE OFF) designate actions to be taken at specific points in the program.

**Execution Time Support Libraries**

FORTRAN IV, through its object time support libraries, provides an execution environment for the object module.

MFSL is required for mathematical and conversion support.

The execution time support library includes support for direct and sequential I/O through FORTRAN IV READ/WRITE sequential/direct, object time trace facilities and the ISA bit manipulation routines. I/O is implemented through GET/PUT in the operating system, thereby ensuring device independence.

**FORTRAN IV REALTIME SUBROUTINE LIBRARY VERSION 1**

Series/1 Realtime Subroutine Library is a licensed program used with FORTRAN programs requiring realtime function. This subroutine library provides the FORTRAN IV user with a call interface to the Realtime Programming System functions needed for building multitask and multitask set applications.

Series/1 FORTRAN IV Realtime Subroutine Library includes system interfaces to the operating system realtime functions, ISA Executive Routines, ISA Process routines, and the ISA time and date routines.

Series/1 FORTRAN IV Realtime Subroutine Library allows the user to manage resources and control execution of applications in the multitasking environment. These realtime service functions supported by FORTRAN IV will include features for task and task set management, partition management, managing interrupts, queue management, synchronize the use of GLOBAL, and rollin/rollout support.

The ISA Executive Function routines allow a FORTRAN IV programmer to start execution of a task set after a time delay or at a particular time of day, and to be able to place a task in the WAIT state. The executive functions START, TRNON and WAIT, are accessible through CALLs and adhere to the ISA standard.

The ISA process routines allow a FORTRAN IV programmer to use sensor I/O devices. The routines allow reading and writing of data to and from analog and digital points.

The ISA time and date library routines will allow the FORTRAN IV programmer easy access to setting the date and TOD clock.

The specific functions provided by the Series/1 FORTRAN IV Realtime Subroutine Library are:

**ISA Routines**

**FORTRAN IV**

Routine	Function
START	- start a task set immediately or after a time delay
TRNON	- start a task set at a given time
WAIT	- delay a task for a specified interval
AISQW	- analog input sequential read
AIRDW	- analog input random read
AOW	- write analog output
DIW	- read digital input
DOLW	- set or reset digital output
DOMWV	- write digital output then reset
TIME	- read current time of day
DATE	- read the current date

**Interface to the Series/1 Realtime Programming System Facilities**

**FORTRAN IV**

Routine	Function
\$DFNEV	- define event
\$DLTEV	- delete event
\$AWAIT	- wait on event completion
\$POST	- post completion of an event
\$DFNQU	- define a storage queue
\$DLTQU	- delete a queue
\$ENQUE	- send an element to a queue
\$DEQUE	- receive an element from a queue
\$DFNRS	- define a resource
\$DLTRS	- delete a resource
\$REQRS	- synchronize (request) use of resource
\$RELRS	- release resource
\$CON	- connect task to process interrupt
\$DISCN	- disconnect task from process interrupt
\$ATACH	- start a new task
\$DTACH	- terminate task set execution
\$MDSTT	- modify system task set table
\$SERXT	- activate task error exit
\$RDTOD	- read time of day
\$SETRL	- set ROLLIN/ROLLOUT status
\$TSQUE	- queue task set for execution
\$TSTOP	- terminate task execution
\$WRTO	- write time of day

**FORTRAN IV REALTIME SUBROUTINE LIBRARY VERSION 2**

Series/1 FORTRAN IV Realtime Subroutine Library Version 2 (5719-FO4) includes all the functions in the Version 1 Realtime Subroutine Library (5719-FO3) plus enhancements to include new Instrument Society of America (ISA) subroutines and additional interfaces to the Realtime Programming System.

These routines, except \$RLOAD, are reentrant and can share the same data areas. The additional functions provided by the FORTRAN IV Realtime Subroutine Library Version 2 are:

**ISA Routines**

**FORTRAN IV**

Routine	Function
AORW	- read analog outputs in user-specified order
DOPW	- writes digital outputs pulsed
DORW	- reads digital outputs in user-specified order
DOW	- writes digital outputs in user-specified order

**Interfaces to the IBM Series/1 Realtime Programming System facilities**

**FORTRAN IV**

Routine	Function
\$CONVT	- convert an EBCDIC character string
\$DFNDQ	- define a disk queue
\$INTOD	- increment time of day
\$TRANS	- translate code format of strings
\$RLOAD	- load the restart supervisor

**FORTRAN IV RAS**

Syntax errors, errors of inconsistency, such as contradictory variable declarations, and detectable semantic errors occurring in the source program, are all diagnosed and reported in a meaningful form. The compiler optionally produces the following maps and listings:

- source statement listings
- statement label map
- cross-reference index for symbols and labels
- hexadecimal listing of the object deck

**Realtime Programming System FORTRAN IV (cont'd)****CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM Series/1 FORTRAN compiler operates in the batch environment of the IBM Series/1 Program Preparation Subsystem under the IBM Series/1 Realtime Programming System. FORTRAN-generated object code is combined with Library Routines by the Application Builder, and can run either as a batch task set or Realtime Task Set under control of the IBM Series/1 Realtime Programming System. The IBM Series/1 Program Preparation Subsystem must be used to prepare the source program.

The compiler operates on the IBM 4953 or IBM 4955 Processors in the batch environment of the IBM Series/1 Program Preparation Subsystem and can execute on a Series/1 configuration that does not have floating-point support.

IBM Series/1 FORTRAN IV object programs require the IBM Series/1 Mathematical and Functional Subroutine Library (MFSL). Floating-point support (either floating point emulator or floating-point hardware feature) is required if any REAL numbers are used in a FORTRAN program.

The IBM Series/1 FORTRAN IV uses other licensed programs to provide direct support of all Series/1 hardware. The compiler-generated object programs use Series/1 hardware through interfaces to the IBM Series/1 Realtime Programming System. They are able to use any DP I/O device supported at a logical I/O level by Series/1 operating system. They access sensor I/O and timers through the IBM Series/1 FORTRAN IV Realtime Subroutine Library.

The minimum system required for compilation and application build is specified in the pages for the version of IBM Series/1 Program Preparation Subsystem utilized.

The minimum system required to execute the compiler-generated object programs in a realtime or batch partition is specified in the pages for the version of the IBM Series/1 Realtime Programming System utilized.

**Note:** The system must be equipped with the Floating Point feature (#3920) or the Floating Point Software Emulator to execute a FORTRAN program when floating-point data is used in the program. Programs using floating-point arithmetic with the Floating-Point Emulator will experience performance degradation relative to the same program using the floating-point hardware feature (#3920).

**Hardware Products Supported****Device Support Processors**

IBM 4952 models A or B  
IBM 4953 models A, B, C, or D  
IBM 4955 models A, B, C, D, or E

**Disk**

IBM 4962 models 1, 1F, 2, 2F, 3 or 4  
IBM 4963 Disk Subsystem

**Diskette**

IBM 4964 Diskette Unit model 1  
IBM 4966 Diskette Magazine Unit

**Printer**

IBM 4973 Line Printer models 1 or 2  
IBM 4974 Matrix Printer model 1

**Display Station**

IBM 4979 model 1  
IBM 4978 model 1

**Magnetic Tape**

IBM 4969

**Sensor I/O**

IBM 4982

**Features**

#1560 - Native attach Sensor I/O  
#7840 - Timer  
#7850 - TTY Adapter (supported for use with Teletype® Models ASR 33/35)

#3920 - Floating Point Processor (transparent to FORTRAN)  
#6335 - Storage Address Relocation Translator  
(IBM 4955 models B or D)

All I/O devices are accessed through Realtime Programming System control program services, and all disks and diskettes supported by Versions 1, 2, 3, or 4 of Realtime Programming System are supported. Floating point is required, either by hardware feature or by emulation. For more detailed description of model types and options, refer to the pages for the operating system and processors being used.

**SOFTWARE REQUIREMENTS**

Licensed programs required for:

**Compilation**

- IBM Series/1 Realtime Programming System Version 1 (5719-PC1) and IBM Series/1 Program Preparation Subsystem Version 1 (5719-AS1)
- or
- IBM Series/1 Realtime Programming System Version 2 (5719-PC2) and IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2)
- or
- IBM Series/1 Realtime Programming System Version 3 (5719-PC3) and IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3)
- or
- IBM Series/1 Realtime Programming System Version 4 (5719-PC4) and IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3) or Version 4 (5719-AS4)

**Application Build**

- IBM Series/1 Realtime Programming System Version 1 (5719-PC1) and IBM Series/1 Program Preparation Subsystem Version 1 (5719-AS1)
- or
- IBM Series/1 Realtime Programming System Version 2 (5719-PC2) and IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2)
- or
- IBM Series/1 Realtime Programming System Version 3 (5719-PC3) and IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3)
- or
- IBM Series/1 Realtime Programming System Version 4 (5719-PC4) and IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3) or Version 4 (5719-AS4)
- and
- IBM Series/1 Mathematical and Functional Subroutine Library (5719-LM1)
- or
- IBM Series/1 Mathematical and Functional Subroutine Library Version 2 (5719-LM2)
- and
- IBM Series/1 Realtime Subroutine Library (5719-FO3), only if called by FORTRAN user program
- or
- IBM Series/1 FORTRAN IV Realtime Subroutine Library Version 2 (5719-FO4) only if called by the FORTRAN user program.

**Execution on Realtime Partition**

- IBM Series/1 Realtime Programming System Version 1 (5719-PC1)
- or
- IBM Series/1 Realtime Programming System Version 2 (5719-PC2)
- or
- IBM Series/1 Realtime Programming System Version 3 (5719-PC3)
- or
- IBM Series/1 Realtime Programming System Version 4 (5719-PC4)



PROGRAM PRODUCTS

**Realtime Programming System FORTRAN IV (cont'd)**

**Execution in a Batch Partition**

- IBM Series/1 Realtime Programming System Version 1 (5719-PC1) and IBM Series/1 Program Preparation Subsystem Version 1 (5719-AS1)  
or
- IBM Series/1 Realtime Programming System Version 2 (5719-PC2) and IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2)  
or
- IBM Series/1 Realtime Programming System Version 3 (5719-PC3) and IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3)  
or
- IBM Series/1 Realtime Programming System Version 4 (5719-PC4) and IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3) or Version 4 (5719-AS4)

Note 1: The 4969 Magnetic Tape Unit licensed program (5719-TA4) is required for 4969 support.

Note 2: The following FORTRAN language statements are not supported for tape control functions

REWIND, BACKSPACE, and END FILE.

**COMPATIBILITY**

Compatibility for Files, Programs and Preparation are specified in the pages for the Version of the IBM Series/1 Realtime Programming System and IBM Series/1 Program Preparation Subsystem utilized.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 FORTRAN IV: Introduction (GC34-0132) ... IBM Series/1 FORTRAN IV: Language Reference (GC34-0133) ... IBM Series/1 FORTRAN IV: Compiler and Object Support Library Licensed Program Specifications (GC34-0131) ... IBM Series/1 FORTRAN IV: Realtime Subroutine Library Licensed Program Specifications (GC34-0140) ... IBM Series/1 FORTRAN IV: User's Guide (GC34-0134) ... IBM Series/1 FORTRAN IV: Language Reference Card (SX34-0135)*

**TERMS and CONDITIONS:** See PP Index

**FORTRAN IV COMPILER AND  
OBJECT SUPPORT LIBRARY VERSION 2  
5719-FO2**

**PURPOSE**

The IBM Series/1 FORTRAN IV Compiler and Object Support Library, Version 2 (5719-FO2) is for use with the IBM Series/1 Event Driven Executive (EDX) Base Supervisor and Emulator (5719-XS1) and the Realtime Programming System, Version 4 (5719-PC4). In addition, this product under the Realtime Programming System provides support for the 4969 Magnetic Tape Subsystem Support program.

The prime purpose of the FORTRAN IV language is to aid in application programming productivity. For applications involving mathematical computations and other manipulation of numerical data, FORTRAN IV offers a major productivity enhancement over assembler coding, with the added benefit that its language is easily understood and easily learned. With FORTRAN IV one can program applications without mastering the less familiar Assembler language. Thus, FORTRAN IV provides faster problem solution since high-level languages usually require less coding than assemblers, macro assemblers, etc.

Series/1 FORTRAN IV object modules can be combined either (1) by the Series/1 Event Driven Executive linkage editor into programs which are executed using the Event Driven Executive Basic Supervisor and Emulator (5719-XS1), or (2) by the Program Preparation Subsystem (5719-AS4), into task sets that run under the Realtime Programming System (5719-PC4).

The key advantages of using FORTRAN IV Version 2 (5719-FO2) over FORTRAN Version 1 (5719-FO1) are:

- Multivolume support for 4969 magnetic tape (Realtime Programming System only)
- Version 2 available on both Realtime Programming System and Event Driven Executive operating systems

Under the Realtime Programming System, programs written for FORTRAN (5719-FO1) can be recompiled with FORTRAN, Version 2, (5719-FO2) without any source changes.

**DESCRIPTION**

**Language Level**

Series/1 FORTRAN IV with the prerequisite Mathematical and Functional Subroutine Library (5719-LM3) conforms to the American National Standard FORTRAN IV, X3.10-1966, with some extensions from American National Standard FORTRAN X3.9-1966. The language also includes a significant number of IBM FORTRAN extensions common to other IBM FORTRANs, which are not part of the American National Standard.

**Specification Statements:**

DIMENSION (allowing arrays of up to 7 dimensions)  
 IMPLICIT  
 Explicit Specification Statements  
 COMMON, labeled, blank  
 DATA  
 EXTERNAL  
 PROGRAM  
 GLOBAL (Realtime Programming System only)  
 Type statement with or without length specification and allowing data initialization and dimension information.  
 Equivalence

**Double-Precision Relational and Logical Operators:**

EQ equal to  
 NE not equal to  
 LT less than  
 GT greater than  
 LE less than or equal to  
 GE greater than or equal to  
 OR or  
 AND and  
 NOT not

**Control Statements:**

GO TO, unconditional  
 GO TO, computed  
 GO TO, assigned  
 DO  
 CONTINUE  
 ASSIGN  
 IF, arithmetic  
 IF, logical  
 INVOKE, (Realtime Programming System only)  
 PAUSE, with optional message or 5-digit identifying number  
 STOP, with optional 5-digit identifying number  
 END

**Assignment Statements:**

Arithmetic assignment, allowing mixed-mode expression and multiple exponentiation  
 Logic assignment

**Input/Output Statements**

READ/WRITE, list directed  
 READ/WRITE, sequential-optional (END=) and (ERR=) parameters on READ; optional (ERR=) parameter on WRITE.  
 READ/WRITE, direct-access, both formatted and unformatted, with optional (ERR=) parameter on READ and WRITE  
 FIND  
 DEFINE FILE  
 BACKSPACE  
 REWIND  
 ENDFILE  
 FORMAT, with these codes: A, D, B, E, H, I, P, T, X, Z, "literal"

**Subprograms and Statement Functions**

SUBROUTINE  
 FUNCTION, allowing type specification of function name and redefinition of arguments  
 CALL, allowing subprogram name and literal constants as arguments  
 RETURN  
 ENTRY, allowing multiple entry points in one subroutine  
 BLOCK DATA

**Constants**

INTEGER (INTEGER \*4)  
 INTEGER (INTEGER \*2)  
 LOGICAL  
 REAL \*4  
 REAL \*8

**Additional Features:**

Carriage control for printed output  
 Static and dynamic debugging capability  
 Symbolic names of up to 6 characters  
 Statement labels of up to 5 digits  
 Continuation up to 19 cards  
 Generalized subscripts  
 Flexible ordering of specific statements  
 Various subroutines (such as OVERFL) to handle error conditions  
 Array declarators available in COMMON and type statements  
 Several mathematical and conversion functions are performed by inline-generated code in the Series/1 FORTRAN IV programs. When integer argument data type is specified, a subroutine is supplied for 16-bit integer and a subroutine is supplied for 32-bit integer. Read variables are 32 bits, double precision variables are 64 bits. The following functions provided by FORTRAN IV are:

- (1) Absolute Value: Four functions are provided
 

Argument Type	Function Value Type
Single word integer (16)	Single word integer (16)
Double word integer (32)	Double word integer (32)
Single precision-real	Single precision-real
Double precision	Double precision
- (2) Integer-to-Real Conversion: Four functions provided
 

Argument Type	Function Value Type
Single word integer (16)	Single precision-real
Single word integer (16)	Double precision
Double word integer (32)	Single precision-real
Double word integer (32)	Double precision
- (3) Real-to-Integer Conversion: Four functions provided
 

Argument Type	Function Value Type
Single precision-real	Single word integer (16)
Double precision	Single word integer (16)
Single precision-real	Double word integer (32)
Double precision	Double word integer (32)
- (4) Precision Decrease: Single function to reduce precision from double precision to single precision.
- (5) Precision Increase: Single function to increase precision from single to double precision.
- (6) Find Storage Address: This function produces a value of the location of the argument in main storage at execution time. The function returns an absolute address.

**S/1 FORTRAN IV V2 (cont'd)**

(7) The ERRXIT and CLOSE are meaningful only to a FORTRAN IV programmer and are supplied by the FORTRAN IV object library. The ERRXIT subroutine permits an error exit to a user-written subroutine to be given control if an error occurs during execution of an I/O statement. CALL CLOSE is used in FORTRAN IV to close a data set by specifying a logical unit number of the data set to be closed.

**Dynamic Debug Facility**

The debug facility is a programming aid that enables the user to locate errors in a FORTRAN IV source program. The debug facility provides for tracing the flow within a program and between programs at execution time.

The specification statement (DEBUG) sets the conditions for operation of the debug facility and designates debugging operations that apply to the entire program unit (such as subscript checking). The debug packet identification statement (AT) identifies the beginning of the debug packet and the statement in the program at which tracing is to begin. The two executable statements (TRACE ON and TRACE OFF) designate action to be taken at specific points in the program.

**Object Support Libraries**

FORTRAN IV, through its object time support libraries, provides an execution environment for the object module.

MFSL is required for mathematical and conversion support.

The execution time support library includes support for direct and sequential I/O through FORTRAN IV READ/WRITE sequential/direct, object time trace facilities, and the ISA bit manipulation routines. Available under the Realtime Programming System only is the Series/1 FORTRAN IV Realtime Subroutine Library Version 2 (5719-FO4), which is optional and offers process I/O, execution function, time, date, and realtime system service interface subroutines. These subroutines are accessed via the CALL statement.

**FORTRAN IV RAS**

Syntax errors, errors of inconsistency, such as contradictory variable declarations, and detectable semantic errors occurring in the source program are all diagnosed and reported in a meaningful form. The compiler optionally produces:

- source statements listings
- statement label map
- cross-reference index for symbols and labels
- hexadecimal listing of the object modules

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum FORTRAN IV, Version 2, storage requirements are:

- For compilation, a minimum 16K byte partition for the compiler; partition requirements depend on size of FORTRAN programs.
- For execution, a minimum partition size is 8K to 10K bytes for small programs; partition size is a function of the FORTRAN source program.

These storage requirements are in addition to the minimum requirements for the operating system environment.

For details on system requirements for the IBM Series/1 EDX Basic Supervisor and Emulator, the IBM Series/1 EDX Program Preparation Facility and the EDX Utilities, or the Realtime Programming System and Program Preparation Subsystem, see the respective pages for these licensed programs.

For EDX, the system must be equipped with the Floating Point feature (#3920) to execute a FORTRAN program that uses Floating Point numbers. Otherwise, FORTRAN will run on either a 4952 or 4955. For the Realtime Programming System, the system must be equipped with the floating point feature (#3920) or the Floating Point Software Emulator to execute a FORTRAN program.

**SOFTWARE REQUIREMENTS**

Licensed programs required for EDX

**Compilation**

- IBM Series/1 EDX Basic Supervisor and Emulator (5719-XS1)

**Program Preparation**

- IBM Series/1 EDX Basic Supervisor and Emulator (5719-XX2)
- IBM Series/1 EDX Utilities (5719-UT3)
- IBM Series/1 EDX Mathematical and Functional Subroutine Library (5719-LM3)

**Program Execution**

- IBM Series/1 EDX Basic Supervisor and Emulator (5719-XS1)

**Licensed Programs required for Realtime Programming System****Compilation**

- IBM Series/1 Realtime Programming System Version 4 (5719-PC4)
- IBM Series/1 Program Preparation Subsystem Version 4 (5719-AS4)

**Application Build**

- IBM Series/1 Realtime Programming System Version 4 (5719-PC4)
- IBM Series/1 Program Preparation Subsystem Version 4 (5719-AS4)
- IBM Series/1 Mathematical and Functional Subroutine Library Version 2 (5719-LM2)
- IBM Series/1 FORTRAN IV Realtime Subroutine Library Version 2 (5719-FO4) (only if called by FORTRAN user program)

**Execution in a Realtime Partition:**

- IBM Series/1 Realtime Programming System Version 4 (5719-PC4)

**Execution in a Batch Partition:**

- IBM Series/1 Realtime Programming Subsystem Version 4 (5719-PC4)
- IBM Series/1 Program Preparation Subsystem Version 4 (5719-AS4)

**COMPATIBILITY**

FORTRAN IV programs written for the EDX Basic Supervisor and Emulator are upward compatible to FORTRAN IV programs written for the Realtime Programming System at the source language level. FORTRAN IV under the Realtime Programming System has the following features not available under EDX:

- GLOBAL statement
- INVOKE statement
- Resource reference (N-CON)
- REUS/NOREUS compiler option
- IOAREA compiler option

For more specific information concerning these differences see *FORTRAN Language Reference* (GC34-0133) and *Realtime Programming System FORTRAN IV User's Guide* (SC34-0134).

**Program Currency**

For program support purposes, a licensed program is considered current if it is the current release of the program and all PID-distributed refreshes/PTFs have been applied.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 FORTRAN IV: Language Reference* (GC34-0133) ... *IBM Series/1 FORTRAN IV and Object Support Library Version 2 Licensed Program Specifications* (GC34-0306) ... *IBM Series/1 Event Driven Executive FORTRAN IV: User's Guide* (SC34-0315) ... *IBM Series/1 Realtime Programming System FORTRAN IV: User's Guide* (SC34-0134)

**TERMS and CONDITIONS:** See PP Index

**7361 FASTDRAFT PROGRAM  
RELEASE 1 (5719-GP1)**

**PURPOSE**

The 7361 Fastdraft Program supports the maximum 7361 Fastdraft System configuration. This program is intended to satisfy requirements for general purpose interactive drafting using 2D cartesian coordinates. It has been developed for use by non-computer-oriented drafters. The overall purpose of the 7361 system and the Fastdraft software is to provide an easy-to-learn and use system to enable drafters to improve drafting productivity.

**HIGHLIGHTS**

- Has capabilities for Isometric drawings and assemblies for clearer visualization of a part and an expanded range of drawing disciplines.
- Provides drafters with graphics systems equivalents for all the conventional tools (i.e., drawing instruments, templates, drafting board) required for general drafting tasks.
- Drafting functions are selected by a drafter using a light-pen, from menus displayed on the 3251 mdl 2 Display Station component of the 7361 system.
- Prompting messages on the 3251 mdl 2 guide the user through drafting functions requiring multiple steps.
- Drawings are saved on diskettes (one drawing per diskette) and can be restored to disk working storage for editing or plotting purposes at any time.
- Emphasis is on ease of learning and use. The *Fastdraft Training Guide* guides the drafter step-by-step through the use of prompting messages, from simple to more complex functions.
- Supports separate workstation areas on disk for each display station. Each action is written to disk. Therefore, minimal recovery is required in the event of a power outage.
- User can create his own templates (as pattern library symbols).
- Fastdraft software offers a choice of the level of detail for creating/editing drawings. The level selected is highlighted and changes are restricted to that level. The five hierarchical levels are:
  - Points
  - Lines
  - Shapes
  - Patterns
  - Views

**DESCRIPTION**

Three function menus are provided. The drafter selects a menu, and follows with the selection of the functions needed from the displayed menu, by use of the light-pen and the keyboard. The keyboard is primarily used to select the menu and to input measurement and other alphanumeric data.

Main Menu consists of four parts:

- Drawing and Diskette Options.
- Drawing Identification.
- Drawing Parameters.
- Notation Area.

Provides the capability to get and save drawings, erase drawing storage, identify jobs, format diskettes, plot, create notes, etc.

Customizing Menu is used to:

- Specify metric or inch units for the drawing.
- Set or change the values for drawing and dimensioning the work.
- Set up the Edit Menu screen and text formatting.
- Select line type and pens.
- Specify scrolling increment control.

The Fastdraft options from the Edit Menu use the specifications or attributes set up on the Customizing Menu.

Edit Menu has four areas:

- Display Window.
- Coordinate Readout Area.
- Instruction Area.
- Edit Menu Options.

Provides the capability to create, structure, copy, rotate, delete and modify drawings in working storage.

The 7361 Fastdraft System operates as a dedicated drafting system.

**FUNCTIONAL CHARACTERISTICS**

For initial construction of shapes:

- **Mathematical/Construction Options**  
Edit Menu options provide for the construction of lines, circles, ellipses, boxes, etc.
- **Editing Options (for use on existing shapes)**  
Menu options are provided for Window, Restore, Delete, Intersect, Rotate, Move, Scale, Measure, etc.
- **Drafting Options**  
Isometrics, dimensioning, cross-hatching, filleting, etc.

Drafting Requirements of the following standards organizations are supported:

- International Standards Organization (ISO).
- American National Standards Institute (ANSI).

**CUSTOMER RESPONSIBILITIES**

To install and use the 7361 Fastdraft Licensed Program, the customer will:

- Order, as a minimum, the basic 7361 System shown under "Devices Supported".
- Order the Fastdraft Licensed Program (5719-GP1) from IBM.
- Follow site preparation guidelines found in the *IBM 7361 Fastdraft System Guide*.
- Read the following publications to acquire a knowledge of the graphics functions provided and the installation procedures:

*IBM 7361 Fastdraft System Guide* (SC34-0514) introduces the system and gives instructions for software installation, operation and maintenance. It also includes physical installation planning information.

*IBM 7361 Fastdraft Training Guide* (SC34-0515) is a self-study manual that explains how to use the functions offered, plot a drawing, create pattern libraries, etc. No knowledge of computers or programming is required.

After the user has become initially familiar with the system, a review of the *IBM Fastdraft Workstation Reference* (SC34-0516) will provide in depth information about each of the drafting functions available.

**Security:** Since the 7361 System is intended to operate in a non-secure environment, customer management should institute appropriate controls and procedures to safeguard the files in the system, and to limit access only to those who have been explicitly authorized.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Devices Supported:** The IBM 7361 Fastdraft Licensed Program is specifically designed for use with the IBM 7361 Fastdraft System. Components of the 7361 System are:

**Basic**

- The IBM 7361 Graphics Processor Unit mdl 001.
- The IBM 3251 mdl 2 Display Station with two special features: Alphameric Keyboard (#4621) and Light-Pen (#4750).
- The IBM 3101 mdl 10 or mdl 23A Display Terminal (used as the system console for program installation and for DPCE Service Representative use in diagnostic testing).

**Optional**

- A second 3251 mdl 2 Display Station (with #4621 and #4750 features).
- An IBM 7374 Color Plotter mdl 001.

**SOFTWARE REQUIREMENTS (None)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM 7361 Fastdraft System Guide* (SC34-0514) ... *IBM 7361 Fastdraft Training Guide* (SC34-0515) ... *IBM Fastdraft Workstation Reference* (SC34-0516) ... *IBM 7361 Licensed Program Specifications* (GC34-0513).\*

\* Describes the IBM 7361 Fastdraft licensed program and warrants that it conforms to its specifications (as contained in the document).

**RPQs ACCEPTED: Yes**

**7361 FASTDRAFT PROGRAM  
RELEASE 1 Modification Level 1  
5719-GP1**

**PURPOSE**

The 7361 Fastdraft Program Release 1.1 is a new release of the Fastdraft Program which contains all the functions available in the initial release, as well as new and enhanced capabilities.

The purpose of the program is to support the 7361 Fastdraft System which provides an easy-to-learn and use, 2D (two-dimensional) interactive drafting system enabling significant productivity improvements for drafters.

**HIGHLIGHTS of RELEASE 1.0**

The highlights of the initial release of the Fastdraft Program are:

- Has capabilities for Isometric drawings and assemblies for clearer visualization of a part and an expanded range of drawing disciplines.
- Provides drafters with graphics systems equivalents for all the conventional tools (i.e., drawing instruments, templates, drafting board) required for general drafting tasks.
- Drafting functions are selected by a drafter using a light-pen, from menus displayed on the 3251 mdl 2 Display Station component of the 7361 system.
- Prompting messages on the 3251 mdl 2 guide the user through drafting functions requiring multiple steps.
- Drawings are saved on diskettes (one drawing per diskette) and can be restored to disk working storage for editing or plotting purposes at any time.
- Emphasis is on ease of learning and use. The *Fastdraft Training Guide* guides the drafter step-by-step through the use of prompting messages, from simple to more complex functions.
- Supports separate workstation areas on disk for each display station. Each action is written to disk. Therefore, minimal recovery is required in the event of a power outage.
- User can create his own templates (as pattern library symbols).
- Fastdraft software offers a choice of the level of detail for creating/editing drawings. The level selected is highlighted and changes are restricted to that level. The five hierarchical levels are:
  - Points
  - Lines
  - Shapes
  - Patterns
  - Views

**DESCRIPTION**

Three function menus are provided. The drafter selects a menu, and follows with the selection of the functions needed from the displayed menu, by use of the light-pen and the keyboard. The keyboard is primarily used to select the menu and to input measurement and other alphanumeric data.

Main Menu consists of four parts:

- Drawing and Diskette Options.
- Drawing Identification.
- Drawing Parameters.
- Notation Area.

Provides the capability to get and save drawings, erase drawing storage, identify jobs, format diskettes, plot, create notes, etc.

Customizing Menu is used to:

- Specify units of measure for the drawing.
- Set or change the values for drawing and dimensioning the work.
- Set up the Edit Menu screen and text formatting.
- Select line type and plotter pens.
- Specify scrolling increment control.

The Fastdraft options from the Edit Menu use the specifications or attributes set up on the Customizing Menu.

Edit Menu has four areas:

- Display Window.
- Coordinate Readout Area.
- Instruction Area.
- Edit Menu Options.

Provides the capability to create, structure, copy, rotate, delete and modify drawings in working storage.

The 7361 Fastdraft system operates as a dedicated drafting system.

**FUNCTIONAL CHARACTERISTICS**

- Mathematical/Construction Options (for initial construction of shapes).  
Edit Menu options provide for the construction of lines, circles, ellipses, boxes, etc.
- Editing Options (for use on existing shapes)  
Menu options are provided for Window, Restore, Delete, Intersect, Rotate, Move, Scale, Measure, etc.
- Drafting Options  
Isometrics, dimensioning, cross-hatching, filleting, etc.

Drafting Requirements of the following standards organizations are supported:

- American National Standards Institute (ANSI)
- International Standards Organization (ISO)

**HIGHLIGHTS of RELEASE 1.1**

The 7361 Fastdraft System Program Release 1.1 contains the following new or enhanced capabilities:

- Fastdraft drawing export/import capability.
- Concurrent plotting
- Feet/inch/fraction units to 1/64 inch.
- Drawing construction at user-defined scales.
- Plot/merge by view.
- Show/no show of text.
- Show/no show of dimensions.
- Main menu nomenclature change.
- Fillet function expansion.
- Chamfer.
- DX, DY value input.
- Expansion of cross-hatch option for 'Pouche'.
- First or third angle isometric projection.
- Automatic dimensioning of angles.
- Dimensioning with use of prefix/suffix.
- Additional line type and dimension terminators.

**DESCRIPTION of RELEASE 1.1 ENHANCEMENTS**

**Fastdraft Drawing Export/Import Capability:** Provides the ability to export graphic data for drawings created on a Fastdraft system to CADAM® or other CAD/CAM system. The export function may be used to migrate an entire drawing data base or allow the Fastdraft System to be used in conjunction with a CAD/CAM system. This capability is required by firms for specific workload management within their own organization or in conjunction with suppliers, contractors, etc.

To allow for the exporting of drawings created on Fastdraft to another system, Release 1.1 provides two main menu functions which allow the creation of Fastdraft drawing transport diskettes. These functions are:

- Format Export Diskette: Formats a type 1 diskette in Basic Exchange format and initializes it for use in exporting drawings.
- Export Drawing: Writes a drawing to one or more export diskettes.

To complete the transfer of graphic data for a Fastdraft drawing to a CAD/CAM system such as CADAM, three additional steps must be implemented by the customer which are external to the Fastdraft system:

- Conversion of the transport diskette to a S/370 file: The BASIC EXCHANGE formatted diskette(s) must be converted to a media which can be accepted by the S/370.
- Conversion of the Fastdraft graphic data to an IGES (Initial Graphics Exchange Specifications) file. This can be accomplished by invoking the Fastdraft to IGES Translator (5796-BEB). See Fastdraft to IGES Translator documentation for data format details.
- Conversion and passing of the IGES data file to CAD/CAM: Once the IGES file is created, it can be transferred to a receiving CAD/CAM system by the appropriate translator. The IGES Processor (5668-904) is used to complete the Fastdraft to CADAM path.

### 7361 Fastdraft Program R1.1 (cont'd)

Fastdraft also has the capability to read and accept graphic data input for drawings created on external systems when the data is in the proper Fastdraft format. It is the customer's responsibility to properly format such data, and the formatting has to be accomplished via customer-written software.

**Concurrent Plotting:** Provides the ability to take full advantage of both displays at the same time that the plotter is operating.

Concurrent plotting allows the system to accommodate the use of both terminal displays for graphic creation in parallel with the plotter. All three units can be in operation simultaneously and be independently working on three separate files or drawings on the same 7361 GPU.

**Feet/Inch/Fraction Units to 1/64 Inch:** Provides the ability to draw in units that are common to the construction industry.

The drafter has at his option the ability to select the units he will be working in for a particular drawing.

Example:

feet-inch-fractions (to 1/64")  
feet-decimal feet (with scaling)  
inches-decimal inches  
System International (SI) metric

The unit of measurement selected will be consistent, at the drawing level, for coordinate display, measure, input and automatic dimensioning.

**Drawing Construction at User-Defined Scales:** This scaling ability will allow any scale to be used for the drawing construction, such as:

1/16" = 1'0"  
1/4" = 1'0"  
1 1/2" = 1'0"  
1" = 40'  
etc.

The view scale is specified on the customizing menu and will always be displayed on the edit menu.

The scale selection applies to the geometry at the view level to enable the drawing to contain detail drawings with views at different scales.

The text size is independent of the drawing scale and must be specified separately.

**Plot Merge by View:** Provides the ability to create drawings with a series of overlays of separate views or layers.

The drafter has the ability to merge and plot by view. View names are alphanumeric with a maximum length of four characters. The view name, in which geometry is presently being created or attached to, is always displayed on the edit menu.

**Show/No Show of Text:** Provides the ability to not display text, which will enhance the display quality by reducing flicker.

Selecting the Show option on the edit menu will query the drafter as to whether text should be displayed. The system will show the text unless otherwise instructed.

**Show/No Show of Dimensions:** Provides the ability to not display dimensions, including leaders, which enhances the display quality by reducing flicker.

Selecting the Show option on the edit menu will query the drafter as to whether the dimensions should be displayed. The system will show all dimensions unless otherwise instructed.

**Main Menu Nomenclature Change:** To make the main menu more global in meaning, two changes will be made: 'Part Number' will be changed to 'Drawing ID', and 'Detailer' will be changed to 'Drawn By'.

**Fillet Function Expansion:** Expands the fillet function to permit use between shapes.

Selecting the fillet function with the pattern level set will allow the routine to construct an arc tangent with two shapes.

**Chamfer:** Provides an additional function on the edit menu to automatically construct a chamfered corner.

The chamfer line for the shape selected will be constructed at any specified angle (45-degree default). Selection of the chamfer option will require the user to indicate the offset distance on the selected corner.

**DX, DY Value Input:** Provides the user with the ability to keyboard-input DX and/or DY values for construction options (e.g., circle, box).

For all construction routines, first entry is considered as absolute X,Y coordinates and all consecutive keyboard entries as DX, DY. Any light-pen entries will always be considered as absolute X,Y. This DX, DY ability would, for example, provide the user the ability to key in radius values in the circle/ellipse option, and height and width for box.

**Expansion of Cross-Hatch Option for Pouche':** Provides the ability to graphically fill shapes and patterns with a user-defined symbol from the symbol library.

This option fulfills the requirements of the construction industry for fill symbolization. The drafter is able to define several fill patterns in the symbol library that can be called and automatically replicated to graphically represent various construction materials. Pouche' will have a no-show option to improve display quality by reducing flicker.

**First or Third Angle Isometric Projection:** Provides capability for first or third angle isometric projection.

First or third angle isometric projection is constructed automatically based on the orientation of the orthographic views.

**Automatic Dimensioning of Angles:** Provides an automatic angular dimensioning routine.

Entry to this routine is invoked through the edit menu by selecting DIMEN and RADIAL, and then selecting a non-circular/arc shape. The angular dimension is created after selecting the first line, the second line, and locating the dimension line point. The dimension line is drawn to the form of a circular arc from the first extension or selected line to the second, and through the dimension point.

**Dimensioning with Use of Prefix/Suffix:** Provides the ability to insert custom prefix or suffix text with dimension text.

The Prefix/Suffix option is added to the Customizing menu as follows:

PREFIX = YES | NO

SUFFIX = YES | NO

If the Yes option has been selected, a prompt message will be displayed just before and/or after the 'ENTER DIMENSION TEXT' prompt appears.

**Additional Line Type and Dimension Terminators:** Provides greater versatility and accommodates the construction industry.

Additional dimension line terminators can be specified on the customizing menu:

- a) ..... - (dot at one end point)
- b) ..... . (dots at both end points)
- c) /----- / (slash at both end points)

Additional line type:

-----/\--- - (break line)

#### CUSTOMER RESPONSIBILITIES

**Licensed Program Installation:** It is the customer's responsibility to install the 7361 Fastdraft Program Release 1.1. Release 1.1 will automatically be shipped to customers on multiple diskettes. Installation of the Release 1.1 software is accomplished by loading the diskettes in the proper sequence in the 7361 GPU Diskette Reader. Details for installation procedures are found in the Program Directory supplied with the program. The complete loading of the software will generally take less than one-half hour. There are no dependencies on external software for installation of the release.

**Security:** Since the 7361 System is intended to operate in a non-secure environment, customer management should institute appropriate controls and procedures to safeguard the files in the system, and to limit access only to those who have been explicitly authorized.

#### SPECIFIED OPERATING ENVIRONMENT

##### HARDWARE REQUIREMENTS

The IBM 7361 Fastdraft licensed program runs only on an IBM Fastdraft System. Other than a minimum Fastdraft configuration, there are no hardware or software prerequisites.

The minimum Fastdraft Configuration consists of:

- An IBM 7361 Graphics Processor Unit.
- An IBM 3251 mdl 2 Display Station with its special drafting keyboard (#4621) and light-pen (#4750).
- An IBM 3101 Display Terminal Console.
- The IBM Fastdraft Licensed Program (5719-GP1).

Additional optional devices supported by the Fastdraft Program are:

- An IBM 7374 Color Plotter.
- A second IBM 3251 mdl 2 Display Station with its drafting keyboard and light-pen.

##### SOFTWARE REQUIREMENTS (None)

##### COMPATIBILITY

Drawings created on a Fastdraft System using the initial release (R1.0) of the Fastdraft Program can be processed on a system using Release 1.1.

**7361 Fastdraft Program R1.1 (cont'd)****CONVERSION**

All Fastdraft customers will automatically receive Release 1.1 of the Fastdraft Program. It is recommended that all installed customers upgrade their program to Release 1.1. This is simply accomplished by reloading the system software as described under "Customer Responsibilities". Central Service of the initial release (R1.0) of the Fastdraft Program will be discontinued 90 days after the availability of Release 1.1.

**DOCUMENTATION**

(available from Mechanicsburg)

Shipped with the program: *IBM 7361 Licensed Program Specifications* (GC34-0513).

Updated to reflect Release 1.1 functions: *IBM 7361 Fastdraft System Guide* (SC34-0514) ... *IBM 7361 Fastdraft Training Guide* (SC34-0515) ... *IBM Fastdraft Workstation Reference* (SC34-0516).

**Problem Determination:** Customers will use the problem determination procedures specified in the *IBM Fastdraft System Guide*. The procedures lead the user through a series of steps which indicate the fastest probable path to problem resolution.

A key assumption in the design of the diagnostic procedures is that most users do not have computer or data processing experience. These procedures help to guide users simply and sequentially to the resolution of a problem, or to the source of the assistance necessary to resolve it.

Some fault conditions can be resolved by the customer without further assistance. If indications are that the problem is in the hardware, the customer calls his Local Customer Service Division. However, if the indications are that the problem is within the software, problem resolution is supported as follows:

Customer calls the Graphics Systems Program (GSP) Customer Assistance Center using the instructions provided with the Fastdraft Licensed Program. The center will respond, using the appropriate level of support, until the problem is resolved.

**Education:** The *IBM 7361 Fastdraft Training Guide*, a self-study guide, will be available. Formal classroom training is not required.

**RPQs ACCEPTED:** Yes

PROGRAM PRODUCTS

**SERIES/1 REALTIME PROGRAMMING SYSTEM  
X.25/HDLC COMMUNICATIONS SUPPORT  
VERSION 1 (5719-HD1)**

**PURPOSE**

The Series/1 Realtime Programming System X.25/HDLC Communications Support is a licensed program that extends the IBM Series/1 Realtime Programming System Version 6 to provide Read/Write level X.25/HDLC support for the DLC Adapter (RPQ 8T1067), the SDLC Single-Line Control (#2090), and the Synchronous Communications Single-Line Control/High Speed (#2080).

**HIGHLIGHTS**

This licensed program consists of a set of functional modules and provides the user with two levels of programmable interface:

1. HDLC Frame Level Interface. Supported protocols in this interface are:
  - a. Asynchronous Balanced Mode (ABM).
  - b. Normal Response Mode (NRM).
2. X.25 Packet Interface.

The interfaces 1 (a) and 2 correspond, respectively, to Level 2 and Level 3 of CCITT Recommendation X.25.

**DESCRIPTION**

The attachments and their operational modes supported by this licensed program are summarized in the following chart:

	X.25 Inter- face+	ABM Only FDX	NRM Primary/ HDX	Secondary/ FDX	Physi- cal Inter- face	Max. Speed (bps)
#2080	S	S	S	S	X.21 V.35	48000 56000
#2090	S **	S **	S	S **	V.24	19200
RPQ 8T1067	S *	S *	NS	S *	V.24	19200

**Legend:**

- HDX Half-duplex.
- FDX Full-duplex.
- S Supported.
- NS Not supported.
- \* Requires quantity two in RPQ 8T1067.
- + Requires the selection of appropriate physical interfaces per individual network specifications.
- \*\* Requires quantity two on #2090 which must be equipped with EC 336758.

In addition, the X.25/HDLC Communications Support will be supported by the Series/1 Communications Manager (5719-CM2) via message path programs both at frame and at packet level.

**Highlights of Each Programmable Interface:**

- HDLC Communications Support
  - Supports ABM (as defined by CCITT Recommendation X.25 LAPB procedure).
  - Supports NRM for primary and secondary stations.
  - Supports multiple data links on a single Series/1 system.
  - Supports unextended (Modulo 8) control formats for commands and responses.
  - Supports data link control procedures for link initiation and termination, data transfer, link-state control and identification, and error recovery.
  - Supports HDLC ABM two-way simultaneous (duplex) point-to-point communications between 'combined' stations.
  - Supports HDLC NRM two-way simultaneous (duplex) and two-way alternate (half-duplex) communications on a point-to-point or multipoint link. The Series/1 can act as a primary or a secondary station.
  - Is supported by IBM Series/1 Communications Manager (5719-CM2) licensed program via message path program.
- X.25 Communications Support
  - Supports CCITT Recommendation X.25 (1980).
  - Supports DTE-to-DCE and DCE-to-DTE protocols.
  - Supports multiple permanent virtual circuits and virtual calls for concurrent access on an X.25 interface.

- Supports packet sizes of 32, 64, 128, 256, 512 and 1024 octets.
- Manages packet-level protocols including call establishment/clearing, data transfer and flow control.
- Performs data segmentation/concatenation and manages More Data ('M') bit.
- Allows user application to control the Qualifier ('Q') bit and the Delivery Confirmation ('D') bit.
- Allows application program access to carrier-supported optional facilities which are controlled by the application program. Examples of optional facilities are:

Throughput Class  
Reverse Charging  
Closed User Group  
Priority Service

- Is supported by the IBM Series/1 Communications Manager licensed program (5719-CM2) via message path program.

Typical functions of user applications based on the Realtime Programming System X.25/HDLC Communications Support are:

- Protocol conversion: To enable non-packet mode terminals on a Series/1 to communicate with a packet switched data network.
- Networking: Where X.25 or HDLC are being used as the communication protocols between Series/1s.

**CURRENT SUPPORT**

This program is compatible with the 1980 version of the CCITT X.25 recommendation, and is intended to attach to packet switched networks conforming to this recommendation. If the network supplier requires certification, it is the responsibility of the customer or the network supplier to obtain the necessary certification.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified environment:

**HARDWARE REQUIREMENTS**

The basic system requirement is a minimum IBM Series/1 Realtime Programming System Version 6 system (5719-PC6) plus the following:

- One of the following communication adapters:

Adapter Feature	Description	Inter- face	Operating Mode
#2080	Synchronous Communication Single-Line Control/ High Speed	X.21 V.35	X.25, ABM, NRM (HDX & FDX)
#2090 -1 card -Pair	SDLC Single-Line Control	V.24	NRM, HDX X.25, ABM, NRM, FDX
RPQ 8T1067 Pair	DLC Adapter	V.24	X.25, ABM, NRM FDX

- One of the following cables appropriate to the communication adapter:

Cable Feature	Description	For Use With
#2067	X.21 DCE Cable	#2080
#2060	V.35 High Speed DDN Cable	#2080
#2057	EIA Data Set Cable	#2090-1 card
RPQ D02063	EIA Duplex Cable	RPQ 8T1067 Pair #2090 Pair

- One Timer feature #7840 dedicated for this licensed program.

**SOFTWARE REQUIREMENTS**



PROGRAM PRODUCTS

**Series/1 RPS X.25/HDLC Communications Support (cont'd)**

The Realtime Programming System X.25/HDLC Communications Support operates under control of the IBM Series/1 Realtime Programming System Version 6 (5719-PC6). For preparation of user-written programs and installation, the Program Preparation Subsystem Version 6 (5719-AS6) is required.

**COMPATIBILITY**

The Realtime Programming System X.25/HDLC Communications Support provides source and object code compatibility for user application programs already in use with Series/1 Realtime Programming System Packet Network Support (5799-TCP) (PRPQ P10008).

**SECURITY, AUDITABILITY and CONTROL**

User management is responsible for evaluating, applying and implementing any Security and Auditability features for the appropriate administrative and application controls.

For applications in which sensitive data is sent over external communication facilities, user management may wish to augment those facilities with the application of cryptography.

**PERFORMANCE CONSIDERATIONS**

Performance of this program is highly dependent on the user application as well as on the hardware and software used in the Series/1 system. Refer to *RPS X.25/HDLC Communications Support: Programming and Operating Reference Manual* (SC09-1029) for details.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 X.25/HDLC Communications Support: General Information Manual* (GC09-1026) ... *IBM Series/1 X.25/HDLC Communications Support: Programming and Operating Reference* (GC09-1029) ... *IBM Series/1 X.25/HDLC Communications Support: Problem Determination Manual* (GC09-1031) ... *IBM Series/1 X.25/HDLC Communications Support: Licensed Program Specifications* (GC09-1027).

**RPQs ACCEPTED:** Yes

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**SERIES/1 EVENT DRIVEN EXECUTIVE  
X.25/HDLC (HIGH-LEVEL DATA LINK CONTROL)  
COMMUNICATIONS SUPPORT (5719-HD2)**

**PURPOSE**

The Series/1 Event Driven Executive X.25/HDLC Communications Support extends the Series/1 Event Driven Executive (EDX) Version 4 to provide Read/Write level X.25/HDLC support for the SDLC Single-Line Control (#2090), and the Synchronous Communications Single-Line Control/High-Speed (#2080).

**HIGHLIGHTS**

This licensed program consists of a set of functional modules and provides the user with two levels of EDL (Event-Driven Language) instructions:

1. HDLC Frame Interface. Supported protocols in this interface are:
  - a. Asynchronous Balanced Mode (ABM).
  - b. Normal Response Mode (NRM).
2. Packet Interface.

The interfaces 1 (a) and 2 correspond, respectively, to Level 2 and Level 3 of CCITT Recommendation X.25.

**DESCRIPTION**

The attachments and their operational modes supported by this licensed program are summarized in the following chart:

	X.25 Inter- face*	ABM Only FDX	NRM Primary/ Secondary HDX	Physi- cal Inter- face	Max. Speed (bps)
#2080	S	S	S	X.21 V.35	48,000 56,000
#2090	S **	S **	S	V.24	19,200

**Legend:**

- HDX Half-duplex.
- FDX Full-duplex.
- S Supported.
- \* Requires the selection of appropriate physical interfaces per individual network specifications.
- \*\* Requires a quantity of two on #2090 which must be equipped with EC 336758.

**Highlights of Each Programmable Interface:**

- HDLC Communications Support
  - Supports ABM (as defined by CCITT Recommendation X.25 LAPB procedure).
  - Supports NRM for primary and secondary stations.
  - Supports multiple data links on a single Series/1 system.
  - Supports unextended (Modulo 8) control formats for commands and responses.
  - Supports data link control procedures for link initiation and termination, data transfer, link-state control and identification, and error recovery.
  - Supports HDLC ABM 2-way simultaneous (duplex) point-to-point communications between 'combined' stations.
  - Supports HDLC NRM 2-way simultaneous (duplex) and two-way alternate (half-duplex) communications on a point-to-point or multipoint link. The Series/1 can act as a primary or a secondary station.
- X.25 Communications Support
  - Supports CCITT Recommendation X.25 (1980).
  - Supports DTE-to-DCE and DCE-to-DTE protocols.
  - Supports multiple permanent virtual circuits and virtual calls for concurrent access on an X.25 interface.
  - Supports packet sizes of 16, 32, 64, 128, 256, 512 and 1,024 octets.
  - Manages packet-level protocols including call establishment/clearing, data transfer and flow control.
  - Performs data segmentation/concatenation and manages More Data ('M') bit.
  - Allows user application to control the Qualifier ('Q') bit and the Delivery Confirmation ('D') bit.

- Allows application program access to carrier-supported optional facilities which are controlled by the application program. Examples of optional facilities are:

- Throughput Class
- Reverse Charging
- Closed User Group
- Priority Service

Typical functions of user applications based on the EDX X.25/HDLC Communications Support are:

- Protocol conversion: To enable non-packet mode terminals on a Series/1 to communicate with a packet-switched data network.
- Networking: Where X.25 or HDLC are being used as the communication protocols between Series/1s.

**CURRENT SUPPORT**

This program is compatible with the 1980 version of the CCITT X.25 recommendation, and is intended to attach to packet-switched networks conforming to this recommendation. If the network supplier requires certification, it is the responsibility of the customer or the network supplier to obtain the necessary certification.

Network Country

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The basic system requirement is a minimum IBM Event Driven Executive Version 4 system (5719-XS4), plus the following:

- One of the following communication adapters:

Adapter Feature	Description	Inter- face	Operating Mode
#2080	Synchronous Communication Single-Line Control/ High-Speed	X.21 V.35	X.25, ABM, NRM (HDX & FDX)
#2090 -1 card -Pair	SDLC Single-Line Control	V.24	NRM (HDX) X.25, ABM, NRM (FDX)

- One of the following cables appropriate to the communication adapter:

Cable Feature	Description	For Use With
#2067	X.21 DCE Cable	#2080
#2060	V.35 High-Speed DDN Cable	#2080
#2057	EIA Data Set Cable	#2090-1 card
#2062	EIA Duplex Cable	#2090 Pair

**SOFTWARE REQUIREMENTS**

The EDX X.25/HDLC Communications Support operates under control of the IBM Series/1 Event Driven Executive Version 4 (5719-XS4). For installation of this program and for preparation of user-written programs, EDX Program Preparation Facility (5719-XX5) will be required.

**SECURITY, AUDITABILITY and CONTROL**

User management is responsible for evaluating, applying and implementing any Security and Auditability features for the appropriate administrative and application controls.

For applications in which sensitive data is sent over external communication facilities, user management may wish to augment those facilities with the application of cryptography.



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PP 5719-HD2.2

Oct 83

New

PROGRAM PRODUCTS

**Series/1 EDX X.25/HDLC Communications Support (cont'd)**

**PERFORMANCE CONSIDERATIONS**

Performance of this program is highly dependent on the user application as well as on the hardware and software used in the Series/1 system. Refer to *RPS X.25/HDLC Communications Support: Programming and Operating Reference Manual* (SC09-1030) for details.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 X.25/HDLC Communications Support: General Information Manual* (GC09-1026) ... *IBM Series/1 Event Driven Executive X.25/HDLC Communications Support: Programming and Operating Reference* (GC09-1030) ... *IBM Series/1 Event Driven Executive X.25/HDLC Communications Support: Problem Determination Manual* (GC09-1032) ... *IBM Series/1 Event Driven Executive X.25/HDLC Communications Support: Licensed Program 1/ Specifications* (GC09-1028).

RPQs ACCEPTED: Yes

**MATHEMATICAL and FUNCTIONAL SUBROUTINE  
LIBRARY (MFSL) (5719-LM1)**

Before ordering, refer to pages for MFSL Version 2. MFSL Version 2 provides commercial subroutines in addition to the subroutines provided by this licensed program.

**PURPOSE**

The IBM Series/1 Mathematical and Function Subroutine Library (MFSL) is a set of subroutines that aids in developing application programs. MFSL offers the user of Series/1 a library of subroutines that meets a wide range of requirements in the area of mathematical and data conversion functions. All routines are reentrant.

The MFSL subroutines are used with the Series/1 FORTRAN IV licensed program or the Macro Assembler language provided with the Program Preparation Subsystem licensed program. The operating environment required for MFSL, FORTRAN IV, and the Macro Assembler is provided by the Realtime Programming System licensed program. MFSL is compatible with any Series/1 hardware configuration that includes the floating-point feature or has the floating-point emulator feature on the Realtime Operating System.

**DESCRIPTION**

MFSL contains four types of subroutines: (1) mathematical functions such as SIN and SORT, (2) EBCDIC conversion subroutines such as EBCDIC-to-floating-point, (3) error-checking subroutines, and (4) subroutine library services.

The facilities provided by MFSL are mathematical functions, data conversion routines, error handling routines and service subroutines. The following sections describe the capabilities of these functions.

**Mathematical Subroutines**

**Arc tangent, one or two arguments:**

Given one argument, an arc tangent subroutine returns the angle that has the argument as its tangent. Given two arguments, an arc tangent subroutine returns the angle that has the quotient of two arguments as its tangent. All angles are in radians.

**Cosine:**

A sine-cosine subroutine returns the value of the cosine of the argument. All angles are in radians.

**Exponential function:**

An exponential subroutine returns the value of  $e$  raised to the power of the argument.

**Exponentiation:**

An exponentiation subroutine returns the value of any base raised to any power.

**Hyperbolic tangent:**

A hyperbolic tangent subroutine returns the value of the hyperbolic tangent for the argument.

**Logarithms, common or natural:**

Logarithmic subroutines return the value of the base 10 or base  $e$  logarithm of the argument.

**Maximum value:**

A maximum value subroutine returns the value of the largest argument in a set of arguments.

**Minimum value:**

A minimum value subroutine returns the value of the smallest argument in a set of arguments.

**Modular arithmetic:**

A modular arithmetic subroutine returns the remainder from the division of two arguments.

**Positive difference:**

A positive difference subroutine returns the positive difference between the first argument and the smaller of two arguments.

**Sine:**

A sine-cosine subroutine returns the value of the sine of the argument. All angles are in radians.

**Square root:**

A square root subroutine returns the value of the square root of the argument.

**Transfer of sign:**

A transfer-of-sign subroutine returns the value of the sign of the second argument concatenated to the absolute value of the first argument.

**Doubleword integer multiplication:**

This subroutine computes the product of a doubleword integer multiplier multiplied by a doubleword integer multiplicand.

**Doubleword integer division:**

This subroutine computes the quotient of a doubleword integer dividend divided by a doubleword integer divisor.

**Conversion Subroutines**

**EBCDIC to floating-point:**

A conversion subroutine converts an EBCDIC input into a floating-point number, single precision or double precision.

**EBCDIC to integer:**

A conversion subroutine converts an EBCDIC input into an integer value, either fullword or doubleword.

**Floating-point to EBCDIC:**

A conversion subroutine converts a floating-point number (single precision or double precision) into an EBCDIC output (with or without exponent).

**Integer to EBCDIC:**

A conversion subroutine converts an integer value (fullword or doubleword) into an EBCDIC output (with or without exponent).

**Error Recovery Features**

**Error checking subroutine:**

Error function subroutine to determine if an error was detected in any MFSL logarithmic, trigonometric, exponentiation, square root, or conversion subroutine since the last call to function test.

**Floating-point divide exception:**

A floating-point divide exception subroutine determines if an error in a floating-point divide operation has occurred since the last call to floating-point divide exception.

**Floating-point overflow/underflow:**

A floating-point overflow/underflow subroutine determines if an overflow or underflow condition has occurred since the last call to floating-point overflow/underflow.

**Service Subroutines (Assembler Applications Only)**

**Library work area initialization/termination:**

An initialization or termination subroutine creates or deletes a work area in storage for user communication (error flagging).

**Abnormal termination routine specification:**

An abnormal termination routine specification subroutine allows the user to specify a routine to receive control if a program interruption occurs or if an abnormal termination macro instruction (STOPTASK) is issued.

Additional Descriptions of MFSL Functions...

**Library Interfaces**

The library subroutines can be used in either a FORTRAN IV or Assembler language program. In FORTRAN IV, calls to the library are either at the programmer's request through explicit references to subroutine names or in response to the FORTRAN IV exponentiation notation. In Assembler language, all MFSL subroutines are invoked through explicit calls to subroutine names. The MFSL subroutines are added to the application load module by the application builder through automatic calls to the subroutine library.

**MFSL RAS**

Error conditions encountered in the mathematical subroutines (such as square root of a negative number, etc.) are recognized by the subroutines internally. The user program should interrogate for such errors.

Error conditions related to hardware operations (such as divide by zero) are recognized by the operating system.

MFSL is dependent upon the Realtime Programming System for programming RAS. It recognizes mathematical errors (such as log of a negative number) internally, expecting FORTRAN IV-coded user programs to check if such an error has an effect on program logic.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**MFSL (cont'd)****SYSTEM REQUIREMENTS**

MFSL runs under the control of the Realtime Programming System and depends upon the operating system to be its complete and only interface to hardware.

MFSL is compatible with any Series/1 hardware configuration that includes the primary and secondary storage required for the MFSL subroutines used. The configuration requires floating-point support only if the user application uses REAL numbers. MFSL functions operate on integer or fixed-point support. The MFSL subroutines are added by the Application Builder through automatic calls to the subroutine library.

**HARDWARE REQUIREMENTS**

The following are the hardware requirements for MFSL:

- IBM 4952, 4953, or 4955 Processors
- Floating-Point feature or emulation under Series/1 Realtime Programming System
- MFSL requires only a processor and storage to execute. The MFSL storage requirement is a function of the size of each subroutine used, the length of each call to those subroutines, plus the storage requirements of dependent subroutines and the size of any error exit routines. The minimum system is defined by the Realtime Programming System.

**SOFTWARE REQUIREMENTS**

IBM Series/1 Realtime Programming System Version 1 (5719-PC1) and IBM Series/1 Program Preparation Subsystem Version 1 (5719-AS1)

or

IBM Series/1 Realtime Programming System Version 2 (5719-PC2) and IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2)

or

IBM Series/1 Realtime Programming System Version 3 (5719-PC3) and IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3)

or

IBM Series/1 Programming System Version 4 (5719-PC4) and IBM Series/1 Program Preparation Subsystem Version 3 or 4 (5719-AS3 or 5719-AS4)

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Mathematical and Functional Subroutine Library: Licensed Program Specifications (GC34-0137) ... IBM Series/1 Mathematical and Functional Subroutine Library: Introduction (GC34-0138) ... IBM Series/1 Mathematical and Functional Subroutine Library: User's Guide (SC34-0139).*

**TERMS and CONDITIONS:** See PP Index

**MATHEMATICAL AND FUNCTIONAL SUBROUTINE LIBRARY (MFSL) VERSION 2 (5719-LM2)**

**PURPOSE**

The IBM Series/1 Mathematical and Functional Subroutine Library (MFSL) Version 2 (5719-LM2) is a licensed program which provides all the facilities of the Mathematical and Functional Subroutine Library Version 1 (5719-LM1) plus commercial subroutines. The commercial subroutines offer the users of Series/1 a library of subroutines that will meet most requirements for decimal data handling. The commercial subroutines provide comprehensive facilities for editing, decimal arithmetic, data compaction, and conversion subroutines for data manipulation. These subroutines are similar to commercial subroutine packages offered on other IBM systems.

The commercial subroutines are callable through Series/1 FORTRAN IV or the Macro Assembler program provided with the Series/1 Program Preparation Subsystem. The operating environment required for MFSL Version 2, FORTRAN IV and Assembler is provided by the Series/1 Realtime Programming System.

**DESCRIPTION**

The commercial subroutines are intended to facilitate the use of FORTRAN and Macro Assembler for commercial programming. They are reentrant which results in efficient storage utilization.

The following subroutines are included:

- An editing subroutine, EDIT, for the preparation of output in special formats. The EDIT subroutine includes functions to insert commas, supply leading blanks, float dollar signs, and insert a CR symbol after negative numbers. EDIT functions are useful in the preparation of invoices, checks, and other commercial documents.
- Data compaction and conversion subroutines for data manipulation and data packing:

PACK	A1 Format to A2 Format
UNPACK	A2 Format to A1 Format
A1DEC	A1 to Decimal Format
DECA1	Decimal to A1 Format

- Variable-length decimal arithmetic subroutines for arithmetic operations with integer or decimal numbers, with field lengths specified by the user. Subroutines included are decimal add (ADD), subtract (SUB), multiply (MPY), divide (DIV), compare (ICOMP), and sign test (NSIGN).
- Utility subroutines for:

LCOMP, NCOMP	For comparing two variable-length, alphameric (A1) fields
MOVE	For moving data from one area to another
FILL	To fill an area with a specified value

In summary, the following are the provided functions:

Function Name	Function
MOVE	Moving data from one area to another
FILL	Fill an area with special character
EDIT	Edit data between arrays, with edit-mask
*NCOMP	Logical compare between data fields
*LCOMP	Logical compare between data fields
ICOMP	Algebraic compare between data fields for NOCOMPAT compiler option use KCOMP
ADD	Sums two arbitrary length data fields
SUB	Subtracts two arbitrary length data fields
DIV	Divides arbitrary length data fields
MPY	Multiplies arbitrary length data fields
NSIGN	Interrogates sign of decimal data field
PACK	Packs 2 characters per word into A2 format
UNPACK	Unpacks 2 characters into A1 format
A1DEC	Converts from A1 format to D1 format
DECA1	Converts from decimal format to A1 format

\* NCOMP supports 1130 collating sequence; LCOMP supports Series/1 collating sequence.

Detailed information on the use of subroutines, data format requirements, and call parameters, is provided in the *IBM Series/1 Mathematical and Functional Subroutine Library User's Guide* (SC34-0139).

The Mathematical and Functional Subroutine Library Version 2 (5719-LM2) includes a set of commonly used subroutines that aid in developing application programs. All routines are reentrant.

For details on these subroutines see the pages for the Mathematical and Functional Subroutine Library (5719-LM1).

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**SYSTEM REQUIREMENTS**

MFSL Version 2 runs under all versions of the Realtime Programming System.

MFSL Version 2 is compatible with any Series/1 hardware configuration that includes main and external storage required for the MFSL subroutines used. The Series/1 commercial subroutines which are part of MFSL Version 2 use no floating-point and have no requirements for floating-point support. The overall configuration may require floating-point support only if the user application uses REAL numbers. The MFSL subroutines are added by the Application Builder through automatic calls to the subroutine library.

**HARDWARE REQUIREMENTS**

The following are the hardware requirements for MFSL:

- IBM 4952, 4953 or 4955 Processors
- For Real numbers, Floating-Point feature or emulation under Series/1 Realtime Programming System for REAL numbers.
- MFSL Version 2 requires only a processor and storage to execute. The storage requirement is a function of the size of each subroutine used, the length of each call to those subroutines, plus the storage requirements of dependent subroutines and the size of any error exit routines. The minimum system is defined by the Realtime Programming System.

**Hardware Products Supported**

**Device Support Processors**

IBM 4952 models A or B  
IBM 4953 models A, B, C, or D  
IBM 4955 models A, B, C, D, or E

**Disk**

IBM 4962 models 1, 1F, 2, 2F, 3, or 4  
IBM 4963 Disk Subsystem

**Diskette**

IBM 4964 Diskette Unit model 1  
IBM 4966 Diskette Magazine Unit

**Printer**

IBM 4973 Line Printer models 1 or 2  
IBM 4974 Matrix Printer model 1

**Display Station**

IBM 4979 model 1  
IBM 4978 model 1

**Magnetic Tape**

IBM 4969

**Sensor I/O**

IBM 4982

**Features**

- #1560 - Native attach Sensor I/O
- #7840 - Timer
- #7850 - TTY Adapter (supported for use with Teletype® Models ASR 33/35 or IBM 3101 Display Terminal)
- #3920 - Floating-Point Processor (transparent to FORTRAN)
- #6335 - Storage Address Relocation Translator (IBM 4955 models B or D)

All I/O devices are accessed through Realtime Programming System control program services, and all disks and diskettes supported by Versions 1, 2, 3 or 4 of Realtime Programming System are supported. Floating-point is required, either by hardware feature or by emulation. For a more detailed description of model types and options, refer to the operating system and processors being used.



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PP 5719-LM2.2

May 83

Major Revision

PROGRAM PRODUCTS

**MFSL V2 (cont'd)**

**SOFTWARE REQUIREMENTS**

Any version of Realtime Programming System (5719-PC1, 5719-PC2, 5719-PC3, 5719-PC4) along with appropriate version of Program Preparation Subsystem (5719-AS1, 5719-AS2, 5719-AS3, 5719-AS4).

**COMPATIBILITY**

MFSL Version 2 (5719-LM2) is upward compatible from MFSL (5719-LM1).

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Mathematical and Functional Subroutine Library Version 2: Licensed Program Specifications (GC34-0142) ... IBM Series/1 Mathematical and Functional Subroutine Library: Introduction (GC34-0138) ... IBM Series/1 Mathematical and Functional Subroutine Library: User's Guide (SC34-0139).*

**Note:** *Introduction* and *User's Guide* contain information that is applicable to Version 1 and Version 2 users.

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE  
MATHEMATICAL and FUNCTIONAL SUBROUTINE  
LIBRARY (MFSL)  
5719-LM3**

A new licensed program, IBM Series/1 Event Drive Executive Mathematical and Functional Subroutine Library (5719-LM3), is available for the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1).

The Event Driven Executive Mathematical and Functional Subroutine Library (MFSL) is a set of subroutines that aids in developing application programs. MFSL offers the user of Series/1 a library of subroutines that meets a wide range of requirements in the area of mathematical and data conversion functions. In addition, there are commercial subroutines which provide comprehensive facilities for editing, decimal arithmetic, data compaction and conversion subroutines for data manipulation.

The MFSL subroutines are used with the Series/1 FORTRAN IV licensed program (5719-FO2) on the Event Driven Executive Operating System. The operating environment required for MFSL, FORTRAN IV and Program Preparation Facility is provided by the Event Driven Executive Basic Supervisor and Emulator (5719-XS1).

**DESCRIPTION**

MFSL contains three types of subroutines: (1) mathematical functions such as SIN and SQRT, (2) EBCDIC conversion subroutines such as EBCDIC-to-floating-point, and (3) commercial subroutines.

**Mathematical Subroutines**

**Arc tangent, one or two arguments:**

Given one argument, an arc tangent subroutine returns the angle that has the argument as its tangent. Given two arguments, an arc tangent subroutine returns the angle that has the quotient of two arguments as its tangent. All angles are in radians.

**Cosine:**

A sine-cosine subroutine returns the value of the cosine of the argument. All angles are in radians.

**Exponential function:**

An exponential subroutine returns the value of any base raised to any power.

**Exponentiation:**

An exponentiation subroutine returns the value of any base raised to any power.

**Hyperbolic tangent:**

A hyperbolic tangent subroutine returns the value of the hyperbolic tangent for the argument.

**Logarithms, common or natural:**

Logarithmic subroutines return the value of the base 10 or base e logarithm of the argument.

**Maximum value:**

A maximum value subroutine returns the value of the largest argument in a set of arguments.

**Minimum value:**

A minimum value subroutine returns the value of the smallest argument in a set of arguments.

**Modular arithmetic:**

A modular arithmetic subroutine returns the remainder from the division of two arguments.

**Positive difference:**

A positive difference subroutine returns the positive difference between the first argument and the smaller of two arguments.

**Sine:**

A sine-cosine subroutine returns the value of the sine of the argument. All angles are in radians.

**Square root:**

A square root subroutine returns the value of the square root of the argument.

**Transfer of sign:**

A transfer-of-sign subroutine returns the value of the sign of the second argument concatenated to the absolute value of the first argument.

**Doubleword integer multiplication:**

This subroutine computes the product of a doubleword integer multiplier multiplied by a doubleword integer multiplicand.

**Doubleword integer division:**

This subroutine computes the quotient of a doubleword integer dividend divided by a doubleword integer divisor.

**Conversion Subroutines**

**EBCDIC to floating-point:**

A conversion subroutine converts an EBCDIC input into a floating-point number single precision or double precision.

**EBCDIC to integer:**

A conversion subroutine converts an EBCDIC input into an integer value either fullword or doubleword.

**Floating-point to EBCDIC:**

A conversion subroutine converts a floating-point number (single precision or double precision) into an EBCDIC output (with or without exponent).

**Integer to EBCDIC:**

A conversion subroutine converts an integer value (fullword or doubleword) into an EBCDIC output (with or without exponent).

**Commercial Subroutines**

- An editing subroutine, EDIT, for the preparation of output in special formats. The EDIT subroutine includes functions to insert commas, supply leading blanks, float dollar signs, and inset a CR symbol after negative numbers. EDIT functions are useful in the preparation of invoices, checks, and other commercial documents.

- Data compaction and conversion subroutines for data manipulation and data packing:

PACK	A1 Format to A2 Format
UNPACK	A2 Format to A1 Format
A1DEC	A1 to Decimal Format
DECA1	Decimal to A1 Format

- Variable-length decimal arithmetic subroutines for arithmetic operations with integer or decimal numbers, with field lengths specified by the user. Subroutines included are decimal add (ADD), subtract (SUB), multiply (MPY), divide (DIV), compare (ICOMP), and sign test (NSIGN).

- Utility Subroutines for:

LCOMP	For comparing two variable-length, alphanumeric (A1) fields.
NCOMP	
MOVE	For moving data from one area to another.
FILL	To fill an area with a specified value.

In summary, the following are the provided functions:

Function Name	Function
MOVE	Move data from one area to another
FILL	Fill an area with a special character
EDIT	Edit data between arrays, with edit-mask
NCOMP*	Logical compare between data fields
LCOMP*	Logical compare between data fields
ICOMP	Algebraic compare between data fields for NOCOMPAT compiler option use KCOMP
ADD	Sum two arbitrary length data fields
SUB	Subtract two arbitrary length data fields
DIV	Divide arbitrary length data fields
MPY	Multiply arbitrary length data fields
NSIGN	Interrogate sign of decimal data field
PACK	Pack 2 characters per word into A2 format
UNPACK	Unpack 2 characters into A1 format
A1DEC	Converts from A1 format to D1 format
DECA1	Converts from decimal format to A1 format

\* NCOMP supports 1130 collating sequence; LCOMP supports Series/1 collating sequence.

Detailed information on the use of subroutines, data format requirements, and call parameters is provided in the *IBM Series/1 Mathematical and Functional Subroutine Library User's Guide* (SC34-0139).

**EDX MFSL (cont'd)****CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

- IBM 4952, 4953, or 4955 Processors.
- For floating-point numbers, the hardware floating-point feature (#3920) is required (available on IBM 4955 only).
- The storage requirement is a function of the size of each subroutine used, the length of each call to those subroutines, plus the storage requirements of dependent subroutines and the size of any error exit routines.

**SOFTWARE REQUIREMENTS**

IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1, 5719-XS2, 5719-XS3). MFSL runs under the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1). MFSL is compatible with any Series/1 hardware configuration that includes main and external storage required for the MFSL subroutines used. The Series/1 Commercial Subroutines which are part of MFSL use no floating-point and have no requirements for floating-point support. The overall configuration will require floating-point support only if the user application uses REAL numbers. The MFSL subroutines are added by the Linkage Editor through automatic calls to the subroutine library.

**Program Currency**

For program support purposes, a licensed program is considered current if it is the current release of the program and all PID-distributed refreshes/PTFs have been applied.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Mathematical and Functional Subroutine Library: Licensed Program Specifications (GC34-0137) ...*  
*IBM Series/1 Event Driven Executive Mathematical and Functional Subroutine Library: User's Guide (GC34-0516)*

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE  
LICENSED PROGRAMS VERSION 1**

**MACRO LIBRARY -- (5719-LM5)**  
**UTILITIES -- (5719-UT3)**  
**BASIC SUPERVISOR AND EMULATOR -- (5719-XS1)**  
**PROGRAM PREPARATION FACILITY -- (5719-XX2)**  
**MACRO LIBRARY/HOST -- (5740-LM2)**

Version 1.1 of the following licensed programs is available for the IBM Series/1 Event Driven Executive:

**EVENT DRIVEN EXECUTIVE MACRO LIBRARY  
(5719-LM5)**

A set of macros which can be used to build a Basic Supervisor and Emulator and to assemble application programs written in the Event Driven Executive Language and/or Series/1 instruction set under the Event Driven Executive Macro Assembler (5719-ASA).

**EVENT DRIVEN EXECUTIVE UTILITIES  
(5719-UT3)**

A set of utility programs that serve as productivity aids for application development and installation. These programs are independent load modules capable of running concurrently with other application programs under the Basic Supervisor and Emulator.

**EVENT DRIVEN EXECUTIVE BASIC SUPERVISOR AND EMULATOR  
(5719-XS1)**

A multiprogramming system supervisor controlled by a user-oriented instruction set. This supervisor supports multiple, independent, time dependent, and/or event driven applications with minimum interaction. This support includes:

- The ability to initiate any application program from a terminal or another application program and to pass parameters to the new program
- Multitasking within each application program, with pre-emptive task switch
- Multiple terminal support so terminals may be dynamically assigned to each application requiring them
- A relocating loader so an application program may use any available main storage area at the time of invocation

**EVENT DRIVEN EXECUTIVE PROGRAM PREPARATION FACILITY  
(5719-XX2)**

A group of programs to compile and link-edit application programs written in the Event Driven Executive language only. These programs may run concurrent with the execution of other programs, including other program preparation programs. The user can also reconfigure, compile and link-edit custom supervisors online.

**EVENT DRIVEN EXECUTIVE MACRO LIBRARY/HOST  
(5740-LM2)**

A set of macros which provide the capability to assemble application programs written in the Event Driven Executive language and/or Series/1 instruction set on a host System/370 in conjunction with that system's program preparation facilities.

**PURPOSE**

Together, the above listed licensed programs form a set of productivity tools, enhancing the implementation of user application programs on the Series/1.

The Event Driven Executive is an entry level operating system on the Series/1 that can apply to a broad range of applications such as data entry, distributed processing, and other commercial applications; as well as typical sensor-based functions such as data acquisition, material and component testing, machine and process control, and shop floor control.

The Event Driven Executive and the Series/1 offer the user many benefits including:

- Multiprogramming diskette-based or disk-based capability
- User-oriented, simple and easy-to-learn
- Flexibility and ease-of-expansion
- Application development productivity that can aid in reducing the cost and time to put the user's application into service

**HIGHLIGHTS****Multiprogramming multitasking supervisor**

- Up to 512 task priorities
- Multiple independent applications can run concurrently.
- In general, utility programs can run concurrently with application programs.
- Multiple copies of the same program can run concurrently.

**Macro instructions high-level instruction set**

- Emulator, table driven
- Simple, easy-to-learn and use
- Integer/Floating-Point calculations and logical functions [execution of floating point operations are limited to the 4955 Processor with the Floating-Point feature (#3920)]
- Structured program functions such as DO, IF THEN, ELSE, UNTIL
- Timing, realtime clock functions
- Realtime dynamic task control and synchronization with POST, WAIT, QUEUE, ATTACH
- Teleprocessing capability with BTAM-like BSC access method for multiple lines in point-to-point, switched, and/or multidrop configurations. In addition, direct read/write to System/360 or System/370 (Host) data sets and job submission to host batch processor is supported via the System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH).
- Interactive terminal commands with forms and screen control
- Allows for the inclusion of basic Series/1 assembler instructions
- Generalized EXIO interface
- 128 byte/sector diskette interchange
- Data set management
- Distributed processing/communications control
- Source program entry, line and full screen editing
- Interactive program debugging
- Program library update
- Sensor I/O test functions
- Graphics display processor
- Screen format builder
- Session manager facilities
- Job stream processor
- Remote job entry (2780- and 3780-like work station)
- Terminal configurator
- Binary Synchronous Communications trace
- Message sending
- 4978 customizing for image and control store

**Multiple device support**

- Any mix of supported disk or diskette storage units including the 4963 Disk Subsystem and the 4966 Diskette Magazine Unit
- Any mix of terminal units as identified under DEVICE SUPPORT including the 3101 Display Terminal and other ASCII devices

**Sensor input/output support**

- Analog Input (AI), Analog Output (AO), Digital Input (DI), Digital Output (DO), Process Interrupt (PI)
- Sequential and random input/output
- External synchronization
- Relay/Solid State, Multi-Range Analog Input

**Low storage requirements**

- Supervisor sizes can range from 12K bytes to 32K bytes or more
- Event Driven Executive language instructions typically average six to eight bytes of storage

**Flexible operating environment**

- Multitasking, storage resident only
- Multiprogramming diskette- or disk-based
- Multiprogramming, multi-terminal, communication to host, disk/diskette-based distributed processing and/or program preparation capability
- Optional diagnostic and recovery facilities such as error recording and program exception trace

**Distributed processing support**

- Uses Binary Synchronous Communications Single- and Multiple-Line Controllers (#2074, #2075, #2093, #2094)
- Compatibility with System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH) for direct read/write

**EDX Licensed Programs (cont'd)**

access to host data sets and batch job submission to host System/360 or 370.

- Remote Job Entry (2780- or 3780-like) work station support to Host RJE (HASP, HASP 4, RES, JES 2, JES 3, VM-RSCS).

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system requirement for program execution as a multitasking system is:

- IBM 4953 or 4955 Processor with 16K bytes or an IBM 4952 Processor with the minimum 32K bytes (IBM 4955 Processor with Floating-Point feature (#3920), if floating-point calculations are included).
- IBM 4964 Diskette Unit or 4966 Diskette Magazine Unit as an IPL source
- Application requirements may expand the system beyond this minimum system.

For native program preparation, assembly and installation:

- IBM 4953 or 4955 Processor with 48K bytes or IBM 4952 Processor with 64K bytes
- IBM 4962 Disk Storage Unit or 4963 Disk Subsystem
- IBM 4964 Diskette Unit or 4966 Diskette Magazine Unit
- IBM 4973 Line or 4974 Matrix Printer (optional)
- IBM 4979 Display station  
or  
IBM 4978 Display Station  
or  
Teletypewriter Adapter with IBM 3101 Display Terminal or Teletype® Models ASR 33/35

The configuration must have the following standard address assignments in order to satisfy the minimum system requirements. (The Starter System supports the minimum system requirements.)

Description	Decimal Address	Hexadecimal Address
IBM 4962 Disk Unit	03	03
IBM 4963 Disk Subsystem	72	48
IBM 4964 Diskette	02	02
IBM 4966 Diskette Magazine	34	22
IBM 4973 Line Printer	33	21
IBM 4974 Printer	01	01
IBM 4978 or 4979 Display Station	04	04
#7850 Teletypewriter Adapter	00	00

**SOFTWARE REQUIREMENTS**

None.

**COMPATIBILITY**

Application programs generated for the EDX FDP (5798-NRR) or the licensed program (5719-XS1) prior to the availability of Version 1.1 are source compatible with some exceptions and will require recompilation or reassembly to execute under Version 1.1. If the application programs make reference to the supervisor area or have dependencies on internal supervisor structures, source code modifications may be required. Storage requirements for the Version 1.1 supervisor can be expected to increase up to 10% to 15% depending on system configuration and functions required. (Refer to the *IBM Series/1 Event Driven Executive System Guide*, (SC34-0312) for storage estimates and the *IBM Series/1 Event Driven Executive Planning Guide*, (GC34-0328), for compatibility details).

The following Series/1 Licensed Programs are compatible and required for use with the Event Driven Executive Version 1.1:

- EDX Macro Assembler Version 1.1 (5719-ASA)
- EDX FORTRAN IV Compiler and Object Support Library Version 1.1 (5719-FO2)
- EDX Mathematical and Functional Subroutine Library Version 1.1 (5719-LM3)
- EDX COBOL Compiler and Resident Library Version 1.1 (5719-CB3)

®Registered trademark of Teletype Corporation.

- EDX Sort/Merge Version 1.1 (5719-XM2)
- EDX Multiple Terminal Manager (5719-MS1)
- EDX Indexed Access Method (5719-AM3)

These licensed programs are available concurrent with the availability of Version 1.1. For details on these licensed programs refer to the respective pages.

**Files**

Data files generated by the FDP (5798-NRR) or Version 1.0 (5719-XS1) can be processed without charge by Version 1.1.

**Preparation**

For application development and installation of PID-distributed service material, the Event Driven Executive (EDX) licensed programs are used in the following ways:

- For native program preparation and assembly, the following licensed programs are prerequisite:
  - IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1)
  - IBM Series/1 Event Driven Executive Utilities (5719-UT3)
  - IBM Series/1 Event Driven Executive Program Preparation Facility (5719-XX2)

If the Series/1 instruction set is used, the Macro Assembler (5719-ASA) is required and the Macro Library (5719-LM5) may be used in lieu of (5719-XX2).

- For host program preparation of application programs the following programs are required:

**On the System/370**

- IBM Series/1 Event Driven Executive Macro Library/Host (5740-LM2)
- System/370 Program Preparation Facilities for Series/1 FDP (5798-NNQ)
- System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH) (optional)

**On the Series/1**

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1)
- IBM Series/1 Event Driven Executive Utilities (5719-UT3)

- For program execution, the Event Driven Executive Basic Supervisor and Emulator is a prerequisite. If any of the utility program functions are to be executed as a part of the user's application solution, the Event Driven Executive Utilities is a prerequisite.

- The System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH) or equivalent may be used if data reduction, storage and reporting functions are to be supported on a host System/360 or 370. The Remote Job Entry capability of the Event Driven Executive Utilities may also be used.

**DEVICE SUPPORT**

The following Series/1 hardware products are supported:

**Processor**

- 4955 up to 256K bytes with Storage Address Translator (#6335) (standard on 4955E)
- 4953 up to 64K bytes.
- 4952 up to 128K bytes

**I/O Devices (multiples supported)**

- 3101 Display Terminal (character move only)
- 4962 Disk Storage Unit
- 4963 Disk Subsystem
- 4964 Diskette Unit
- 4966 Diskette Magazine Unit
- 4973 Line Printer
- 4974 Printer
- 4978 Display Station
- 4979 Display Station
- 4982 Sensor I/O Unit and related features

**Features (multiples supported)**

- #1560 Integrated Digital Input/Output
- #1610 Asynchronous Communications Single-Line Control
- #2074 Binary Synchronous Communications Single-Line Control to 9600 bps



PROGRAM PRODUCTS

**EDX Licensed Programs (cont'd)**

- #2075 Binary Synchronous Communications Single-Line Control – High Speed to 56K bps
- #2091 Asynchronous Communications 8-Line Control
- #2092 Asynchronous Communications 4-Line Adapter
- #2093 Binary Synchronous Communications 8-Line Control
- #2094 Binary Synchronous Communications 4-Line Adapter
- #2095 Feature – Programmable 8-Line Control
- #2096 Feature – Programmable 4-Line Adapter
- #3920 Floating-Point (4955 Processor only)
- #7840 Timers
- #7850 Teletypewriter Adapter

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Licensed Program Specifications: Basic Supervisor and Emulator (5719-XS1) (GC34-0301) ... Utilities (5719-UT3) (GC34-0302) ... Program Preparation Facility (5719-XX2) (GC34-0303) ... Macro Library (5719-LM5) (GC34-0304) ... Macro Library/Host (5740-LM2) (GC34-0305) ... IBM Series/1 Event Driven Executive System Guide (SC34-0312) ... IBM Series/1 Event Driven Executive Language Reference (SC34-0314) ... IBM Series/1 Event Driven Executive Utilities, Operator Commands and Program Preparation Message Codes (SC34-0313) ... IBM Series/1 Event Driven Executive Communication and Terminal Application Guide (SC34-0316) ... IBM Series/1 Event Driven Executive Reference Summary (SX34-0101) ... IBM Event Driven Executive Version 1.1 Planning Guide ... IBM Series/1 Authorized Program Analysis Report (APAR) User's Guide (GC34-0099) ... IBM Series/1 Event Driven Executive Tabs (SX34-0030)*

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE  
LICENSED PROGRAMS VERSION 2**

MACRO LIBRARY -- (5719-LM6)  
 UTILITIES -- (5719-UT4)  
 BASIC SUPERVISOR AND EMULATOR -- (5719-XS2)  
 PROGRAM PREPARATION FACILITY -- (5719-XX3)  
 MACRO LIBRARY/HOST -- (5740-LM3)

Version 2 of these programs provides all the facilities of the respective Version 1 licensed programs plus the following features:

- Support for the 4969 Magnetic Tape Subsystem
- Remote Management Utility

The 4969 Magnetic Tape Subsystem Attachment supporting one-half inch (1/2") nine (9) track tape transports at data densities of 800 BPI NRZI or 1600 BPI PE is now added to Event Driven Executive supported devices.

**HIGHLIGHTS****Device Support**

The Event Driven Executive language and Assembler users are provided a READ/WRITE interface or may use the EXIO interface in support of the 4969 Magnetic Tape Subsystem. This support, provided by the Supervisor and Utilities, consists of:

- READ/WRITE block of data, minimum of 18 to maximum 32,766 bytes
- REWIND Tape
- WRITE TAPE MARK
- FORWARD SPACE record or file
- BACK SPACE record or file
- NOTE/POINT
- REWIND and set tape transport offline
- Label processing includes:
  - IBM DOS standard tables
  - Non-labelled tape
  - Label bypass
- Multiple files per volume
- ONLINE UTILITIES
  - Save/Restore Disk volume or total disk contents to/from tape
  - Copy Tape to disk/diskette/tape
  - Initialize Tape
  - Online Tape Exerciser
  - Tape to Printer

**Language Support**

Event Driven Executive FORTRAN (5719-FO2), COBOL (5719-CB3 and 5719-CB4), and PL/I (5719-PL5 and 5719-PL6) support the 4969 Magnetic Tape Subsystem. Event Driven Executive Sort/Merge (5719-SM2) supports magnetic tape for sort input and output files. Review "Compatibility" section for applicable versions.

**Remote Management Utility**

The Remote Management Utility provides the capability to control a remote Series/1 from another CPU. The Remote Management Utility runs as a program under the Event Driven Executive on the Series/1 and provides an interface to any host system that provides support via Binary Synchronous Communications in transparent mode. It is the user's responsibility to provide the program in the host processor to interface with the Remote Management Utility. The support provided by the Remote Management Utility includes:

- SEND – Read a disk/diskette data set on the Series/1 and transmit it to the host
- RECEIVE – Receive data from the host and write it to an existing disk/diskette data set on the Series1
- DELETE – Delete a disk/diskette data set on the Series/1
- ALLOCATE – Allocate disk/diskette data set on the Series/1
- DUMP – Dump storage to a disk/diskette data set on the Series/1
- WRAP – Transmit a block of data just received back to the host
- IDCHECK – Verify identification between host and Remote Management Utility
- EXEC—Initiate execution of a program on the Series/1
- SHUTDOWN – Terminate the Remote Management Utility and free any allocated resources; may also initiate execution of another program
- PASSTHRU – Establish an interactive connection between the host and an application or utility on the remote Series/1

**Device Support**

The following Series/1 hardware products are supported.

**Processor**

- 4955 up to 256K bytes with Storage Address Translator (#6335) (standard on 4955E)
- 4953 up to 64K bytes
- 4952 up to 128K bytes

**I/O Devices (multiples supported)**

- 3101 Display Terminal (character mode only)
- 4962 Disk Storage Unit
- 4963 Disk Subsystem
- 4964 Diskette Unit
- 4966 Diskette Magazine Unit
- 4969 Magnetic Tape Subsystem
- 4973 Line Printer
- 4974 Printer
- 4978 Display Station
- 4979 Display Station
- 4982 Sensor I/O Unit and related features

**Features (multiples supported)**

- #1560 Integrated Digital Input/Output
- #1610 Asynchronous Communications Single-Line Control
- #2074 Binary Synchronous Communications Single-Line Control to 9600 bps
- #2075 Binary Synchronous Communications Single-Line Control – High Speed to 56K bps
- #2091 Asynchronous Communications 8-Line Control
- #2092 Asynchronous Communications 4-Line Adapter
- #2093 Binary Synchronous Communications 8-Line Control
- #2094 Binary Synchronous Communications 4-Line Adapter
- #2095 Feature - Programmable 8-Line Control
- #2096 Feature - Programmable 4-Line Adapter
- #3920 Floating-Point (4955 Processor only)
- #7840 Timers
- #7850 Teletypewriter Adapter

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system requirement for program execution as a multitasking system is:

- IBM 4953 or 4955 Processor with 16K bytes or an IBM 4952 Processor with the minimum 32K bytes (IBM 4955 Processor with Floating-Point feature (#3920), if floating-point calculations are included).
- IBM 4964 Diskette Unit or 4966 Diskette Magazine Unit as an IPL source.
- Application requirements may expand the system beyond this minimum system.

For native program preparation, assembly, and installation:

- IBM 4953 or 4955 Processor with 48K bytes or IBM 4952 Processor with 64K bytes.
- IBM 4962 Disk Storage Unit or 4963 Disk Subsystem.
- IBM 4964 Diskette Unit or 4966 Diskette Magazine Unit.
- IBM 4973 Line or 4974 Matrix Printer (optional).
- IBM 4979 Display Station.  
or  
IBM 4978 Display Station.  
or

**EDX Licensed Programs V2 (cont'd)**

IBM 3101 Display Terminal.  
or  
Teletypewriter Adapter with Teletype® Models ASR 33/35.

The configuration must have the following standard address assignments in order to satisfy the minimum system requirements. (The Starter System supports the minimum system requirements.)

Description	Decimal Address	Hexadecimal Address
IBM 4962 Disk Unit	03	03
IBM 4963 Disk Subsystem	72	48
IBM 4964 Diskette	02	02
IBM 4966 Diskette Magazine	34	22
IBM 4973 Line Printer	33	21
IBM 4974 Printer	01	01
IBM 4979 Display Station	04	04
#7850 Teletypewriter Adapter	00	00

SOFTWARE REQUIREMENTS: None.

**COMPATIBILITY**

**Files**

Data files generated by previous versions of the Event Driven Executive system can be processed by this version without change.

**Application Programs**

Application programs generated for Version 1.1 are object compatible with Version 2. Programs generated on Version 1.0 are source compatible only and will require recompilation or re-assembly to execute in the Version 2 environment.

The following licensed programs are compatible with Version 2. For details on these licensed programs, refer to the respective pages:

- FORTRAN IV Compiler and Object Support Library Version 2.3 (5719-FO2)
- Mathematical and Functional Subroutine Library Version 1.1 (5719-LM3)
- Event Driven Executive Macro Assembler Version 1.1 (5719-ASA)
- Event Driven Executive COBOL Compiler and Resident Library Version 1.2 (5719-CB3)
- Event Driven Executive COBOL Transient Library Version 1.2 (5719-CB4)
- Event Driven Executive Indexed Access Method (5719-AM3)
- Event Driven Executive Sort/Merge Version 1.2 (5719-SM2)
- Event Driven Executive PL/I Compiler and Resident Library (5719-PL5)
- Event Driven Executive PL/I Transient Library (5719-PL6)
- Event Driven Executive Multiple Terminal Manager Version 1.1 (5719-MS1)
- Event Driven Executive Data Collection Interactive Programming RPQ P82600 (5799-TDE)

**Preparation**

For application development and installation of PID-distributed service material, the Event Driven Executive Program Products are used in the following ways:

- For native program preparation and assembly, the following licensed programs are prerequisite:
  - IBM Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS2)
  - IBM Series/1 Event Driven Executive Utilities (5719-UT4)
  - IBM Series/1 Event Driven Executive Program Preparation Facility (5719-XX3)

If the Series/1 instruction set is used, the Macro Assembler (5719-ASA) is required and the Macro Library (5719-LM6) may be used in lieu of 5719-XX3.

- For System/370 host program preparation of application programs the following programs are required:

**On the host**

- Event Driven Executive Macro Library/Host (5740-LM3)
- System/370 Program Preparation Facilities for Series/1 FDP (5798-NNQ)
- System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH) (optional)

**On the Series/1**

- Event Driven Executive Basic Supervisor and Emulator (5719-XS2)
- Event Driven Executive Utilities (5719-UT4)
- For program execution, the Event Driven Executive Basic Supervisor and Emulator is a prerequisite. If any of the utility program functions are to be executed as a part of the user's application solution, the Event Driven Executive Utilities are a prerequisite.
- The System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH) or equivalent may be used if data reduction, storage and reporting functions are to be supported on a host System/360 or 370. The Remote Job Entry capability of the Event Driven Executive Utilities may also be used.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Licensed Program Specifications for: Basic Supervisor and Emulator (5719-XS2) (GC34-0353) ... Utilities (5719-UT4) (GC34-0354) ... Program Preparation Facility (5719-XX3) (GC34-0355) ... Macro Library (5719-LM6) (GC34-0356) ... Macro Library/Host (5740-LM3) (GC34-0357) ... IBM Series/1 Event Driven Executive System Guide (SC34-0312) ... IBM Series/1 Event Driven Executive Language Reference (SC34-0314) ... IBM Series/1 Event Driven Executive Utilities, Operator Commands, Program Preparation, Messages and Codes (SC34-0313) ... IBM Series/1 Event Driven Executive Communications and Terminal Applications Guide (SC34-0316) ... IBM Series/1 Event Driven Executive Reference Summary (SX34-0101) ... IBM Series/1 Authorized Program Analysis Report (APAR) User's Guide (GC34-0099) ... IBM Series/1 Event Driven Executive Tabs (SX34-0030).*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**EVENT DRIVEN EXECUTIVE (EDX) VERSION 3**

MACRO LIBRARY (5719-LM7)

UTILITIES (5719-UT5)

BASIC SUPERVISOR AND EMULATOR (5719-XS3)

PROGRAM PREPARATION FACILITY (5719-XX4)

MACRO LIBRARY/HOST (5740-LM4)

These Series/1 licensed programs provide all the facilities of the respective Version 2 licensed programs plus support for the following:

- 4955 Processor, model F
- 4954 Processor
- 4952 Processor, model C
- 4965 Diskette Drive and I/O Expansion Unit
- 4975 Printer, models 1L, 1R, 2L, and 2R
- Multifunction Attachment Feature #1310
- 3101 Display Terminal Support Enhancements
- Data Management Enhancements
- New Spool Facility
- New Linkage Editor
- Support of GPIB and Series/1 to Series/1 Attachment
- Communication with other IBM products
- Functional Realignment

These new facilities expand EDX capabilities within the commercial application environment as well as provide new device support for terminal and OEM configurations.

**HIGHLIGHTS**

**Series/1 4955 Processor Model F**

EDX support of the 4955 Processors includes the larger storage capacity available in the model F. Storage management and processor feature support are unchanged in relation to the currently available support provided for the 4955.

**Series/1 4954 Processor**

EDX support of the 4954 Processors includes those facilities currently provided for equivalent models of the 4952. Support is extended to include floating point, eight address spaces, and the large capacity available with the 4954.

**Series/1 4952 Processor Model C**

**Series/1 4965 Diskette Drive and I/O Expansion Unit**

The diskette functions and data management of EDX for the 4964 and 4965 are extended to include support of the diskette drive(s) available within these Series/1 products.

**Series/1 4975 Printer**

EDX support for the 4974 Printer is extended to include the 4975 Printer in both local and remote mode attached to the Multifunction Attachment. Support is transparent to the using applications. The additional features available with the 4975 Printer such as quality print, selectable character-per-inch/lines-per-inch, and multiple character sets, are supported.

**Support for Upper and Lower Case**

EDX provides support for upper and lower case input for all terminals. In addition, ability to specify upper case conversion for output or input is provided.

**Series/1 Multifunction Attachment**

Support of this attachment is transparent to those applications utilizing the existing EDX functions for:

- Binary Synchronous Communications
- 3101 Display Terminal
- 4975 Printer

**3101 Display Terminal Support**

Current EDX Versions 1.1 and 2 support all models of the 3101 as a teletype device, or character mode, attached through the Teletypewriter Adapter (#7850) and the asynchronous communications attachments (#1610, #2091, #2092, and #2095/#2096). Version 3 introduces support for the 3101 models 20, 22, and 23 in block mode attached through the asynchronous communication attachments in point-to-point mode. The support functions are similar to those currently provided for the 4978 Display Station; however, specific functions will depend on the 3101 device characteristics. Briefly, 3101 support in block mode includes the following:

- Terminal I/O user interface
- Line-by-line (Roll) and Full Screen (Static) access
- 8 Program Function Key recognition. This support is also extended to the 3101 in character mode.
- Field control for protected, blinking, and highlighting
- Supporting utilities include screen formatter, screen-related subroutines and session manager

**Data Management Enhancements**

Significant enhancements to disk and diskette data management are:

- Disk volume or data set capacity is extended to the maximum capacity of the physical device capacity. This removes the previous limitation of 32,767 records.
- The volume table of contents for disk, formerly resident within the supervisor, is now contained on the physical device itself, thereby allowing mobility of supervisors from system to system.
- Diskette support, previously limited to 128 bytes per sector on diskette types 1 and 2, is now extended to 256 bytes per sector on types 1, 2, and 2D. 2D is not applicable for the 4964 Diskette Unit. Diskette capacity is increased to 958K bytes for type 2D.
- 2D diskettes formatted at 1024 bytes/sector will be supported on 4966, 4952 Processor model C and 4965.
- A utility is provided to allow a 2D diskette interchange for Type H data exchange.
- Diskette management is extended to include support of multiple volumes per diskette for all Series/1 diskette products.

**New Spool Facility**

Printer management allows one or more programs or tasks executing concurrently to be independent of the printer(s) resource. Spool intercepts and routes printer output to intermediate disk or diskette storage for later printing. This function is totally transparent to the application, with the exception of immediate device buffer control operations. Features are provided to allow:

- Program control of the number of copies, output disposition, forms type and report identification
- Operator control to display the print job(s) status, alter disposition, hold/delete, and alter target printer
- Restart capability

With Spool, application execution need not be delayed by printer availability nor intermixed with other application printer output.

**Directory Utility**

The \$DIRECT utility sorts disk/diskette volume directories alphabetical by size, or location. User may also place frequently used data sets at the beginning of the directory by user-defined list of data set names.

**New Linkage Editor**

Single level overlay segments can be defined at the linkage editor program development stage for applications generated in PL/I, FORTRAN, EDL, and/or the Series/1 instruction set. Existing EDL overlay programs and COBOL segmentation facilities are unaffected.

The EDX system common data area (\$SYSCOM) can be referenced directly from FORTRAN by utilizing the GLOBAL statement of the language.

Full screen support facilities are available to FORTRAN, COBOL, and PL/I via a direct CALL from the language. In addition to the field control, cursor positioning, etc., screen formats built by the \$IMAGE utility can be retrieved from disk(ette) data sets by the CALL interface.

**GPIB and Series/1 to Series/1 Attachment Support**

These RPQs are supported through the terminal I/O user interfaces of the EDX language. A utility is also provided for the operator to achieve interactive communications with the attachment. GPIB (RPQ D02118) provides for the attachment of instrumentation or other devices that adhere to the IEEE 488 Standard, thus extending the OEM interface capabilities of Series/1.

Series/1 to Series/1 Attachment RPQs D02241 and D02242 provide a high-speed intercommunication between the processors. With the Version 3 support, data transfers can be initiated between processors including an IPL request.

PROGRAM PRODUCTS

**EDX V3 (cont'd)**

**Communication With Other IBM Products**

It has been verified that user-written programs in the Series/1 can use the EDX asynchronous communications interface to communicate with the following products:

- IBM Personal Computer with the Asynchronous Communications Adapter and utilizing the Asynchronous Communications Support licensed program or appropriate user programming.
- System/23 Datamaster with the Communications Adapter Feature and utilizing the Asynchronous Communications licensed program.
- Displaywriter System with a Communications Adapter and utilizing the Asynchronous Communications licensed program.
- 6733 Typewriter Communication Module as a Teletype® Model 33/35 (with attached Electronic Typewriter 85).

The products attach to the Series/1 via asynchronous communication attachments #1610, #2091/#2092, or #2095/#2096. Switched and point-to-point nonswitched connections are supported.

It has been verified that user-written programs in the Series/1 can use the EDX binary synchronous communications interface to communicate with:

- System/23 Datamaster with the Communications Adapter Feature and utilizing the Binary Synchronous Communications licensed program.
- Displaywriter System with a Communications Adapter and utilizing the Binary Synchronous Communications licensed program.

The products attach to the Series/1 via binary synchronous communications attachments #2074 or #2093/#2094. The Displaywriter System can also attach via feature #1310. Switched and point-to-point nonswitched connections are supported.

With the Version 3 support, data transfers can be initiated between processors including an IPL request.

**Functional Realignment**

Version 3 of the Basic Supervisor and Emulator (5719-XS3) contains in addition to supervisory functions the following utilities:

- Allocation and deletion of data sets
- Copy functions
- Terminal initialization
- Error logging

For operating environments that do not require program preparation or do not utilize functions such as RJE or graphics, there will not be a requirement to license the processor for the Utilities program (5719-UT5).

The Utilities program will now contain the linkage editor function which was contained within the Program Preparation Facilities or Macro Assembler programs.

**DEVICE SUPPORT**

The following Series/1 hardware products are supported. Additional devices are supported by other licensed programs.

**Processor**

- 4955 up to 512K bytes with Storage Address Translator (#6335) (function included with 4955 models E and F)
- 4954 up to 256K bytes
- 4952 up to 128K bytes

**I/O Devices (Multiples Supported)**

- 3101 Display Terminal models 10, 12, 13, 20, 22, 23\* – Teletypewriter Adapter and ACCA in Character mode  
Models 20, 22, 23\* – ACCA for Block mode  
\* EIA RS-422-A interface is not supported.
- 4962 Disk Storage Unit
- 4963 Disk Subsystem
- 4964 Diskette Unit
- 4965 Diskette Drive and I/O Expansion Unit
- 4966 Diskette Magazine Unit
- 4969 Magnetic Tape Subsystem
- 4973 Line Printer
- 4974 Printer
- 4975 Printer
- 4978 Display Station

- 4979 Display Station
- 4982 Sensor I/O Unit and related features

**Features (Multiples Supported)**

- #1310 Multifunction Attachment
- #1560 Integrated Digital Input/Output
- #1610 Asynchronous Communications Single-Line Control
- #2074 Binary Synchronous Communications Single-Line Control to 9600 bps
- #2075 Binary Synchronous Communications Single-Line Control/High Speed to 56K bps
- #2080 Synchronous Communications Single-Line Control/High Speed
- #2091 Asynchronous Communications 8-Line Control
- #2092 Asynchronous Communications 4-Line Adapter
- #2093 Binary Synchronous Communications 8-Line Control
- #2094 Binary Synchronous Communications 4-Line Adapter
- #2095 Feature—Programmable 8-Line Control
- #2096 Feature—Programmable 4-Line Adapter
- #3920 Floating Point (4955 only)
- #7840 Timers
- #7850 Teletypewriter Adapter

**RPQs (Multiples Supported)**

- D02118 GPIB Attachment
- D02241 and D02242 Series/1 to Series/1 Attachment
- D02350 3101 Direct Connect - 8-Line Adapter

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of these licensed programs. IBM services for these licensed programs are described elsewhere.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system requirement for program execution as a multitasking system is:

- A Series/1 Processor with 32K bytes of storage
- 4964, 4965, or 4966 Diskette units or a 4952 Processor as an IPL source
- Application requirements may expand the system beyond this minimum configuration. Floating point calculations require the 4955 Processor with Floating Point (#3920).

For native program preparation, assembly, and installation:

- A Series/1 Processor with 64K bytes of storage
- 4962 Disk Storage Unit or 4963 Disk Subsystem
- 4964, 4965, or 4966 Diskette units or a 4952 model C Processor
- 4973, 4974, or 4975 Printer (optional)
- 4979 Display Station  
or  
4978 Display Station  
or  
3101 Display Terminal  
or  
Teletypewriter Adapter (#7850 with teletypewriters)

The configuration must have the following standard address assignments in order to satisfy the minimum system requirements. (The Starter System supports the minimum system requirements.)

PROGRAM PRODUCTS

EDX V3 (cont'd)

Description	Decimal Address	Hexadecimal Address
3101 Display Terminal (Reference *1,*2,*3)		
4962 Disk Unit	03	03
4963 Disk Subsystem	72	48
Diskette drive available in		
4964 Diskette	02	02
4965 Diskette		
Drive and I/O		
Expansion Unit	68	44
4966 Diskette Magazine	34	22
4973 Line Printer	33	21
4974 Printer	01	01
4975 Printer (Reference *3)		
4978 Display Station	36	24
4979 Display Station	04	04
#1310 Multifunction Attachment (*3)	88	58
#1610 Async. Comm. Single Control (*2)	08	08
#2091/92 Asyn. Comm. Multi-Control (*2)	104	68
#2095/96 Feat.-Programmable Comm. (*2)	96	60
#7850 Teletypewriter Attachment (*1)	00	00
*1 Supports 3101 models 10, 12, 13, 20, 22, 23 in character mode		
*2 Supports 3101 models 20, 22, 23 in block mode (1200 bps for the Starter System only)		
*3 Multifunction Attachment (#1310) supports:		
• 3101 model 23 (EIA RS-422-A interface)	89	59
• 4975 model 1L	90	5A
• 4975 model 2L	91	5B

SOFTWARE REQUIREMENTS: None

COMPATIBILITY

Data

As a result of the data management enhancements for Version 3, previously generated data volumes and data sets will not be compatible. These files must be reinstalled prior to processing in the Version 3 environment. Conversion utilities (\$MIGRID and \$MIGRATE) are provided to facilitate the conversion of the data files.

Programs

Application programs generated for EDX Version 1.1 or 2 are source compatible only and will require recompilation or reassembly with the compatible program preparation programs to execute in the Version 3 environment. A *Planning Guide* (see "Documentation") is available to assist in understanding compatibility requirements and the new facilities provided.

Licensed Programs

The following Series/1 licensed programs are compatible to operate in EDX Version 3. Consult the sales manual for specific feature codes pertaining to compatibility:

- Indexed Access Method (5719-AM3)
- Indexed Access Method Version 2 (5719-AM4) (EDX Version 3.1)
- Macro Assembler (5719-ASA)
- COBOL Compiler and Resident Library (5719-CB3)
- COBOL Transient Library (5719-CB4)
- COBOL Compiler and Resident Library Version 2 (5719-CB5) (EDX Version 3.1)
- COBOL Transient Library Version 2 (5719-CB6) (EDX Version 3.1)
- System/370 Channel Attachment (5719-CX1)
- FORTRAN IV Compiler and Object Support Library (5719-FO2)
- Multiple Terminal Manager Version 2 (5719-MS2)
- Mathematical and Functional Subroutine Library (5719-LM3)
- PL/I Compiler and Resident Library (5719-PL5)
- PL/I Transient Library (5719-PL6)
- Sort/Merge (5719-SM2)
- Systems Network Architecture (5719-SX1)
- Systems Network Architecture RJE (5719-SX2)
- 523X Entry Station Direct Attachment Support (5799-TDE)
- Communications Facility (5719-CF1)

• Query (5719-XR1)

Preparation

For application development and installation of PID-distributed material, the Event Driven Executive licensed programs are used in the following ways:

- For native program preparation and assembly, three licensed programs (5719-XS3, 5719-UT5, 5719-XX4) are prerequisites. If the Series/1 instruction set is used, the Macro Assembler (5719-ASA) and the Macro Library (5719-LM7) are used in lieu of Program Preparation Facility (5719-XX4).

- For host program preparation of application programs, the following programs are required:

On the host

- Event Driven Executive Macro Library/Host Version 3 (5740-LM4)
- System/370 Program Preparation Facilities for Series/1 FDP (5798-NNQ)
- System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH) (optional)

On the Series/1

- Event Driven Executive and Emulator Version 3 (5719-XS3)
- Event Driven Executive Utilities Version 3 (5719-UT5)

- For program execution, the Event Driven Executive Basic Supervisor and Emulator is a prerequisite. If certain utility program functions are to be executed as a part of the user's application solution, the Event Driven Executive Utilities are a prerequisite.

- To transfer programs generated on the host to the Series/1, the following are available:

- The IBM System/370 Host Communications Facility IUP (5796-PGH) and the host communications facilities of the IBM Series/1 Event Driven Executive Utilities (5719-UT5)

or

- The remote job entry capability of the System/370 and the remote job entry facilities of the IBM Series/1 Event Driven Executive Utilities (5719-UT5)

or

- The remote management utility of the Series/1 Event Driven Executive Utilities (5719-UT5) in conjunction with a System/370 user application that provides a binary synchronous communications interface.

or

- Physical media exchange utilizing magnetic tape between System/370 and the Series/1 4969 Magnetic Tape Subsystem.

DOCUMENTATION

(available from Mechanicsburg)

IBM Series/1 Event Driven Executive Version 3 Planning Guide	GC34-0378
IBM Series/1 Programming System Summary	GC34-0285
IBM Series/1 Event Driven Executive Licensed Program Specifications for	
Basic Supervisor and Emulator (5719-XS3)	GC34-1696
Utilities (5719-UT5)	GC34-1697
Program Preparation Facility (5719-XX4)	GC34-1707
Macro Library (5719-LM7)	GC34-1698
Macro Library/Host (5740-LM4)	GC34-1699
IBM Series/1 Event Driven Executive System Guide	SC34-1702
IBM Series/1 Event Driven Executive Language Reference	SC34-1706
IBM Series/1 Event Driven Executive Operator's Reference	SC34-1703
IBM Series/1 Event Driven Executive Messages and Codes	SC34-0403
IBM Series/1 Event Driven Executive Communications and Terminal Applications Guide	SC34-1705
IBM Series/1 Event Driven Executive Commercial Applications Development Guide	SC34-0381



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PP 5719-LM7.4  
May 83

PROGRAM PRODUCTS

**EDX V3 (cont'd)**

IBM Series/1 Event Driven Executive Reference Summary	SX34-0038
IBM Series/1 Event Driven Executive Program Preparation Guide	SX34-1704
IBM Series/1 Event Driven Executive Library Summary	GC34-0379
IBM Series/1 Authorized Program Analysis Report (APAR) User's Guide	SC34-0099

**Note:** The above publications should be ordered via SLSS for customers. Customers on subscription for current versions of a licensed program will not automatically receive publications for subsequent versions; SLSS must be updated for Version 3.

**TERMS and CONDITIONS:** See PP Index

**Ordering Information:** Consult IBM.



PROGRAM PRODUCTS

**SERIES/1 EVENT DRIVEN EXECUTIVE  
VERSION 4**

**BASIC SUPERVISOR and EMULATOR ... 5719-XS4  
PROGRAM PREPARATION FACILITY ... 5719-XX5  
MACRO LIBRARY ... 5719-LM8  
MACRO LIBRARY/HOST ... 5740-LM5**

**PURPOSE**

The Event Driven Executive System (EDX) has been enhanced to provide the Series/1 users with improved performance, ease-of-use, and support for larger application environments.

The Event Driven Executive System improvements in management of unmapped storage may result in larger, faster application programs being implemented.

The restructuring of the supervisor of the Event Driven Executive System such that supervisor modules may be loaded in other partitions allows a large increase in the number of devices that EDX will support.

**HIGHLIGHTS**

Significant new functions are offered in the Event Driven Executive, Version 4 which provides a growth path for users of prior versions of EDX.

The significant functions provided are:

- Support for the 4956 Processor
- Support for the 4967 Disk Subsystem
- Support for the 4968 Autoload Tape Unit
- Support for the 5640 Printer Attachment for 5224 and 5225 Printers
- A Cross Partition Supervisor
- An Unmapped Storage Manager
- Unmapped Storage Overlay Support
- An Improved Text Editor
- Job Queue Processing
- A Message Data Set Facility
- Additional EDL Instructions
- Enhanced Timer Support Facilities
- ACCA and EXIO Trace Facilities
- Reduced Initialization Storage Requirements
- Selective Mapping of System Common Areas
- Redistribution of Production and Programming Development Utilities

**DESCRIPTION**

**Support for the 4956 Processor:** EDX support for the 4956 Processor allows up to 1,024K bytes of storage to be supported in the following manner; the first 512K bytes is supported as mapped storage with the remaining 512K bytes supported as unmapped storage by the Unmapped Storage Manager. EDX will also provide support for the floating-point feature and integrated clock/comparator.

**Support for the 4967 Disk Subsystem:** EDX supports the larger storage of the 4967 Disk Unit without change to existing EDX application programs. The cache facility on the 4967 attachment card is transparent to user applications.

**Support for the 4968 Autoload Tape Unit:** EDX supports the 4968 Tape Unit in a manner compatible with the 4969 Tape Unit support. In addition, support is provided to use the 4968 Tape Unit as a DUMP/RESTORE device. This can be accomplished in data streaming mode at 3200 bpi running at 50 inches per second or using standard 1600 bpi mode. The 4968 Tape support requires a processor with a minimum of 128K bytes of storage.

**Support for the 5640 Printer Attachment for 5224 and 5225 Printers :** EDX supports the 5224 and 5225 Printers in a manner compatible with the 4975 Printer. These printers are attached through the 5640 Attachment feature. Data stream mode of operation will be allowed from a user application.

**Cross-Partition Supervisor:** A Cross-Partition Supervisor architecture allows EDX supervisor modules to be assigned to any address space. Device control blocks continue to reside in partition 1 with their first level interrupt handlers.

This greatly increases the ability of EDX to support the attachment of more physical Input/Output devices such as terminals and printers. Initial functions supported by the cross partition supervisor are:

- Bisynchronous Access Method Support
- Floating-Point Services
- Queue I/O
- Sensor I/O

Terminal I/O  
Printer Spooler

**Unmapped Storage Manager:** The Unmapped Storage Manager provides a technique to access unmapped storage. Unmapped storage is storage that the supervisor has not reserved for system common areas, or that the user has not reserved at system generation time. New EDL instructions will be available to the application programmer to manage the unmapped storage area.

- The GETSTG instruction is used to acquire exclusive use of a storage area
- The FREESTG instruction is used to release a previously acquired storage area
- The SWAP instruction is used to exchange addressability between storage areas
- The STORBLK is a non-executable statement that builds a storage management control block

**Unmapped Storage Overlay Support:** The EDX Linkage Editor is enhanced to support unmapped storage as a cache storage area for user-defined high performance overlay execution versus standard disk overlay management. With the exception of a new 'storage' command for the linkage editor overlay structure, the management of unmapped storage overlays is transparent to the user. A slightly larger overlay manager is used instead of the standard disk overlay manager.

**Improved Text Editor:** The \$FSEDIT Text Editor has been enhanced to provide the following additional functions:

- New line commands to manage data set access
- Set up to 10 tab stops (4978 only)
- Shift 2 spaces right/left
- Move command word 2 spaces right/left
- Masks for inserting lines
- Flagged changed lines
- Automatic COBOL line numbering

The improved text editor makes user of larger buffers to execute most functions with better performance than the previous \$FSEDIT Text Editor.

**Job Queue Processing:** The Job Queue Processor allows the submission of 'jobs' for future execution within an EDX system, while allowing the continuation of other processing. A 'job' is the execution of a \$JOBUTIL command stream. A job can be submitted from a terminal and that terminal used interactively for other work. Additionally, a program can submit a job and resume execution without further consideration for that job. Jobs are executed by the Job Queue Processor independently of the submission facility (interactive or program) chosen.

**Message Data Set Facility:** The Message Data Set support provides an interface for acquisition, formatting, and presentation of data set resident message text. This eliminates the static storage required for message text in executable programs.

A disk message utility is provided to format source messages into forms suitable for use with the system message handler. Optionally, the messages can be generated into a storage resident format which can be linked with an application program. This latter facility is implemented for most of the Event Driven Executive Utilities.

**EDL Instructions:** Some instructions in the EDL language are enhanced to extend logical decision processing. The 'IF' instruction now can do a logical compare on EQ, NE, GT, LT, GE, or LE.

Test bit operators have been added to the 'IF', 'DO-WHILE' and 'DO-UNTIL' instruction constructs to help the EDL application programmer perform bit manipulation. In addition, a companion 'SETBIT' instruction has been added to the EDL language.

**Enhanced Timer Support Facilities:** STIMER support is extended to provide a WAIT with timeout capability. This can be used with terminal input statements to provide more efficient management of system resources. A terminal no longer needs to be tied up indefinitely while waiting for a response. This facility can also be used to allow application programs a timeout facility while waiting for other resource events.

**ACCA and EXIO Trace Facilities:** New facilities have been added to EDX to support the analysis of communications messages to and from ACCA and EXIO devices attached to the system.

**Reduced Initialization Storage Requirements:** EDX Supervisors that are built using the overlay initialization feature require less than 7K bytes of storage for initialization for a reduction of approximately 1K bytes from EDX Version 3.

**Selective Mapping of System Common Areas:** The user can specify at system generation time which selected address spaces that the system common areas will be mapped across. The selected address spaces need not be contiguous.

PROGRAM PRODUCTS

Series/1 Event Driven Executive V4 (cont'd)

**Redistribution of Production and Program Development Utilities:** The utilities, previously packaged as a separate licensed program product have been distributed based on function (production versus program development) into the Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS4) or the IBM Event Driven Executive Program Preparation.

**System Services:** In addition to the above support, the Event Driven Executive provides operating system services and communications support for the following:

- Program Management
- Multi-Tasking Management
- Storage Management
- Queue Management
- Timer and Time/Date Management
- Data Management
- Error Logging and Recovery Management
- Operations Interface
- General Device Support

The Event Driven Executive supports the 4952, 4954, 4955, and 4956 Processors when the systems have at least 48K bytes of storage. The following options are also supported:

- #3920 Floating Point feature (4955 only)
- #3925 Floating Point feature (4954 and 4956)

In addition, multiples of the following devices and features are supported:

- 3101 Terminals
- 4978 and 4979 Display Stations
- 4962, 4963, or 4967 Disk Units
- 4964, 4965, 4966 Diskette Units
- 4973, 4974, 4975, 5224, 5225 Printers
- 4968 and 4969 Magnetic Tape Units
- 4982 Sensor I/O Units
- #1310 Multi-Function Attachment
- #1560 Integrated Digital I/O
- #1610 Asynchronous Communications Single-Line Control to 9600 bps
- #2074 Binary Synchronous Communications Single-Line Control to 9600 bps
- #2075 Binary Synchronous Communications Single-Line Control to 56K bps
- #2091/2092 Asynchronous Communications Multi-Line Control
- #2093/2094 Binary Synchronous Communications Multi-Line Control
- #2095/2096 feature Programmable Control
- #7840 Timers
- #7850 Teletypewriter Attachment
- RPOs (Multiples)
- DO2118 GPIB Attachment
- DO2241 and DO2242 Series/1-to-Series/1 Attachment

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of these licensed programs.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for these licensed programs when it is operated in the following environments.

**HARDWARE REQUIREMENTS**

The minimum system requirement for program execution as a multitasking system is:

- IBM 4952, 4954, 4955, or 4956 Processor with 48K bytes of storage.
- IBM 4964, 4965, or 4966 Diskette Units as IPL source.
- Application requirements may expand the system beyond the minimum requirement. Floating-point calculations require floating-point feature #3925 on an IBM 4954 or 4956 Processor, #3920 on a 4955 Processor.

For native program preparation, assembly, and installation:

- IBM 4952, 4954, 4955, or 4956 Processor with 96K bytes of storage.
- IBM 4962, 4963, or 4967 Disk Unit
- IBM 4964, 4965, or 4966 Diskette Unit
- IBM 4973, 4974, 4975, 5224, or 5225 Printer (optional)
- IBM 3101, 4978, or 4979 Display Stations or
- Teletypewriter Adapter (#7850) with teletypewriter

**Device Address Assignments:** The EDX system as distributed from PID supports the minimum system configuration for installation and must have the following standard address assignments. Other address assignments or options are supported after completion of a system generation.

Description	Decimal Address	Hexadecimal Address
IBM 3101 Display Terminal (Reference *1, *2, *3)		
IBM 4962 Disk Unit	02	02
IBM 4963 Disk Subsystem	72	48
IBM 4967 Disk Subsystem	72	48
IBM diskette drive available in		
IBM 4964 Diskette Drive	02	02
IBM 4965 Diskette Drive and I/O Expansion Unit	68	44
IBM 4966 Diskette Magazine	34	22
IBM 4973 Printer	33	21
IBM 4974 Printer	01	01
IBM 4975 Printer (3)		
IBM 4978 Display Station	36	24
IBM 4979 Display Station	04	04
#1310 Multi-Function Attachment (3)	88	58
#1610 Async. Comm. Control (2)	08	08
#2091/92 Async. Comm. Multi-line Control (2)	104	68
#2095/96 Feature Programmable Comm. (2)	96	60
#7850 Teletypewriter Attachment (1)	00	00

- (1) Supports 3101 models 10, 12, 13, 20, 22, 23 in character mode
- (2) Supports 3101 models 20, 22, 23, in block mode (1200 bps for starter system only)
- (3) Multi-Function Attachment (#1310) supports:
  - 3101 model 23 (EIA RS-422A interface) 89 59
  - 4975 model 01L 90 5A
  - 4975 model 02L 91 5B

**SOFTWARE REQUIREMENTS**

**Program Prerequisites:** For application and installation of PID distributed material, the Event Driven Executive licensed programs are used in the following ways:

- For native program preparation and assembly, two licensed programs (5719-XS4 and 5719-XX5) are prerequisites. If the Series/1 instruction set is used, the Macro Assembler (5719-ASA) and the Macro Library (5719-LM8) are used in lieu of the Program Preparation Facility (5719-XX5).
- For host preparation of application programs the following programs are required:

On the host

- Event Driven Executive Macro Library/Host Version 4 (5740-LM5)
- System/370 Program Preparation Facility for Series/1 FDP (5799-NNQ)
- System/370 Event Driven Executive Host Communications Facility IUP (5799-PGH) (optional)

On the Series/1

- Event Driven Executive Supervisor and Emulator, Version 4 (5719-XS4)
- For program execution, the Event Driven Executive Supervisor and Emulator is a prerequisite.

**COMPATIBILITY**

Data volumes and data sets generated by Version 3 can be processed by Version 4 without change.

Data volumes and data sets generated prior to Version 3 are not compatible. These files must be re-installed prior to processing in the Version 4 environment. Conversion utilities (\$MIGRID, \$MIGCOPY, and \$MIGRATE) are provided to convert the data files.

**Programs:** Application programs generated to operate in the Version 3 environment are load module compatible with Version 4 provided they are coded with only the documented interfaces of the *Language Reference Manual*, *Installation and Systems Generation Guide*, and *Communications Guide*.

Application programs generated prior to Version 3 must be recompiled or re-assembled with Version 4 program preparation programs in order to execute in the Version 4 environment.

**Licensed Programs:** The following IBM Series/1 licensed programs are compatible to operate in the EDX Version 4 environment. Consult your



## PROGRAM PRODUCTS

**Series/1 Event Driven Executive V4 (cont'd)**

ordering information for specific feature order codes pertaining to compatibility.

- Indexed Access Method Version 2 5719-AM4
- Macro Assembler 5719-ASA
- COBOL Compiler and Resident Library Version 2 5719-CB5
- COBOL Transient Library Version 2 5719-CB6
- System/370 Channel Attach 5719-CX1
- FORTRAN IV Compiler and Object Support Library 5719-FO2
- Multiple Terminal Manager Version 2 5719-MS2
- Mathematical and Functional Subroutine Library 5719-LM3
- PL/1 Compiler and Resident Library 5719-PL5
- PL/1 Transient Library 5719-PL6
- Sort/Merge 5719-SM2
- Systems Network Architecture 5719-SX1
- Systems Network Architecture RJE 5719-SX2
- Query 5719-XR1
- Remote Manager 5719-RM1
- Advanced Remote Job Entry 5719-RJ1

In order to provide customers with planning information, IBM will include Communications Facility (CF) support under EDX Version 4 in a future release of CF. This support will be available by the fourth quarter of 1983.

**SECURITY, AUDITABILITY, AND CONTROL**

User management is responsible for evaluating, selecting, applying, and implementing any security and auditability features for the appropriate administration and application controls.

For applications in which sensitive data is sent over external communications facilities, user management may wish to augment those facilities with the application of cryptography.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Licensed Program Specifications ... IBM Series/1 Event Driven Executive Installation and System Generation Guide ... IBM Series/1 Event Driven Executive Language Reference ... IBM Series/1 Event Driven Executive Library Guide and Common Index ... IBM Series/1 Event Driven Executive Communications Guide ... IBM Series/1 Event Driven Executive Operator Command and Utilities Reference ... IBM Series/1 Event Driven Executive Messages and Codes*

**RPOs ACCEPTED: Yes**

PROGRAM PRODUCTS

**EVENT DRIVEN EXECUTIVE  
MULTIPLE TERMINAL MANAGER (5719-MS1)**

**PURPOSE**

The IBM Series/1 Event Driven Executive Multiple Terminal Manager provides facilities designed to simplify the design and implementation of transaction-oriented application programs written in COBOL, FORTRAN, PL/I or Event Driven Language (EDL). These applications execute in an interactive environment, where one or more application programs run concurrently with one or more display devices. Programs using predefined screen formats may be used for such applications as order entry, inventory file update, and inquiry. Full screen support for the 4978, 4979 and 3101 (models 2X in block mode) includes:

- Write protected data
- Write variable data
- Read unprotected data from screen
- Cursor positioning
- Sound tone alarm (4978 and 3101 only)
- PF key support for invoking programs

Using the Event Driven Executive \$IMAGE utility, users can interactively design screen formats on a 4978 or 4979 and then store them into a disk data set which can be referenced by Multiple Terminal Manager application programs. Screen design for the 3101, using \$IMAGE, must be performed on a 4978 or 4979. No support for the execution of \$IMAGE on a 3101 is provided.

**HIGHLIGHTS**

- Productivity tool enhancing the implementation of transaction-oriented applications
- Applies to application-driven inquiry, file update, and data entry type applications
- Function available via call interface from COBOL, FORTRAN, PL/I or EDL
- Full screen formatted access
- Efficient storage usage
- Multiple terminals
- Access via call interface to:
  - Indexed data files
  - Direct data files
  - Retrieve screen
  - Write screen
  - Read screen
  - Link to named programs
  - Set cursor
  - Audible alarms (4978 and 3101 only)
  - Call menu
  - Describe input fields of current screen
- Operator interface support for:
  - Programs report
  - Screens report
  - Terminal activity report
  - Disconnect a terminal
  - Reconnect a terminal
  - Sign-on (optional)
  - Data entry (application driven)

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

- IBM 4952 or 4955 Processor with 96K bytes of storage
- IBM 4962 Disk Storage Unit or 4963 Disk Subsystem
- IBM 4964 Diskette Unit or 4966 Diskette Magazine Unit
- IBM 4973 Line Printer or 4974 Printer
- IBM 4978 or 4979 Display Station
  - or
  - IBM 3101 Display Terminal model 20, 22 or 23\* in block mode
    - Attached by means of feature #1610, #2091/#2092 or #2095/#2096
    - \* (Model 23 RS-422 attachment capability not supported.)
  - or
  - IBM 3101 Display Terminal in character mode (or an equivalent ASCII Device).

The Multiple Terminal Manager requires a minimum of 15K bytes to support four 4978/4979 Display Stations (19.5K bytes would be required to support four model 2X 3101 Display Terminals in block mode). This minimum is in addition to that storage required for the user's application programs, Indexed Access Method support, and the Event Driven Executive supervisor and its required device support programs and control blocks. There must also be sufficient disk space available for work areas and sufficient diskette or disk space available for user data sets.

**SOFTWARE REQUIREMENTS**

The Multiple Terminal Manager (5719-MS1) requires the current version/modification levels of the following licensed programs:

- Event Driven Executive Basic Supervisor and Emulator Version 1 or 2 (5719-XS1 or 5719-XS2)
- Event Driven Executive Utilities Version 1 or 2 (5719-UT3 or 5719-UT4)
- Event Driven Executive Program Preparation Facility Version 1 or 2 (5719-XX2 or 5719-XX3)

The Utilities and Program Preparation Facility are required only for preparation and installation of Multiple Terminal Manager application programs, and are not required for execution.

**Additional Licensed Programs**

The current version/modification levels of the following Series/1 Event Driven Executive licensed programs are compatible with the Multiple Terminal Manager (5719-MS1):

- Indexed Access Method (5719-AM3)
- Macro Assembler (5719-ASA)
- Macro Library Version 1 or 2 (5719-LM5 or LM6)
- COBOL Compiler and Resident Library (5719-CB3) and Transient Library (5719-CB4)
- FORTRAN IV Compiler and Object Support Library (5719-FO2)
- Mathematical and Functional Subroutine Library (5719-LM3)
- PL/I Compiler and Resident Library (5719-PL5) and Transient Library (5719-PL6)—requires Version 1.1 or later of the Multiple Terminal Manager

The following licensed programs are required to assemble Multiple Terminal Manager application programs on a host system:

- System/370 Program Preparation Facilities for Series/1 FDP (5798-NNQ)
- Series/1 Event Driven Executive Macro Library/Host Version 1 or 2 (5740-LM2 or 5740-LM3)

For compatibility statements between the Event Driven Executive versions and other licensed programs listed above, refer to the respective program.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Reference Summary (SX34-0101) ... IBM Series/1 Event Driven Executive System Guide (SC34-0312) ... IBM Series/1 Event Driven Executive Communications and Terminal Applications Guide (SC34-0316) ... IBM Series/1 Event Driven Executive Language Reference (SC34-0314) ... IBM Series/1 Event Driven Executive Utilities, Operator Commands, Program Preparation, Messages and Codes (SC34-0313) ... IBM Series/1 Event Driven Executive Multiple Terminal Manager Licensed Programming Specifications (GC34-0346).*

**TERMS and CONDITIONS:** See PP Index

## EVENT DRIVEN EXECUTIVE MULTIPLE TERMINAL MANAGER VERSION 2 5719-MS2

The IBM Series/1 Event Driven Executive (EDX) Multiple Terminal Manager Version 2 (5719-MS2) is a licensed program which operates under control of the Series/1 Event Driven Executive Basic Supervisor and Emulator Version 3.2 (5719-XS3). Version 2 includes all functions and facilities contained in Version 1 of the Multiple Terminal Manager (5719-MS1), and includes the following new and enhanced capabilities:

- 3101 Display Terminal Support
- Screen Support
- Utility Functions
- Additional IBM Products Supported
- Installation and Tailoring Aids
- Communications Facility Bridge
- 3101 Buffered Server
- Source Code Availability

### HIGHLIGHTS

#### 3101 Display Terminal Support

Current Multiple Terminal Manager support for 3101 models 20, 22 and 23 in block mode, is extended to utilize the block mode transmission and field control functions provided for the 3101 in EDX Version 3. This will allow specification of field control attributes for functions such as the highlighting or blinking of selected display fields when utilizing data stream formats built for the 3101.

#### Screen Support

New support routines provide the following functions, through a CALL interface:

- Blink cursor (4978 or block mode 3101 only)
- Return cursor position

#### Utility Functions

New utility functions to allow the user to:

- Dynamically add/update programs or screen formats without restarting the Multiple Terminal Manager.
- Reconnect a terminal not currently attached to the Multiple Terminal Manager from that same terminal.
- Alter the Multiple Terminal Manager log device to other than the \$SYSPRTR device.
- Execute EDX Utilities on Multiple Terminal Manager terminals.
- As development aids
  - Interactively request any FILEIO operation and display the results.
  - Determine at a display what interrupt codes are generated by each function key on a display.
  - Display a field definition table (FTAB) of any screen.

#### Additional IBM Products Supported

The Multiple Terminal Manager supports each of the following IBM products as a teletypewriter:

- IBM Personal Computer with the Asynchronous Communications Adapter and utilizing the Asynchronous Communications Support licensed program or appropriate user programming.
- System/23 Datamaster with the Communications Adapter Feature and utilizing the Asynchronous Communications licensed program.
- Displaywriter System with a Communications Adapter and utilizing the Asynchronous Communications licensed program.

The Multiple Terminal Manager supports these products via the asynchronous communications attachments #1610 and #2091/#2092 in point-to-point nonswitched connections.

#### Installation and Tailoring Aids

Version 2 includes new aids which will assist the user when installing and tailoring the Multiple Terminal Manager environment.

#### Communications Facility Bridge

This support allows Multiple Terminal Manager application programs to use the message routing capabilities of Communications Facility to send and receive messages.

#### 3101 Buffered Server

An optional buffered terminal server is available for 3101 display terminals in block mode.

#### Source Code Availability

Source code in the form of machine-readable material is available.

### CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specific operating environment:

#### HARDWARE REQUIREMENTS

The minimum system requirements for the IBM Series/1 Event Driven Executive Multiple Terminal Manager (5719-MS2) are as follows:

- Any IBM Series/1 Processor with 96K bytes of storage
- IBM 4962 Disk Storage Unit or IBM 4963 Disk Subsystem
- IBM 4964 Diskette Unit or IBM 4965 Diskette Drive and I/O Expansion Unit or IBM 4966 Diskette Magazine Unit
- IBM 4973 Line Printer or IBM 4974 Printer or 4975 Printer
- IBM 4978 Display Station  
or  
IBM 4979 Display Station  
or  
IBM 3101 Display Terminal\*  
or  
Teletypewriter (or equivalent)

\* See EDX Version 3 (5719-XS3) for attachment methods supported.

The Multiple Terminal Manager requires a minimum of 16.5K bytes to support four 4978/4979 Display Stations (19K bytes would be required to support four 3101 Display Terminals, model 20, 22, or 23, in block mode). This minimum is in addition to that storage required for the user's application programs and other licensed programs, and the Event Driven Executive supervisor and its required device support programs and control blocks.

#### SOFTWARE REQUIREMENTS

Version 2 of the Multiple Terminal Manager requires the following licensed programs:

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Version 3.2 (5719-XS3)
- IBM Series/1 Event Driven Executive Utilities Version 3.2 (5719-UT5)
- IBM Series/1 Event Driven Executive Program Preparation Facility Version 3.2 (5719-XX4)

The Utilities and Program Preparation Facility are required only for the preparation and installation of Multiple Terminal Manager application programs. They are not required for execution.

#### Additional Licensed Programs

The following Series/1 Event Driven Executive licensed programs are compatible with this licensed program:

- IBM Series/1 Indexed Access Method (5719-AM3)
- IBM Series/1 Macro Assembler (5719-ASA)
- IBM Series/1 Macro Library Version 3 (5719-LM7)
- IBM Series/1 Communications Facility (5719-CF1)
- IBM Series/1 Query (5719-XR1)
- IBM Series/1 COBOL Compiler and Resident Library (5719-CB3, 5719-CB5) and COBOL Transient Library (5719-CB4, 5719-CB6)
- IBM Series/1 FORTRAN IV Compiler and Object Support Library (5719-F02)
- IBM Series/1 Mathematical and Functional Subroutine Library (5719-LM3)
- IBM Series/1 PL/I Compiler and Resident Library (5719-PL5) and PL/I Transient Library (5719-PL6)
- IBM Series/1 Event Driven Executive Macro Library/Host Version 3 (5740-LM4)
- IBM System/370 Program Preparation Facilities for Series/1 FDP (5798-NNQ)
- IBM System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH) [optional]



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PP 5719-MS2.2

May 83

Major Revision

PROGRAM PRODUCTS

**EDX Multiple Terminal Manager V2 (cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Version 3 Planning Guide (GC34-0378) ... IBM Series/1 Event Driven Executive Commercial Applications Development Guide (SC34-0381) ... IBM Series/1 Event Driven Executive Multiple Terminal Manager Version 2 Internal Design (LY34-0213) ... IBM Series/1 Event Driven Executive Multiple Terminal Manager Version 2 Licensed Program Specifications (GC34-1700)*

**TERMS and CONDITIONS:** See PP Index

**SERIES/1 REALTIME PROGRAMMING SYSTEM  
MULTIPLE TERMINAL MANAGER VERSION 3  
5719-MT1**

**PURPOSE**

The Series/1 Multiple Terminal Manager Version 3 licensed program contains changes to support the functions offered in the Series/1 Realtime Programming System Version 6.

**HIGHLIGHTS**

- Compatibility with the Realtime Programming System Version 6 Multiprocessing feature.
- 3101 dynamic terminal support extended.
- Increased Multiple Terminal Manager Version 3 partition space available to pass-through users.

**DESCRIPTION**

**Compatibility with the Realtime Programming System Version 6 Multiprocessing Feature:** This maintenance release is required for compatibility with the Multiprocessing feature.

**3101 Dynamic Terminal Support Extended:** The 3101 dynamic terminal support has been extended to allow switching between Series/1 subsystems (if the set-up switches are modified by the user), when connected via the #1310 Multifunction Attachment or the #2095/#2096 feature Programmable Attachment, or the D02350 RPQ Asynchronous Direct 8-line Adapter.

**Increased Multiple Terminal Manager Version 3 Partition Space Available to Pass-Through Users:** The Logical Unit Type 2 support which previously occupied Multiple Terminal Manager Version 3 partition space, has been moved to secondary storage. This leaves more space available in the Multiple Terminal Manager Version 3 partition for SNA users. This extra space makes support of larger application programs or more terminals possible.

**Hardware Supported**

- 4952, 4955 and 4956 Processor (192K bytes of storage minimum)
- 4962 Disk Storage Unit
- 4963 Disk Subsystem
- 4964 Diskette Unit
- 4965 Diskette Drive and I/O Expansion Unit
- 4966 Diskette Magazine Unit
- 4973 Line Printer
- 4974 Printer
- 4975 Printer
- Display Stations and Terminal Devices

**Formatted:**

- 3101 Display Terminal (block and character mode)
- 3270 Information Display System
- 4978 Display Station
- 4979 Display Station

**Unformatted:**

- 3101 Display Terminal (character mode) or equivalent ASCII device

- **Communications**
  - Binary Synchronous Communications Single-Line Control (#2074)
  - Binary Synchronous Communications Single-Line Control/High-Speed (#2075)
  - Binary Synchronous Communications 8-Line Control/4-Line Adapter (#2093/#2094)
  - Asynchronous Communications Single-Line Control (#1610)
  - Asynchronous Communications 8-Line Control/4-Line Adapter (#2091/#2092)
  - Multifunction Attachment (#1310)
  - Feature-Programmable 8-Line Communications Control/4-Line Communications Adapter (#2095/#2096)
  - Asynchronous Direct 8-Line RS-422-A Adapter (#2095/D02350)
  - SDLC Single-Line Control (#2090)
  - Teletypewriter Attachment (#7850)
- The Multiple Terminal Manager supports each of the following IBM products as a teletypewriter:
  - IBM Personal Computer with the Asynchronous Communications Adapter and utilizing the Asynchronous Communications Support licensed program or appropriate user programming.
  - System/23 Datamaster with the Communications Adapter feature and utilizing the Asynchronous Communications licensed program.
  - 6580 Displaywriter with a Communications Adapter and utilizing the Asynchronous Communications licensed program.

**Terminal and Performance Considerations**

The number of terminals that can be supported by the Multiple Terminal Manager is dependent upon storage availability, terminal type(s) selected and performance requirements of the user's applications. Performance is dependent upon many factors; for example, the system hardware configuration, Realtime Programming System generation options selected, application program design, how often programs must access the terminals, etc. Analysis is required to evaluate expected performance.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified environment:

**HARDWARE REQUIREMENTS**

- IBM Series/1 Processor and I/O devices as required by the IBM Series/1 Realtime Programming System Version 5 (5719-PC5) or Version 6.

**SOFTWARE REQUIREMENTS**

Version 3 requires the current release of the following IBM Series/1 licensed programs:

- Realtime Programming System Version 5 (5719-PC5) or Version 6.
- Program Preparation Subsystem Version 5 (5719-AS5) or Version 6 (5719-PC6) is required for the preparation of user applications.

For certain environments and functions, the following Series/1 Realtime Programming System licensed programs may be required:

- Indexed Access Method Version 2 (5719-AM2)
- FORTRAN IV Compiler and Object Support Library (5719-FO2) and Realtime Subroutine Library (5719-FO4)
- Mathematical and Functional Subroutine Library Version 2 (5719-LM2)
- COBOL Compiler and Resident Library Version 2 (5719-CB7) and Transient Library Version 2 (5719-CB8)
- PL/I Compiler and Resident Library Version 2 (5719-PL2) and Transient Library Version 2 (5719-PL4)
- Realtime Programming System Query (5719-XR2)
- IBM Series/1 PASCAL Compiler and Object Library Programming RPQ P82659 (5799-TEQ).

See the terms and conditions which apply to the above licensed programs. Some are licensed on development machines only.

**COMPATIBILITY**

This licensed program is compatible with the licensed programs which are identified in the "Specified Operating Environment".

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System Multiple Terminal Manager Version 3 Licensed Program Specifications (GC34-0456) ... IBM Series/1 Realtime Programming System Multiple Terminal Manager Version 3 User's Guide (SC34-0455)*



**BASE PROGRAM PREPARATION FACILITIES  
5719-PA1****PURPOSE**

The IBM Series/1 Base Program Preparation Facilities licensed program is a set of standalone programs that aid in the preparation of programs for execution on the IBM Series/1. The licensed program consists of a Text Editor, a Macro Assembler, and a Linkage Editor. Each program is loaded separately and executes through prompts from the program with responses from the operator.

**HIGHLIGHTS**

- Provides the programming preparation facilities to develop and maintain specialized software systems and applications.
- Standalone program preparation on Series/1.
- Distributed from PID on Diskettes.

**Text Editor**

The Text Editor is a standalone program that creates and modifies source modules, which can then be used as input to the Macro Assembler. The Text Editor is used as an interactive tool for editing text modules. Commands are entered at the operator station with response by the Text Editor. Prompts from the Text Editor are responded to by the operator. Through this interactive process, assembler source modules or other text modules are created and modified. The output module is stored on a diskette.

- Source data is entered from the operator station.
- A variety of commands enable the user to create, display, and modify source modules.
- Source modules are retrieved from and stored on diskette.

**Macro Assembler**

The Macro Assembler is a standalone program that processes the machine, assembler, and macro instructions coded in Assembler language. Using the assembler language program, along with information entered at the operator station, the Macro Assembler produces a machine language object module, which is placed on disk. In addition, the Macro Assembler prepares listings and supplies information needed by the Linkage Editor.

Macros are coded in line or are in the users macro library stored on disk.

- Symbolic source statements entered from diskette.
- Mnemonic symbols for machine operations.
- Output modules are stored on disk along with information for linkage editing module relocation and external symbol resolution.
- Output to printer includes source program listing, external symbol dictionary, relocation dictionary, cross-reference table and error messages.

**Linkage Editor**

The Linkage Editor is a standalone program that processes one or more object modules produced by the Macro Assembler. Using these object modules, along with information entered at the operator station, the Linkage Editor (1) links the object modules, (2) resolves external references by searching the Object Module Library, (3) relocates all addresses to absolute addresses, and (4) prepares diagnostic and storage map listings. The result is an executable load module, which is placed on disk.

- Combines and links object modules into a single storage load.
- Prepares diagnostic and storage map listings.

**Standalone Programs**

The Series/1 Base Program Preparation Facilities are used to create standalone application programs. Program loading is performed with the IPL Bootstrap/Loader Disk Utility.

Standalone programs are coded entirely by the user with no dependence on other programming support.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

<b>Processor</b>	IBM 4953 Processor (32K bytes minimum) or IBM 4955 Processor (32K bytes minimum)
<b>Disk/ Diskette</b>	1 - IBM 4962 model 2 or 2F Disk Storage Unit (Combination disk/diskette unit) or 1 - IBM 4962 model 1 or 1F Disk Storage Unit and 1 - IBM 4964 Diskette Unit. (Work files can optionally be assigned to a second or third disk if available to improve performance.)

<b>Printer</b>	1 - IBM 4974 Printer
<b>Operator Station</b>	1 - Teletypewriter Adapter #7850 with Teletype® Models ASR 33/35 or an ASCII equivalent device.

**SOFTWARE REQUIREMENTS**

Standalone Disk Utilities (5719-SC2).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Base Program Preparation Facilities Licensed Program Specifications (GC34-0091) ... IBM Series/1 Base Program Preparation Facilities User's Guide (SC34-0072) ... IBM Series/1 Base Program Preparation Facilities Macro Assembler Programmer's Guide (SC34-0074) ... IBM Series/1 Base Program Preparation Facilities Macro Assembler Language Reference Summary (SX34-0076). ... IBM Series/1 Base Program Preparation Facilities Macro Assembler PLM (LY34-0075) ... IBM Series/1 Base Program Preparation Facilities PLM (LY34-0073).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**REALTIME PROGRAMMING SYSTEM VERSION 1  
5719-PC1**

**PURPOSE**

The IBM Series/1 Realtime Programming System Licensed Program provides operating system functions for realtime operations with optional batch program preparation. Realtime Programming System allows the generation of a multi-partition system as well as smaller configurations in a consistent and compatible manner. Realtime Programming System includes multitasking facilities, storage management, data management, system operator station support, timer support and communications facilities.

The Realtime Programming System supervisor, when combined with the Program Preparation Subsystem, allows Series/1 to operate in a realtime online preparation environment or, if realtime is not required, in a simple batch environment.

The Series/1 Realtime Programming System provides an operating system that has been optimized for predictable response, and rich function. The Series/1 Realtime Programming System addresses the needs of users who require realtime control functions.

**DESCRIPTION**

- Supervisory Services
  - Task Management
    - Primary and Secondary Tasks
    - Dynamic Task Control Block Management
    - Prioritization by Hardware Level, Software Sublevel
  - Storage Management
    - Fixed Partitions
    - Overlays from Disk
    - Buffer Pooling
  - Task Set Management
    - Rollout/Rollin
    - Chaining of Task Sets
    - Queuing of Task Sets to Partitions
    - Optional Binding at Task Set Install Time
    - Scheduling Task Set Execution
  - Event Management
    - WAIT/POST (Simple, Iterative, Multiple)
    - Wait on Timer
    - Wait on I/O
  - Queue Management
    - Priority Queues in Storage
    - FIFO Queues on Disk and in Storage
  - Timer Management
    - Time-of-Day, Date
    - Time Delay
    - Asynchronous Timers
  - Serially Reusable Resource Management
    - REQUEST/RELEASE
  - Interrupt Management
    - I/O Interrupts
    - Class Interrupts
  - Error Management
    - Error Logging and Reporting
    - Task Error Exits
    - Storage Dump
    - System Reload and Restart
    - System Termination
    - Abnormal Termination of a Task
  - Operator Interface
    - Command Processing
    - Message Processing
  - Floating Point Emulator Support
- Data Management
  - Data Set Management
    - Basic I/O Access (EXIO)
    - Physical Access (READ/WRITE)
    - Logical Access (GET/PUT)
    - Sequential and Direct Access Methods
    - Consecutive, Direct, and Partitioned Organization
    - OPEN/CLOSE
    - CREATE/DELETE/RENAME
    - NOTE/POINT
  - DPIO Support
    - 4962 Disk Storage Unit
    - 4964 Diskette Unit
    - 4979 Display Station
    - 4973 Line Printer
    - 4974 Printer
  - Special Feature #7850, Teletypewriter Adapter
  - Message Buffering for User-selected Output Devices

**Sensor I/O Support**

- Analog I/O (single or multiple point)
- Digital I/O (single or multiple point)
- Process Interrupt

**Communications Features Support**

- Asynchronous Communications Single-Line Control (#1610)
- Asynchronous Communications 8-Line Control (#2091)
- Asynchronous Communications 4-Line Adapter (#2092)
- Binary Synchronous Communications Single-Line Control (#2074)
- Binary Synchronous Communications Single-Line Control/High Speed (#2075)
- Binary Synchronous Communications 8-Line Control (#2093)
- Binary Synchronous Communications 4-Line Adapter (#2094)

**Communications Terminals and Systems Support**

**Via Start/Stop (asynchronous) Communications:**

- 2740 Communications Terminal, model 1, in point-to-point switched and point-to-point nonswitched connections. Record Checking (#6114), Dial Up (#3255), and Transmit Control (#8028) special features are supported.
- Teletype® Models ASR 33/35 Data Terminals in point-to-point nonswitched connections.

**Via Binary Synchronous Communications:**

- IBM System/370 using OS/VS1 or OS/VS2 (SVS or MVS) BTAM in point-to-point switched and point-to-point non-switched connections (Series/1 as System/3).

• Utility Package

**Standalone Utility Functions**

- Storage-Diskette Dump
- Disk Initialization
- System Build

**System Utility Functions**

- Compress (Partitioned Data Set or Volume)
- Copy
- Define (Create, Delete and Rename, Logical Volumes, Data Sets, Members)
- Initialize Diskette
- Prepare Diskette to IPL Standalone Dump
- Assign Realtime Programming System to be loaded by IPL Merge (PDS or Volumes)
- Patch
- Report (Print Disk/Diskette Directories, Disk/Diskette Data or Storage Dump)

• Service Aids

- I/O Trace
- Storage Patch and Dump
- SVC Trace

• Generation Facilities

• System Initialization

**HIGHLIGHTS**

• Storage Management and Task Set Management

Realtime Programming System supports multiple partitions. One partition (Number 0) is for the nucleus (System task set). Another partition may, at the user's option, contain a shared task set and be used as a shared partition containing data and other resources which may be used by programs in other partitions. The user may specify the number and sizes of the partitions at SYSGEN time and may alter his specifications at IPL time. Each partition must be a multiple of 2,048 bytes. Up to 12 user partitions (besides Partition 0) may be created until the total storage requirements reach the maximum 64K bytes. Programs executing in user partitions are organized into task sets. One task set at a time may occupy a user partition. One partition (selectable at SYSGEN or IPL time) may have a task set rolled out to disk to make way for a higher priority task set. A task set to be rolled out must have been specified to be rolltable at Application Build time. Only one task set at a time may be rolled out.

Task sets may use overlays from disk. Overlay areas may be shared between tasks only as serially reusable resources under user control.

A task set may chain to another task set which will replace it as the executing task set in the same partition. A partition GLOBAL area is maintained during this exchange, allowing several task sets to operate in sequence as a single logical operation using the same data. This facility supports the FORTRAN function "INVOKE" and the PL/I function "TRANSFER". Each task set has one primary task which executes following task set load. A buffer pooling

## Realtime Programming System V1 (cont'd)

facility allows reservation of a pool of storage in a task set for dynamic allocation of buffers to tasks on request.

### Supervisory Functions

#### • Task Management

Realtime Programming System is capable of supporting as many concurrent tasks as the user has processor storage (up to 64K) to execute the tasks. The user may have as many disk-resident programs as he can store on his disks. Tasks are dispatched in response to hardware interrupts, user requests from the system operator station, program requests, or timer services. Realtime Programming System supports the dispatching of independent tasks from other tasks.

Realtime Programming System provides up to 256 preemptive priority sub-levels within each of the four hardware levels. A task may be assigned to any level and sub-level. Multiple tasks may be assigned the same priority level. Several tasks can be simultaneously suspended on a level.

The programmer specifies whether a program is serially reusable, reentrant, refreshable, or non-reusable through the use of the program preparation facilities.

#### • Timer Services

Realtime Programming System manages all physical and logical timers. The system supports multiple logical timers per physical timer. Realtime Programming System requires a dedicated physical timer attachment for its own use in order to provide Time-of-Day and Date and logical timer services when required. No timers are required for batch-only systems running Program Preparation Subsystem. The other timers are available to the user as I/O devices through the READ/WRITE interface. The programmer is provided with a facility so that he may request his program to be suspended for a specified time interval or until a specified time.

The system provides a Time-of-Day Clock (TOD) and DATE. The DATE may be requested from the system in any of the following formats: Julian (YYDDD), MM DD YY and YY MM DD. The user is provided a facility for setting the DATE and TOD clock through the system operator station or from a program.

Scheduler services are provided the user so he may schedule a task set to execute on a periodic basis, at a particular time-of-day, or after a specified time interval. A facility is provided to add and delete task sets from the scheduler table on program request and from the system operator station.

#### • Interrupt Handler

An interrupt handler is provided for the initial handling of machine level interrupts and the dispatching of interrupt service routines. The programmer has the ability to assign task sets and events to specific bits within a process interrupt group through console or program request. Programs may dynamically connect and disconnect process interrupt bits. The programs dispatched may be storage-resident (a waiting task) or disk-resident (a task set to be queued). The user specifies the priority level at which the service task will execute.

The user is able to provide a program to be executed when the programmer console interrupt switch is depressed.

#### • Event Services

The programmer may define events and cause resumption of a suspended task upon the occurrence of an event. A Wait/Post facility is provided for the synchronization of tasks.

Events that are supported include I/O completion, timer, user-defined, and adding an element to a queue. The three event types supported are simple, iterative and multiple. A task may be suspended until a single event occurs or any of a list of events occurs.

#### • Floating Point Emulator

The Floating Point Emulator duplicates the execution of the floating point instructions when the Floating Point Processor is not attached to the system. The user specifies whether the emulator is to be resident or transient when the system is configured.

#### • Queuing Services

The user has the facility of defining storage and disk queues. These queues may be used for passing data from one task to another. The system provides for priority queues, while entries with the same priority are maintained on a FIFO basis. The user may add and remove entries from the queues. A copy queue entry facility is provided so entries may be added from a transient area. Provision is made for warm restart (queue elements retained) or cold restart (queue cleared) of disk queues after system shutdown. Queues may be "Public", that is, serviced by multiple tasks in a task set; or "Private", that is, serviced only by the task owning it.

#### • Resource Management

The system provides the user with a facility for management of serially reusable resources. Once the resource is freed from the current task, control is given to the highest priority task waiting on the resource.

#### • Command Language Processor

The functions supported through the system operator station using the command language are:

Execute a task set

Terminate a task set

Delete a task set from the partition queue(s)

Add and delete entries from the scheduler table, that is, task sets that will execute on TOD, on a periodic basis, after a time delay, etc.

Set and display TOD Clock and DATE

Put I/O devices online and offline

Devices may be reassigned by the operator in the event of a permanent I/O Error

Assign logical device numbers to physical device addresses

Define and Delete Error Logs

Mount and Demount 4964 Diskettes

Start and Stop the I/O Trace

Start and Stop the SVC Trace

Display up to 56 bytes of processor storage

Patch up to 20 bytes of processor storage

Make ABEND dump data set or member available for reuse

Set operating mode to Attended or Unattended

Reply to a WRITE-TO-CONSOLE message with an identifying number

Define partitions (as part of IPL sequence)

Activate support for physical devices (as part of IPL sequence)

A facility is provided so the user may select and add system operator station functions that he desires at SYSGEN

### Data Management Functions

#### • DPIO Support

Realtime Programming System Data Management provides the user with services which are described below:

#### • Device Service Routines

Device Service Routines are provided for supported devices. Character data conversion between EBCDIC and TTY ASCII is provided.

The system performs all physical I/O upon request by the user program. Realtime Programming System provides optional I/O timeout for systems with hardware timers with times dependent on the device type. The programmer is able to read into his program the programmer console data buffer upon request. The programmer also has the ability to write to the programmer console lights. The DPIO user-interface is either GET/PUT or READ/WRITE. For Sensor I/O it is READ/WRITE. There is also a third level of access (EXIO) which is primarily for device manipulation such as diagnostic programs perform. Data files may exist on either fixed disk or removable diskette.

The data set organizations supported for sectorized devices are:

Consecutive  
Random  
Partitioned

The user may add and update records to a consecutive DASD file. The user may have multiple data sets per volume. Multivolume files (diskettes only) are supported only for Basic Exchange Format Files. When using random data sets, the user may also access the records by relative record number.

The partitioned data set support is provided for user and system libraries. Realtime Programming System provides facilities for the creation, deletion, and maintenance of the partitioned data sets.

Realtime Programming System supports the fixed heads option in the 4962 Disk Storage Unit file to the extent that the user may place data sets under the fixed heads at his discretion.

Data sets may be shared among tasks in the system. Management of sensor I/O is supported to the extent described under Sensor I/O. DPIO may be shared among any tasks in the system.

## Realtime Programming System V1 (cont'd)

Management of shared I/O devices is the responsibility of the programmer. Management of disk message buffering is handled by Realtime Programming System.

The user has the option of accessing Series/1 I/O devices at the READ/WRITE, and GET/PUT level (sensor I/O at the READ/WRITE level only). The user is provided with device independence at the GET/PUT level. All hard copy devices logically support the ASA Control characters. This option allows the user to direct a print file to the disk or diskette for later printing. A write with read verify option may be a parameter on the OPEN macro only.

The record types supported are:

- Fixed
- Fixed Block
- Fixed Blocked Spanned
- Variable
- Variable Blocked
- Variable Blocked Spanned (Including Text Compression)

Data sets may be created and deleted via online system utility functions and from program requests (including the Program Preparation Subsystems).

Support of the 4964 diskettes:

- Provides users with a usable, removable programming medium
- Enhances data security, integrity, and privacy

The system user can copy via online system utility functions, a diskette volume to the fixed disk and utilize the stored data of the diskette as if it had always been on disk. When the user's operations are completed, a copy of the disk data may be transferred to diskette. The diskettes may contain multiple files, files may span multiple diskettes, and many diskettes/files may be copied to fixed disk at one time. The user will have the convenience and privacy that removable diskette modules provide him, while the system is able to utilize the speed and reliability offered by a fixed disk. The expiration date, which is a user option on diskettes, is honored by Realtime Programming System.

The user has the option to bind I/O devices and data sets during:

- A. Program Preparation
- B. Task Set Installation
- C. Execution (OPEN) Time

Options (A) and (B) provide the Realtime Programming System user with the ability to achieve higher performance by requiring a minimum number of disk reads to locate programs and data.

### • Sensor Input/Output

**Note:** Multiple points (AI, AO, DI, DO) may be accessed via one supervisor request.

Process Interrupt

As defined under Interrupt Handler.

Analog Input

Realtime Programming System supports Analog Input including the programmable gain amplifier, and the automatic zero correction option. The user has a choice of either sequential or random access at the READ/WRITE level. A single point can be handled under either of the access forms by specifying a count of one.

Analog Output

Realtime Programming System supports analog output including maintaining the present output value of each point. The user has a choice of either sequential or random access at the READ/WRITE level. A single point can be handled under either of the access forms by specifying a count of one.

Digital Input

Realtime Programming System supports sequential and random access at the READ/WRITE level. Logical groups may be defined as contiguous DI points in a physical group composed of 16 points. This allows the user to place DI points among different devices and/or programs. A single point or group can be handled under either of the access forms by specifying a count of one.

Digital Output

Realtime Programming System supports sequential and random access at the READ/WRITE level. Digital Output points may be defined in a logical group as in Digital Input above.

### • Communications Support

Communications support is an integral part of Realtime Programming System data management and is accessed via the Read/Write interface. The support directs the transfer of data between user programs and remote stations. A remote station may be either a supported start/stop terminal or another computer system via binary synchronous communications. Facilities are provided to:

- Establish, control, and terminate user program access to remote stations.
- Transfer data between user programs and remote stations on point-to-point lines (either switched or nonswitched).

The start/stop terminals supported are:

- 2740 Communications Terminal, model 1, in point-to-point switched and point-to-point nonswitched connections. Record checking, Dial Up, and Transmit Control Optional special features are supported.
- Teletype® Models ASR 33 and 35 Data Terminals or equivalent ASCII device in point-to-point nonswitched connections.

Binary Synchronous communications is supported to System/370s using OS/VS1 or OS/VS2 (SVS or MVS) BTAM in point-to-point switched and point-to-point nonswitched connections (Series/1 as System/3).

A function is provided (TRANSLTE macro) to facilitate code conversion between EBCDIC and commonly used line codes: ASCII, PTTC/EBCD, PTTC/BCD, PTTC/Correspondence, and 8-Level TWX Code.

For switched line processing, provision is made for connection via:

- Manual Call
- Manual Answer
- Auto Answer

ID exchange is supported for binary synchronous communications.

In normal operation with the 2740, or binary synchronous, the support will automatically include the proper line control (framing) characters. However, insertion and deletion of terminal control characters (carriage return, line feed, for example) are the responsibility of the user. Support for the Teletype® Models ASR 33 and 35 is limited to making and maintaining half-duplex line connection, transmitting user-furnished buffers on the line, receiving data from the line and filling user-furnished buffers, and recognizing user supplied change-of-direction character on receive as end of data. No Model ASR 33/35 features are supported. Features such as Echo Mode, Answer Back, Full-duplex, etc., must be supported through user programming.

### • Storage Protection

Realtime Programming System protects the Realtime Programming System supervisor and, optionally, both the Control Module and Protected Dynamic Storage with user task sets from all application programs. Realtime Programming System uses the Series/1 hardware to achieve this protection. The 4953 processor does not have hardware storage protection. Realtime Programming System systems running in the 4953 are not storage protected.

### • Message Buffering

Realtime Programming System provides a disk message buffering facility, supporting the following sequential output devices:

- Operator Station
- 4973 Line Printer
- 4974 Printer
- Communication Devices

Other devices may use the message buffering facility. The system will print a complete message before starting another message.

### Initial Program Load (IPL)

A capability is provided to IPL from the following devices:

- 4964 Diskette (IPL Standalone Utilities)
- 4962 (IPL Realtime Programming System)

After Realtime Programming System is loaded in the system, Realtime Programming System processes a user specified command data set which may be used to start user task sets or perform any valid operator command.

### Utilities

A set of utilities is provided for the proper installation and maintenance of application programs and data. Certain utilities may run concurrently with the user application programs and others run offline (that is, standalone - not concurrently with user programs or under Realtime Programming System).

## Realtime Programming System V1 (cont'd)

The standalone utilities are loaded from a 4964 diskette.

The following standalone utilities are provided:

### System Build

This utility prepares a disk device to IPL the Realtime Programming System starter system and execute Realtime Programming System online system utilities. System build is executed prior to system generation as part of the Realtime Programming System installation process and at other times to restore the Realtime Programming System starter system and Realtime Programming System online system utilities.

### Disk Initialization

This utility initializes the fixed disks. It performs surface analysis and allows alternate sector assignments.

### Storage-to-Diskette-Dump

This utility is used for APAR submission and dumps all of storage except for the area where the utility is loaded from the 4964 Diskette. This utility also dumps all the system's registers and status indicators. The online system REPORT utility may be used to obtain a printout of the dump on a hardcopy device. Additional dump diskettes may be created using the online system IPLMAINT utility.

### Diskette Initialization

This utility provides online initialization of diskettes.

### DEFINE/CREATE/BUILD/DELETE/RENAME Data Sets

These utilities perform the following functions:

- **DEFINE** - The function of defining a disk or diskette to be in Realtime Programming System format containing logical volumes.
- **CREATE** - The function of assigning space on sectorized devices including creation of logical volumes, partitioned data sets, consecutive or direct data sets, or members.
- **BUILD** - The function of building data set definitions in a task set library.
- **DELETE** - The function of deleting volumes, data sets, members, or data set definitions on sectorized devices including the management of TOCs and partitioned data set directories.
- **RENAME** - The function of renaming a volume, data set, or member, including the handling of TOCs and partitioned data set directories.

### COMPRESS

This utility performs the function of copying partitioned data sets or volumes in place on sectorized devices to consolidate all available free space within one contiguous area.

### PATCH DISK/DISKETTE

This utility provides the functions of applying permanent fixes to the DASD devices. Visual verification of the data to be replaced is provided before the user enters the new data.

### REPORT

This utility provides the ability to print data from the diskette and disk files to any of the Series/1 hard copy output devices. The user has the ability to print the file (or data set), TOCs, and partitioned data set directories. This utility also provides the ability to print a formatted dump of storage. The dump was previously taken either standalone or online.

### COPY

The COPY utility provides the function of doing either a selective or volume copy. The user has the ability to copy as follows:

From	To
Diskette, Disk	Diskette, Disk, Printer, Teletypewriter, Display

Selective copies allow the user to copy data sets, volumes, or members of data sets. Records may also be added to the end of a consecutive data set.

### MERGE

This utility provides the function of combining two partitioned data sets or volumes into a third partitioned data set or volume.

### IPLMAINT

This utility provides the functions to:

- Prepare a diskette to IPL the standalone storage-to-diskette dump utility, and
- Establish the system to be loaded from disk at IPL time.

## REALTIME PROGRAMMING SYSTEM RAS CHARACTERISTICS

Realtime Programming System provides a set of RAS facilities which are always included in the Realtime Programming System system. Additional facilities may be optionally included which result in an extensive set of RAS functions.

### Error Response

Detection of machine check or program check conditions, error logging and message generation are performed by supervisory functions in Realtime Programming System.

### System Recovery

Error Recovery Procedures provide the system with capability to continue operation if at all possible, in the case of software, hardware, and power failures. Task set and system restart and reloading are provided. If the system cannot continue normal execution, the system user is able to specify execution of a program which utilizes minimum system resources and can notify and prepare the external environment for the imminent loss of the system.

Failure of the disk module that contains the System task set does not cause total system failure or initiate a reload of the supervisor. In the event of disk failure, programs that do not require that disk module are able to continue operation. Disk service to other disk modules continues. However, the next request for a system transient, with the exception of error logging, may cause an abnormal termination of the system.

### Hardware Service Aids

Maintaining error logs is a means of assessing hardware and software reliability. By using hardware error recording to monitor the system, user personnel are made aware of marginally operating equipment. The type of intermittent failures of devices, channels, and CPU will be optionally recorded on a 4962 disk. The error logs are used by customer engineers and user personnel for diagnostic purposes. The user and the customer engineer are able to obtain dumps of disk recorded log areas.

Realtime Programming System provides the following functions:

- Routines to handle the occurrence of a machine check. These routines provide the option of returning control to a user routine after the check has been cleared and optionally logged. The system passes the pertinent error data to the user.
- Support of Automatic Restart after Power Failure. Upon power restoration, a user-specified load module is loaded.
- Support of Battery Backup Feature. Systems with the Battery Backup Feature and Timer Support notify the user of a power failure by dispatching a user-specified program. When the power is restored, Realtime Programming System dispatches a user-specified program and passes the duration of the power failure in minutes, seconds, and milliseconds. If the battery is exhausted, results will be the same as if the system does not have the Battery Backup Feature.
- In addition to the general purpose RAS aids, additional optional aids are provided for communications:
  - Communications Trace program which, when activated under user control, is designed to continuously record current communications activity in main storage. This facility works in conjunction with the general purpose I/O trace facility.
  - Communications Online Test is an optional facility which provides a means of testing attached 2740 model 1 terminals concurrent with user operation and determining proper operation of the communication link (lines and modems) as well as the terminal and system programming support.

### Device Support

The Realtime Programming System supports the 4953 and 4955 Processors, all of the following Series/1 standard I/O devices and the following processor options:

- Floating Point Processor
- Programmer's Console

Multiples of the following devices and features are supported.

4962	model 1, 1F, 2, and 2F	Disk
4964	model 1	Diskette
4974	model 1	Printer
4973	models 1 and 2	Line Printer
4982	model 1	Sensor I/O
4979	model 1	Display Station
4999	models 1 and 2	Battery Backup
#7840	-	Timer
#7850	-	Teletypewriter adapter (supported for use with Teletype® Models ASR 33/35)
#1560	-	Integrated DI/DO
#1610	-	Asynchronous Communications Single-Line Control
#2091	-	Asynchronous Communications 8-line Control



PROGRAM PRODUCTS

Realtime Programming System V1 (cont'd)

- #2092 - Asynchronous Communications 4-line Adapter
- #2074 - Binary Synchronous Communications Single-Line Control
- #2075 - Binary Synchronous Communications Single-Line Control/High Speed
- #2093 - Binary Synchronous Communications 8-line Control
- #2094 - Binary Synchronous Communications 4-line Adapter

TERMS and CONDITIONS: See PP Index

Note: Device and feature performance is dependent upon hardware configuration, Series/1 Realtime Programming System generation options, and application program design.

CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The minimum system after initially loading the disk, and when the application program executes without hard copy output, system console operations, and data interchange, is:

- Processor IBM 4953 or IBM 4955 Processor
- Storage 48K bytes
- Disk 1 - IBM 4962 model 1 or 1F Disk Storage Unit

The minimum hardware configuration to support System Generation is:

- Processor IBM 4953 or 4955 Processor
- Storage 48K bytes
- Disk/Diskette 1 - IBM 4962 model 2 or 2F Disk Storage Unit (Combination disk/diskette unit)  
or  
1 - IBM 4962 model 1 or 1F Disk Storage Unit  
and  
1 - IBM 4964 Diskette Unit
- Printer 1 - IBM 4973 Line Printer  
or  
1 - IBM 4974 Printer
- Operator Station 1 - IBM 4979 Display Station  
or  
1 - Teletypewriter Adapter #7850 with Teletype® Models ASR 33/35

The actual configuration required by the user depends on his application needs. In addition to the above hardware, the Communications Indicator Panel (#2000) is recommended for configurations which contain communications features.

Note: The configuration must have the following standard address assignments in order to satisfy the minimum system requirements. (The starter system supports the minimum system requirements.)

Description	Decimal Address
IBM 4962 Disk Unit	03
IBM 4964 Diskette	02
IBM 4973 Line Printer	33
IBM 4974 Printer	01
IBM 4979 Display Station	04
#7850 Teletypewriter Adapter	00

SOFTWARE REQUIREMENTS: None

DOCUMENTATION

(available from Mechanicsburg)

IBM Series/1 Realtime Programming System: Licensed Program Specifications (GC34-0101) ... IBM Series/1 Realtime Programming System: Introduction (GC34-0102) ... IBM Series/1 Realtime Programming System: Supervisor User's Guide (SC34-0103) ... IBM Series/1 Realtime Programming System: Data Management User's Guide (SC34-0104) ... IBM Series/1 Realtime Programming System: Communications User's Guide (SC34-0105) ... IBM Series/1 Realtime Programming System: Macro Reference (SC34-0106) ... IBM Series/1 Realtime Programming System: Operator Commands and Utilities (SC34-0107) ... IBM Series/1 Realtime Programming System: Messages and Codes (SC34-0109) ... IBM Series/1 Realtime Programming System: Generation and Installation Procedures (SC34-0110) ... IBM Series/1 Realtime Programming System: Problem Determination and Control Blocks (SC34-0111).



PROGRAM PRODUCTS

REALTIME PROGRAMMING SYSTEM VERSION 2  
5719-PC2

PURPOSE

The IBM Series/1 Realtime Programming System Version 2 (5719-PC2) Licensed Program provides all the facilities of the IBM Series/1 Realtime Programming System Version 1 (5719-PC1) Licensed Program plus the following additional features:

- System support for the IBM 4962 Disk Storage Unit models 3 and 4 with a capacity of 13,962,240 bytes.
- Storage Overlays: Storage above 64K can be used to enhance the performance of user task sets by allowing more user-written program segments to be resident in storage at one time.
  - Uses Overlay Manager provided by 5719-AS2, or equivalent.
  - Invoked by CALL statement.
  - Faster than disk overlay.
  - Reduces DASD load, compared to using disk overlays.
- Secondary storage (above 64K) assigned to partitions at SYSGEN with optional IPL override.
- Supports up to 128K of physical storage.
- Storage Overlays loaded at task set load time.
- Fully compatible with rollout/rollin capability.

DESCRIPTION

Debug Package

The interactive debug package provides a set of functions to assist in program debugging. These functions are invoked and controlled from the system console. The following functions are provided:

- Display/Modify Storage
- Display/Modify Registers
- Display/Modify Floating Point Registers
- Display/Modify Segmentation Registers
- Print Control Blocks
- Print Storage
- Print Storage Overlays
- Hexadecimal Addition and Subtraction
- Decimal-Hexadecimal Conversion
- Set Break Point
- Display Break Points
- Reset Break Point
- Branch
- Execute
- Trace Storage Contents
- Display/Modify Disk
- Display/Modify Diskette
- Display/Modify Program
- Display/Modify Overlay
- Display/Modify Transient
- Load/Unload Transient

Automatic Device Backup

This facility provides automatic switching from a failing primary device to a secondary device. If an unrecoverable I/O error occurs on a device with device backup, data is redirected from that device to its backup. The following combinations are supported for automatic device backup:

- Teletypewriter primary to Teletypewriter backup (output only)
- Line Printer to line printer, matrix printer, or teletypewriter
- Matrix printer to matrix printer, line printer, or teletypewriter

Write with Read Verify Option

This facility allows Data Set Definitions (DSD) to contain the indication that all write operations to that data set (on disk or diskette) defined by the DSD are to be verified. This option may also be exercised by a parameter on the OPEN macro.

BSC Initial Program Load (IPL)

An IPL bootstrap program is provided, allowing a user program in a host Series/1 under the IBM Series/1 Realtime Programming System to transmit this bootstrap to a suitably configured remote Series/1 over a BSC line, causing the remote Series/1 to IPL from its own system residence device.

BSC Dump

This facility allows a remote Series/1, at the request of the host Series/1, to transmit the contents of its dump data set to the host Series/1 for subsequent printing.

Terminal and Systems Support

The IBM Series/1 Realtime Programming System Version 2 (5719-PC2) extends the communications support of Version 1 (5719-PC1) by adding:

- Start/Stop (Asynchronous) Communications support of:

- Teletype® Models ASR 33/35 Data Terminals or equivalent in point-to-point switched connections. Determination of equivalency is a user responsibility.

• Binary Synchronous Communications

- To another IBM Series/1 using IBM Series/1 Realtime Programming System Versions 2, 3, or 4 in point-to-point switched or nonswitched connections.
- To an IBM System/3 using CCP or RPG in point-to-point switched or nonswitched connections (Series/1 as System/3).
- To an IBM System/370 using DOS/VS BTAM or VTAM in point-to-point switched or nonswitched connections (Series/1 as System/3).

• EXIO Support for Communications

This facility allows the user to access the Binary Synchronous and Asynchronous communications features at a Basic level (EXIO). This basic access allows access to all facilities supported by the hardware features. The EXIO and the READ/WRITE support are mutually exclusive for an attachment.

Customers ordering the 4962 Disk Storage Unit models 3 and 4 should order the IBM Series/1 Realtime Programming System Version 2 (5719-PC2) and the IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2).

The Storage Overlay Feature can enhance performance of applications by permitting more program segments to be in storage at one time. These can be located in storage above 64K (secondary storage) and accessed by Supervisor control of the contents of segmentation registers provided by the Storage Address Relocation (#6335). Storage Overlay areas are loaded at task set load time, and the programs are executed when called.

Device Support

The Realtime Programming System Version 2 supports the 4953 and 4955 Processors and the following processor options:

- #3920 Floating Point Processor (4955 only)
- #5650 Programmer's Console
- #6335 Storage Address Relocation Translator (4955 only)

In addition, multiples of the following devices and features are supported:

- 4962 models 1, 1F, 2, 2F, 3 and 4
  - 4964 model 1
  - 4974 model 1
  - 4973 models 1 and 2
  - 4979 model 1
  - 4982 model 1
  - 4999 models 1 and 2\*
- Disk
  - Diskette
  - Printer
  - Line Printer
  - Display Station
  - Sensor I/O
  - BatteryBackup

\* Only one is supported.

Features

- #1560 - Integrated DI/DO
- #7840 - Timer
- #7850 - Teletypewriter Adapter, Supported for use with Teletype® Models ASR 33/35
- #1610 - Asynchronous Communications Single Line Control
- #2091 - Asynchronous Communications 8-Line Control
- #2092 - Asynchronous Communications 4-Line Adapter
- #2074 - Binary Synchronous Communications Single Line Control
- #2075 - Binary Synchronous Communications Single Line Control/High Speed
- #2093 - Binary Synchronous Communications 8-Line Control
- #2094 - Binary Synchronous Communications 4-Line Adapter

Note: Device and feature performance is dependent upon hardware configuration, Realtime Programming System generation options, and application program design.

CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.

PROGRAM PRODUCTS

**Realtime Programming System V2 (cont'd)**

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system after initially loading the disk and when the application program executes without hard copy output, system console operations, and data interchange is:

<b>Processor</b>	IBM 4953 or IBM 4955 Processor
<b>Storage</b>	48K bytes
<b>Disk</b>	1 - IBM 4962 model 1, 1F, or 3 Disk Storage Unit

The minimum hardware configuration to support System Generation and System Installation is:

<b>Processor</b>	IBM 4953 or IBM 4955 Processor
<b>Storage</b>	48K bytes
<b>Disk/ Diskette</b>	1-IBM 4962 model 2, 2F or 4 Disk Storage Unit (Combination disk/diskette unit) or 1 - IBM 4962 model 1, 1F or 3 Disk Storage Unit and 1 - IBM 4964 Diskette Unit
<b>Printer</b>	1 - IBM 4973 Line Printer or 1 - IBM 4974 Printer
<b>Operator Station</b>	1 - IBM 4979 Display Station or 1 - Teletypewriter Adapter #7850 Supported for use with Teletype® Models ASR 33/35

To support BSC IPL and BSC DUMP, the host system must have any of the BSC communications features (#2074, #2075, #2093/#2094). The remote system must have one of the BSC single line features (#2074 or #2075).

The hardware requirement for the storage overlay capability includes the Storage Address Relocation Translator (#6335), and a minimum of 64K bytes of physical storage.

The Communications Indication Panel (#2000) is recommended for configurations which include communications features. The actual configuration required by the user depends on his application needs in addition to the above hardware.

**Note:** The configuration must have the following address assignments in order to satisfy the minimum system requirements. (The starter system supports the minimum system requirements.)

Description	Decimal Address
IBM 4962 Disk Unit	03
IBM 4964 Diskette	02
IBM 4973 Line Printer	33
IBM 4974 Printer	01
IBM 4979 Display Station	04
#7850 Teletypewriter Adapter	00

**SOFTWARE REQUIREMENTS**

None.

**COMPATIBILITY**

**Files**

Complete compatibility with files supported by the IBM Series/1 Realtime Programming System Version 1 (5719-PC1) is provided. Any data file written using either of these systems is directly usable by the other.

Compatibility with external (to Series/1) devices is maintained by using the diskette interchange architecture.

**Programs**

The IBM Series/1 Realtime Programming System Version 2 (5719-PC2) is functionally upward-compatible with the IBM Series/1 Realtime Programming System Version 1 (5719-PC1).

Problem state source programs that compile and execute on the IBM Series/1 Realtime Programming System Version 1 will compile and execute on the IBM Series/1 Realtime Programming System Version 2.

Customer-written programs included with the supervisor must be written in accordance with the internal supervisor programming

conventions and interfaces. In some areas these are different from those of the IBM Series/1 Realtime Programming System Version 1 (5719-PC1).

All task sets built to execute in the IBM Series/1 Realtime Programming System Version 1 (5719-PC1) environment must be rebuilt to execute in the IBM Series/1 Realtime Programming System Version 2 (5719-PC2) environment.

**Preparation**

The IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2) can prepare programs to execute with the IBM Series/1 Realtime Programming System Version 1 (5719-PC1) and Version 2 (5719-PC2). The IBM Series/1 Program Preparation Subsystem Version 1 (5719-AS1) can prepare programs to execute on the IBM Series/1 Realtime Programming System Version 1.

The following IBM Series/1 Licensed Programs can be used to prepare programs to execute with the IBM Series/1 Realtime Programming System Version 1 (5719-PC1) or the IBM Series/1 Realtime Programming System Version 2 (5719-PC2).

- IBM Series/1 FORTRAN IV Compiler and Object Support Library (5719-FO1)
- IBM Series/1 FORTRAN IV Realtime Subroutine Library (5719-FO3)
- IBM Series/1 Mathematical and Functional Subroutine Library (5719-LM1)
- IBM Series/1 Mathematical and Functional Subroutine Library Version 2 (5719-LM2)
- IBM Series/1 PL/I Compiler and Resident Library (5719-PL1)
- IBM Series/1 PL/I Transient Library (5719-PL3)

The IBM Series/1 Program Preparation Facilities (5719-PA1) cannot be used to prepare programs to run with the IBM Series/1 Realtime Programming System Version 2 (5719-PC2).

**Required EC Levels**

The required engineering change level for 5719-PC2 for the 4962 Disk Unit is EC 829868 and EC 578573. This applies to the IBM 4962 Disk Unit serial numbers 10001 through 10188.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System Version 2: Licensed Program Program Specifications (GC34-0168) ... IBM Series/1 Realtime Programming System Version 2: Introduction (GC34-0114) ... IBM Series/1 Realtime Programming System Version 2: Supervisor User's Guide (SC34-0163) ... IBM Series/1 Realtime Programming System Version 2: Data Management User's Guide (SC34-0164) ... IBM Series/1 Realtime Programming System Version 2: Communications User's Guide (SC34-0165) ... IBM Series/1 Realtime Programming System Version 2: Macro Reference (SC34-0169) ... IBM Series/1 Realtime Programming System Version 2: Operator Commands and Utilities (SC34-0166) ... IBM Series/1 Realtime Programming System Version 2: Messages and Codes (SC34-0167) ... IBM Series/1 Realtime Programming System Version 2: Generation and Installation Procedures (SC34-0162) ... IBM Series/1 Realtime Programming System Version 2: Problem Determination and Control Blocks (SC34-0170).*

**TERMS and CONDITIONS:** See PP Index

## REALTIME PROGRAMMING SYSTEM VERSION 3 5719-PC3

### PURPOSE

The IBM Series/1 Realtime Programming System Version 3 (5719-PC3) is a licensed program which provides all the facilities of the Realtime Programming System Version 2 (5719-PC2) plus the additional function to manage up to 256K bytes of processor storage. Features of Version 3 are:

- Dynamic partitions which can be created upon demand.
- Relocatable task sets which can be executed in a partition other than the one for which the task set was built.
- Multiple address space management to provide isolation between task sets and the flexible use of up to 256K bytes.
- Multiple address space partitions which allow a shared task set to be shared system-wide.
- System-wide events and queues via the shared tasks set.
- Up to 15 user partitions.
- Up to 64K byte user partition size.
- Separation of system instructions and data to permit the system partition to occupy two address spaces and therefore exceed 64K bytes. (Instruction/Data Split System.) The new maximum size is 126K bytes (64K bytes maximum for data and 62K bytes maximum for instructions).

### HIGHLIGHTS

This licensed program is a version of the Realtime Programming System, whose purpose is to provide an operating system which fully supports Series/1 configurations containing the Storage Address Relocation Translator feature. It allows the flexible use of physical storage greater than 64K. It also provides an increased degree of isolation of individual programs from other programs.

The option of splitting supervisory data and supervisor instructions into two address spaces (0 and 1) permits larger configurations and more capable systems than would be possible under a 64K size limitation. The new maximum size is 126K with a 64K maximum on data and on instructions including 2K mapped identically into each address space. The additional space may be variously used for such items as making more transients resident for improved performance, more control module space to support more user partitions and more complex task sets, support for more I/O, and more user-provided programming to be included in the supervisor.

### DESCRIPTION

#### System-wide Objects

The Supervisor manages objects which are recognized across address space boundaries. These are:

- A. Events designated in a shared task set. (Other events are recognized within the task set in which they are defined.)
- B. Task sets which can be queued for execution by tasks executing in different address spaces from the one the requested task set will execute in.
- C. Queues in the shared task set whose elements may be either placed into a queue or removed from a queue by any task executing in a task set using the shared task set.

System-wide objects are referenced by name so that:

- User programs refer to them symbolically.
- Program preparation steps recognize them as shared objects.
- At execution time supervisory services perform the requested function across the address space boundaries.

There is a single shared task set. The purpose of the shared task set is to allow a single storage-resident copy of programs such as those in the Mathematical and Functional Subroutine Library (5719-LM1) routines to serve calling programs in all address spaces using the shared tasks set and to allow system-wide sharing of data and objects located in the shared task set.

#### System-wide Timer Services

The system maintains a single realtime clock. Other timer services are also consolidated for all tasks in the system.

#### Storage Management Functions

All of the storage management functions of Realtime Programming System Version 2 (5719-PC2) are available in this release.

Storage overlay is the capability of the supervisor to control the contents of the segmentation registers which are associated at task set load time with a storage overlay area in a task set (2K or a multiple of 2K in size). These registers may be pointed to different blocks of physical storage to provide a logical overlay with faster response than that obtainable from disk overlays and without performing any I/O

operation. The blocks of storage which compose the overlays are initialized at task set load time. The control operations are invoked by an SVC within the user program.

Disk overlays are available to each task set in the same manner as in Realtime Programming System Version 2 (5719-PC2).

The system will support up to 15 user partitions.

The relocatable task set feature allows task sets to execute in a partition (including a dynamic partition) or with an origin address other than the one it was built for. At task set load time, the loader will perform the relocation. A relocatable task set may do anything that any other task set may do with the following exceptions:

- a. It may not be pre-bound through task set installation unless it is being bound to the partition (number and origin) for which it was built; that is, a task set will not be relocated during task set installation.
- b. It may not be a shared task set. (It may, however, make use of a shared task set.)

The supervisor cannot be altered or referenced by user programs executing in problem state.

Programs and data residing in user-controlled sections of storage mapped exclusively to a single address space may not be altered or referenced by user programs residing in storage mapped to another address space because of addressability.

#### Task and Task Set Management

##### Task Management

Task management is the same as that provided in Realtime Programming System Version 2 (5719-PC2).

Each task will compete for execution by its numerical priority (level and sublevel) against all others in the system.

##### Task Set Management

A task set is what is loaded for execution into a partition, as in Realtime Programming System Version 2 (5719-PC2), with the extension that storage overlays can now be included in the task set.

The dynamic partition feature allows task sets to be executed without requiring that a pre-specified fixed partition be available. Task sets queued for execution without designating a partition number or specifying an undefined partition number will be brought into execution in a dynamic partition provided that:

- a. Sufficient unallocated storage is available (not necessarily contiguous).
- b. There is a partition number (1-15) which is not defined during IPL.
- c. There is an address key (2-7 in instruction/data split system) which did not have a partition defined in it at IPL time.

Task set queuing may be performed by either console request or program request.

#### Communications Support

All communications capabilities provided by Realtime Programming System Version 2 (5719-PC2) are also provided under this version.

In addition, under the Realtime Programming System Version 3 (5719-PC3), the support for the Binary Synchronous Communications features (#2074, #2093, #2094) has been verified for operation in the following environments:

- *System/32* using point-to-point BSC under RPG programming facilities as an IBM System/3.
- *System/34* using point-to-point BSC under RPG programming facilities and the recently announced BSCEL (BSC Equivalence Link) feature of the SSP-ICF (Interactive Communications Feature) as an IBM System/3.
- *5260 Retail System* via the 5265 models A12, A22, A42, B12, B22, B42 using point-to-point BSC discipline as an IBM System 3.
- *System/370 OS/VS1, OS/VS2 TCAM* using point-to-point BSC discipline as an IBM System/3. (Non-conversational mode only.)
- *System/370 OS/VS1, OS/VS2, DOS/VS CICS/VS* using point-to-point BSC discipline as an IBM System/3. (BTAM only.)
- *System/370 OS/VS1, OS/VS2 IMS/VS* using point-to-point BSC discipline. (BTAM only.) IMS/VS support is via IRSS (Independent Remote Subsystem Support), an IMS/VS protocol for the support of remote systems. A Series/1 user-written application program under the Realtime Programming System is required for the formatting and handling of messages in the proper IMS/IRSS formats.

PROGRAM PRODUCTS

**S/1 Realtime Programming System V3 (cont'd)**

**Initial Program Load (IPL)**

IPL will perform the same functions as IPL in Realtime Programming System Version 2 (5719-PC2). It will also allocate storage for the storage overlay function to partitions and assign partitions to address spaces as specified by the user.

**Utilities**

The utilities contain all the functions available in Realtime Programming System Version 2 (5719-PC2).

**Message Buffering**

Message Buffering capability is the same as that provided in Realtime Programming System Version 2 (5719-PC2).

**Device Support**

The Realtime Programming System Version 3 supports the 4955 Processor and the following processor options:

- #3920 Floating Point Processor
- #5650 Programmer's Console
- #6335 Storage Address Relocation Translator (4955 models B and D only)

In addition, multiples of the following devices and features are supported.

4962 models 1, 1F, 2, 2F, 3 and 4	Disk
4964 model 1	Diskette
4974 model 1	Printer
4973 models 1 and 2	Line Printer
4979 model 1	Display Station
4982 model 1	Sensor I/O
4999 models 1 and 2	Battery Backup

**Features**

- #1560 - Integrated DI/DO
- #7840 - Timer
- #7850 - Teletypewriter Adapter supported for use with Teletype® Models ASR 33/35
- #1610 - Asynchronous Communications Single Line Control
- #2091 - Asynchronous Communications 8-Line Control
- #2092 - Asynchronous Communications 4-Line Adapter
- #2074 - Binary Synchronous Communications Single Line Control
- #2075 - Binary Synchronous Communications Single Line Control/High Speed
- #2093 - Binary Synchronous Communications 8-Line Control
- #2094 - Binary Synchronous Communications 4-Line Adapter

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system after initially loading the disk and when the application program executes without hard copy input, system console operations, and data interchange is:

<b>Processor</b>	IBM 4955 Processor models B or D with Storage Address Relocation Translator #6335 or IBM 4955 model E or IBM 4952
<b>Storage</b>	64K bytes
<b>Disk</b>	1 - IBM 4962 model 1, 1F, or 3 Disk Storage Unit

The minimum hardware configuration to support System Generation and System Installation.

<b>Processor</b>	IBM 4955 Processor models B or D with Storage Address Relocation Translator #6335 or IBM 4955 model E or IBM 4952
<b>Storage</b>	64K bytes

<b>Disk/ Diskette</b>	1 - IBM 4962 model 2, 2F or 4 Disk Storage Unit (Combination disk/diskette unit) or 1 - IBM 4962 model 1, 1F or 3 Disk Storage Unit and 1 - IBM 4964 Diskette Unit
<b>Printer</b>	1 - IBM 4973 Line Printer or 1 - IBM 4974 Printer
<b>Operator Station</b>	1 - IBM 4979 Display Station or 1 - Teletypewriter Attachment #7850 with Teletype® Models ASR 33/35

The Communications Indication Panel (#2000) is recommended for configurations which include communications features. The actual configuration required by the user depends on his application needs in addition to the above hardware.

To support BSC IPL and BSC DUMP, the host system must have any of the BSC communications features (#2074, #2075, #2093/#2094). The remote system must have one of the BSC single line features (#2074, #2075).

The configuration must have the following standard address assignments in order to satisfy the minimum system requirements. (The starter system supports the minimum system requirements.)

Description	Decimal Address
IBM 4962 Disk Unit	03
IBM 4964 Diskette	02
IBM 4973 Line Printer	33
IBM 4974 Printer	01
IBM 4979 Display Station	04
#7850 Teletypewriter Attachment	00

**SOFTWARE REQUIREMENTS**

None

**COMPATIBILITY**

**Files**

Complete compatibility with files supported by the IBM Series/1 Realtime Programming System Version 1 (5719-PC1) or Version 2 (5719-PC2) is provided. Any data file written using any of these systems is directly usable by the others. Compatibility with external (to Series/1) devices is maintained by using Basic Data Exchange. See the *IBM Diskette General Information Manual (GA21-9182)*.

**Programs**

Problem state source programs which assemble or compile and execute on the IBM Series/1 Realtime Programming System Version 1 (5719-PC1) or Version 2 (5719-PC2) may require source modifications to assemble or compile and execute on the IBM Series/1 Realtime Programming System Version 3 (5719-PC3).

Customer-written programs included with the supervisor must be written in accordance with the internal supervisor programming conventions which are different from those of 5719-PC1 and 5719-PC2. The following IBM Series/1 licensed programs are compatible with the IBM Series/1 Realtime Programming System Version 3. For details on these licensed programs, refer to the respective sales manual pages.

- IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3)
- IBM Series/1 FORTRAN IV Compiler and Object Support Library (5719-FO1)
- IBM Series/1 FORTRAN IV Realtime Subroutine Library (5719-FO3)
- IBM Series/1 FORTRAN IV Realtime Subroutine Library Version 2 (5719-FO4)
- IBM Series/1 Mathematical and Functional Subroutine Library (5719-LM1)
- IBM Series/1 Mathematical and Functional Subroutine Library Version 2 (5719-LM2)
- IBM Series/1 PL/1 Compiler and Resident Library (5719-PL1)
- IBM Series/1 PL/1 Transient Library (5719-PL3)
- IBM Series/1 COBOL Compiler and Resident Library (5719-CB1)
- IBM Series/1 COBOL Transient Library (5719-CB2)
- IBM Series/1 Index Access Method (5719-AM1)
- IBM Series/1 Sort/Merge (5719-SM1)
- IBM Series/1 4987 Programmable Communications Subsystem Preparation Facility (5719-CS0)
- IBM Series/1 4987 Programmable Communications Subsystem Execution Support (5719-CS1)

**S/1 Realtime Programming System V3 (cont'd)**

- IBM Series/1-System/370 Channel Attach Program (5719-CA1)

The following IBM Series/1 Programming RPQs Licensed Programs are compatible with the IBM Series/1 Realtime Programming System Version 3. For details on these Programming RPQs, refer to the respective sales manual pages.

- IBM Series/1 Realtime Programming System Basic Sort Programming RPQ P82573 (5799-TBP)
- IBM Series/1 Remote Job Entry Programming RPQ P82575 (5799-TBK)
- IBM Series/1 Realtime Programming System Indexed Access Method Programming RPQ P82570 Version 3 (5799-TCB)
- IBM Series/1 Realtime Programming System IBM 4978 Display Station Support Programming RPQ P82572 Version 3 (5799-TCE)
- IBM Series/1 Realtime Programming System Disk Spooling Programming RPQ P82574 Version 3 (5799-TCH)
- IBM Series/1 Realtime Programming System Address Translator Transient Support Programming RPQ P82585 Version 3 (5799-TBY)

**Preparation**

The IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3) is required to prepare programs to execute on the IBM Series/1 Realtime Programming System Version 3 (5719-PC3).

The Base Program Preparation Facilities (5719-PA1) cannot be used to prepare programs to run with the Realtime Programming System.

**Required EC Levels**

The required engineering change levels for 5719-PC3 for the IBM 4962 Disk Unit are EC 829868 and EC 578573. This applies to the IBM 4962 Disk Unit serial numbers 10001 through 10188.

The required engineering change level for 5719-PC3 for all models of the 4955 is EC 375013. The 4955 model B must also have EC 578550.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System Version 3: Licensed Program Specifications (GC34-0192) ... IBM Series/1 Realtime Programming System Version 3: Introduction (GC34-0193) ... IBM Series/1 Realtime Programming System Version 3: Supervisor Macro Programmer's Guide (SC34-0195) ... IBM Series/1 Realtime Programming System Version 3: Data Management Macro Programmer's Guide (SC34-0196) ... IBM Series/1 Realtime Programming System Version 3: Communications Macro Programmer's Guide (SC34-0197) ... IBM Series/1 Realtime Programming System Version 3: Design Guide (SC34-0191) ... IBM Series/1 Realtime Programming System Version 3: Macro Reference (SC34-0201) ... IBM Series/1 Realtime Programming System Version 3: Operator Commands and Utilities (SC34-0198\*) ... IBM Series/1 Realtime Programming System Version 3: Messages and Codes (SC34-0199\*) ... IBM Series/1 Realtime Programming System Version 3: Generation and Installation Procedures (SC34-0194\*) ... IBM Series/1 Realtime Programming System Version 3: Problem Determination (SC34-0200) ... IBM Series/1 Realtime Programming System Version 3: Control Blocks (SC34-0218) ... IBM Series/1 Authorized Program Analysis Report (APAR) User's Guide (GC34-0099\*)*

\* One copy included with documentation distributed from PID.

**TERMS and CONDITIONS:** See PP Index

**REALTIME PROGRAMMING SYSTEM  
VERSION 4 (5719-PC4)**

**PURPOSE**

The IBM Series/1 Realtime Programming System Version 4 (5719-PC4) Licensed Program provides operating system functions for realtime operations with either multi-user online or batch program preparation. The Realtime Programming System allows the generation of a multipartition system as well as smaller configurations in a consistent and compatible manner. The Realtime Programming System includes multitasking facilities, storage management, data management, system operator station support, timer support and communications facilities.

The Realtime Programming System supervisor, when combined with the Program Preparation Subsystem, allows Series/1 to operate in a realtime online preparation environment or, if realtime is not required, in a simple batch environment.

**DESCRIPTION**

**Realtime Programming System Function Summary**

- Supervisory Services
  - Task Management
    - Primary and Secondary Tasks
    - Dynamic Control Block Management
    - Prioritization by Hardware Level, Software Sublevel
  - Storage Management
    - Fixed Partitions
    - Dynamic Partitions
    - Overlays from Disk
    - Buffer Pooling
  - Task Set Management
    - Rollout/Rollin of Task Sets
    - Chaining of Task Sets
    - Queuing of Task Sets to Partitions
    - Optional Binding at Task Set Install Time
    - Scheduling Task Set Execution
    - Shared Task Set
    - Relocatable Task Sets
  - Event Management
    - WAIT/POST (Simple, Iterative, Multiple)
    - Wait on Timer
    - Wait on I/O
  - Queue Management
    - Priority Queues in Storage
    - FIFO Queues on Disk and in Storage
  - Timer Management
    - Time-of-Day, Date
    - Time Delay
    - Asynchronous Timers
  - Serially Reusable Resource Management
    - REQUEST/RELEASE
  - Interrupt Management
    - I/O Interrupts
    - Class Interrupts
  - Error Management
    - Error Logging and Reporting
    - Task Error Exists
    - Storage Dump
    - System Reload and Restart
    - System Termination
    - Abnormal Termination of a Task
    - Command Language Facility
    - Series/1 EXEC Interpreter
    - Series/1 EXEC Language Terminal Handler Command (see "Highlights")
  - Operator Interface
    - Command Processing
    - Message Processing
  - Floating Point Emulator Support
- Data Management
  - Data Set Management
    - Basic I/O Access (EXIO)
    - Physical Access (READ/WRITE)
    - Logical Access (GET/PUT)
    - Sequential and Direct Access Methods
    - Consecutive, Direct, and Partitioned Organization
    - OPEN/CLOSE
    - CREATE/DELETE/RENAME
    - NOTE/POINT
    - Data Set Definition (DSD) support

**DPIO Support**

- 4962 and 4963
- 4978 (as a 4979)
- 4964 and 4966 Diskette Unit
- 4979 Display Station
- 4973 Line Printer
- 4974 Printer
- Special Feature #7850, Teletypewriter Adapter Message Buffering for User-selected Output Devices
- 3101 Display Terminal

**Communications Support**

- Binary Synchronous Communications Support
- Start/Stop Asynchronous Support
- Systems Network Architecture Support

**Sensor I/O Support**

- Analog I/O (Single or Multiple Point)

**Digital Input/Digital Output**

- Standalone Utility Functions
  - Storage Dump Diskette
  - Disk Initialization
  - System Build
- System Utility Functions
  - Compress (Partitioned Data Set or Volume)
  - Copy
  - Define (Create, Delete and Rename, Logical Volumes, Data Sets, Members)
  - Initialize Diskette
  - Prepare Diskette to IPL Standalone Dump
  - Assign Realtime Programming System to be loaded by IPL Merge (PDS or Volumes)
  - Patch
  - Report (Print Disk/Diskette Directories, Disk/Diskette Data or Storage Dump)
- Service Aids
  - I/O Trace
  - Storage Patch and Dump
  - SVC Trace
- Generation Facilities
- System Initialization

**REALTIME PROGRAMMING SYSTEM FUNCTIONS**

- Multiple Address Space Management
 

The Series/1 Realtime Programming System Licensed Program provides an operating system which fully supports Series/1 configurations containing the Storage Address Relocation Translator feature. It allows the flexible use of physical storage greater than 64K. It also provides an increased degree of isolation of individual programs from other programs.

The option of splitting supervisor data and supervisor instructions into two address spaces (0 and 1) permits larger configurations and more functions than would be possible under a 64K size limitation. The maximum supervisor size is 126K with a 64K maximum on data and 62K on instructions. The additional space may be used for such items as making more transients resident for improved performance, more control module space to support more user partitions, support for more I/O, and more user-provided programming to be included in the supervisor.
- Single Address Space Management
 

This licensed program also optionally supports a Single Address Space Management configuration, supporting up to 64K of storage. Storage above 64K can be used for overlays to enhance the performance of user task sets by allowing more user-written program segments to be resident in storage at one time.
- Storage Management and Task Set Management
 

Realtime Programming System supports multiple partitions. Partition 0 is for the system task set. Another partition may, at the user's option, contain a shared task set and be used as a shared partition containing data and other resources which may be used by programs in other partitions. The user may specify the number and sizes of the partitions at SYSGEN time and may alter his specifications at IPL time. Each partition must be a multiple of 2,048 bytes. Up to 15 user partitions (besides Partition 0) may be created until the total storage requirements reach the maximum 256K bytes. Programs executing in user partitions are organized into task sets. One task set at a time may occupy a user partition. One partition (selectable at SYSGEN or IPL time) may have a task set rolled out to disk to make way for a higher priority task set. A task set to be rolled out must have been specified to be rolloutable at Application Build time. Only one task set at a time may be rolled out.

## Realtime Programming System V4 (cont'd)

Task sets may use overlays from disk. Overlay areas may be shared between tasks only as serially reusable resources under user control.

Storage overlays are loaded in unaddressable physical storage when the associated task set is started. When an overlay is called by an executing task set, the system accesses it through manipulation of the segmentation registers. Storage overlays are faster than disk overlays since no I/O operations are involved.

A task set may chain to another task set which will replace it as the executing task set in the same partition. A partition GLOBAL area is maintained during this exchange, allowing several task sets to operate in sequence as a single logical operation using the same data. This facility supports the FORTRAN function "INVOKE" and the PL/1 function "TRANSFER". Each task set has one primary task which executes following task set load. A buffer pooling facility allows reservation of a pool of storage in a task set for dynamic allocation of buffer to task on request.

### SUPERVISORY FUNCTIONS

#### • Task Management

Realtime Programming System is capable of supporting as many concurrent tasks as the user has Processor Storage (up to 256K) to execute the tasks. The user may have as many disk-resident programs as he can store on his disks. Tasks are dispatched in response to hardware interrupts, user requests from the system operator station, program requests, or timer services. Realtime Programming System supports the dispatching of independent tasks from other tasks.

Realtime Programming System provides up to 256 preemptive priority sublevels within each of the four hardware levels. A task may be assigned to any level and sublevel. Multiple tasks may be assigned the same priority level. Several tasks can be simultaneously suspended on a level.

The programmer specifies whether a program is serially reusable, reentrant, refreshable, or non-reusable through the program macro.

#### • Timer Services

Realtime Programming System manages all physical and logical timers. The system supports multiple logical timers per physical timer. Realtime Programming System requires a dedicated physical timer attachment for its own use in order to provide time-of-day and date and logical timer services when required. No timers are required for batch-only systems running Program Preparation Subsystem. The other timers are available to the user as I/O devices through the READ/WRITE interface. The programmer is provided with a facility so that he may request his program to be suspended for a specified time interval or until a specified time is reached.

The system provides support for time-of-day (TOD) clock and date. The DATE may be requested from the system in any of the following formats: Julian (YYDDD), MM DD YY and YY MM DD. The user is provided a facility of setting the DATE and TOD through the system operator station or from a program.

Scheduler services are provided to the user so that he may schedule a task set to execute on a periodic basis, at a particular TOD, or after a specified time interval. A facility is provided to add and delete task sets from the scheduler table.

#### • Interrupt Handler

An interrupt handler is provided for the initial handling of machine level interrupts and the dispatching of interrupt service routines. The user specifies the priority level at which the interrupt service task will execute.

The user may provide a routine to be executed when the console interrupt button of the programmer's console is depressed.

#### • Event Services

The programmer may define events and cause resumption of a suspended task upon the occurrence of an event. A Wait/Post facility is provided for the synchronization of tasks.

Events that are supported include I/O completion, timer, user-defined, and adding an element to a queue. The three event types supported are simple, iterative and multiple. A task may be suspended until a single event occurs, or a list of events occurs.

#### • Floating Point Emulator

The Floating Point Emulator duplicates the execution of the floating point instructions when the Floating Point Processor is not attached to the system. The user specifies whether the emulator is to be resident or transient, when the system is configured.

#### • Queuing Services

The user has the facility of defining storage and disk queues. These queues may be used for passing data from one task to

another. The system provides for priority queues, while entries with the same priority are maintained on a FIFO basis. The user may add and remove entries from the queues. A copy queue entry facility is provided so entries may be added from a transient area. Provision is made for warm restart (queue elements retained) or cold restart (queue cleared) of disk queues after system shutdown. Queues may be "Public", that is, accessed by multiple tasks in a task set; or "Private", that is, accessed only by the task owning it.

#### • Resource Management

The system provides the user with a facility for management of serially reusable resources. Once the resource is freed from the current task, control is given to the highest priority task waiting on the resource.

#### • Operator Commands

The functions supported through the system operator station using the command language are:

- Execute a task set
- Terminate a task set
- Delete a task set from the partition queue(s)
- Add and delete entries from the scheduler table; that is, task sets that will execute on TOD, on a periodic basis, after a time delay, etc.
- Set and display TOD and DATE
- Put I/O devices on and offline
- Devices may be reassigned by the operator in the event of a permanent I/O Error
- Assign logical device numbers to physical device addresses
- Define and delete error logs
- Mount and demount diskettes
- Start and stop the I/O Trace
- Start and stop the SVC Trace
- Display up to 56 bytes of processor storage
- Patch up to 20 bytes of processor storage
- Make ABEND dump data set or member available for reuse
- Set operating mode to Attended or Unattended
- Reply to a WRITE-TO-CONSOLE message with an identifying number
- Define partitions (as part of IPL sequence)
- Activate support for physical devices (as part of IPL sequence)
- A facility is provided so the user may select and add system operator station functions at SYSGEN

### DATA MANAGEMENT FUNCTIONS

Realtime Programming System Data Management provides the user with services which are described below:

#### • Device Service Routines

Device Service Routines are provided for supported devices. Character data conversion between EBCDIC and TTY ASCII is provided.

#### • Data Set Management

The system performs all physical I/O upon request by the user program. Realtime Programming System provides optional I/O timeout for systems having hardware timers which are time-dependent on specified device type times. The programmer is able to read the programmer console data buffer into a program upon request. The programmer also has the ability to write to the programmer console lights. The I/O user interface is either GET/PUT or READ/WRITE. For Sensor I/O it is READ/WRITE. There is also a third level of access (EXIO) which is primarily for device manipulation required in diagnostic programs. Data files may exist on either fixed disk or removable diskette.

The data set organizations supported for sectorized devices are:

Consecutive  
Random  
Partitioned

The user may add and update records to a consecutive DASD file. The user may have multiple data sets per volume. Multivolume files (diskettes only) are supported only for Basic Exchange Format Files. When using random data sets, the user may also access the records by relative record number.

The partitioned data set supported is provided for user and system libraries. Realtime Programming System provides facilities for the creation, deletion, and maintenance of the partitioned data sets.

Realtime Programming System supports the fixed heads option in the 4962 and 4963 Disk Storage Units.

Data sets may be shared among tasks in the system. Management of shared I/O devices is the responsibility of the programmer. Management of disk message buffering is handled by the Realtime Programming System.

The user has the option of accessing Series/1 I/O devices at the READ/WRITE, and GET/PUT level (sensor I/O at the READ/WRITE level only). The user is provided with device

## Realtime Programming System V4 (cont'd)

independence at the GET/PUT level. All hard copy devices logically support the ASA Control characters. This option allows the user to direct a print file to the disk or diskette for later printing.

The record types supported are:

- Fixed
- Fixed Block
- Fixed Blocked Spanned
- Variable
- Variable Blocked
- Variable Blocked Spanned (including Data Compression)

Data sets may be created and deleted via online system utility functions and from program requests.

### Write with Read Verify Option

This facility allows Data Set Definitions (DSDs) to contain the indication that all write operations to that data set (on disk or diskette) are to be verified. In Version 1, the Write Verify option may be exercised only by an option on the OPEN macro.

Support of the 4964 and 4966 diskette units:

- Provides users with a removable magnetic medium
- Enhances data security, integrity, and privacy

The system user can copy, via online system utility functions, a diskette to the fixed disk and utilize the stored data of the diskette as if it had always been on disk. When the user's operations are completed, a copy of the disk data may be transferred to diskette. The diskettes may contain multiple files, files may span multiple diskettes, and many diskettes/files may be copied to fixed disk at one time. The user will have the convenience and privacy that removable diskettes provide him, while the system is able to utilize the speed and reliability offered by a fixed disk. The expiration date, which is a user option on diskettes, is honored by Realtime Programming System.

The user has the option to bind I/O devices and data sets during:

- A. Program Preparation
- B. Task Set Installation
- C. Execution (OPEN) Time

Options (A) and (B) provide the Realtime Programming System user with the ability to achieve higher performance by requiring a minimum number of disk reads to locate programs and data.

- Sensor I/O

Analog Input

The Realtime Programming System supports Analog Input, including the programmable gain amplifier, and the automatic zero correction option. The user has a choice of either sequential or random access at the READ/WRITE level. A single point can be handled under either of the access forms by specifying a count of one.

Analog Output

The Realtime Programming System supports analog output, including maintaining the present output value of each point. The user has a choice of either sequential or random access at the READ/WRITE level. A single point can be handled under either of the access forms by specifying a count of one.

Digital Input

The Realtime Programming System supports sequential and random access at the READ/WRITE level. Logical groups may be defined as contiguous DI points in a physical group, composed of 16 points. This allows the user to place DI points among different devices and/or programs. A single point or group can be handled under either of the access forms by specifying a count of one.

Digital Output

Realtime Programming System supports sequential and random access at the READ/WRITE level. Digital Output points may be defined in a logical group as in Digital Input above.

- Storage Protection

The 4953 processor does not have hardware storage protection. Programming System systems running in the 4953 are not storage protected.

- Message Buffering

Realtime Programming System provides a disk message buffering facility, supporting the following sequential output devices:

- Operator Station
- 4973 Line Printer
- 4974 Printer
- Communication Devices

Other devices may use the message buffering facility. The system will print a complete message before starting another message.

### Initial Program Load (IPL)

A capability is provided to IPL from the following devices:

- 4964 or 4966 Diskette (IPL Standalone Utilities)
- 4962 or 4963 (IPL Realtime Programming System)

After Realtime Programming System is loaded, it processes a user-specified command data set which may be used to start user task sets or perform any valid operator command.

### Utilities

A set of utilities is provided for the proper installation and maintenance of application programs and data. Certain utilities may run concurrently with the user application programs and others that run offline (that is, standalone - not concurrently with user programs or under Realtime Programming System).

The standalone utilities are loaded from a 4964 diskette. The following stand-alone utilities are provided:

- System Build

This utility prepares a disk device to IPL the Realtime Programming System starter system and execute Realtime Programming System online system utilities. System build is executed prior to system generation as part of the Realtime Programming System installation process and at other times to restore the Realtime Programming System starter system and Realtime Programming System online system utilities.

- Disk Initialization

This utility initializes the 4962 fixed disks. It performs surface analysis and allows alternate sector assignments.

### Storage-to-Diskette-Dump

This utility is used for APAR submission and dumps all of storage except for the area where the utility is loaded from the 4964 Diskette. This utility also dumps all the system's registers and status indicators. The online system REPORT utility may be used to obtain a printout of the dump on a hardcopy device. Additional dump diskettes may be created using the online system IPLMAINT utility.

- Display/Modify Storage
- Display/Modify Registers
- Display/Modify Floating Point Registers
- Display/Modify Segmentation Registers
- Print Control Blocks
- Print Storage
- Print Storage Overlays
- Hexadecimal Addition and Subtraction
- Decimal-Hexadecimal Conversion
- Set Break Point
- Display Break Points
- Reset Break Point
- Branch
- Execute
- Trace Storage Contents
- Display/Modify Disk
- Display/Modify Diskette
- Display/Modify Program
- Display/Modify Overlay
- Display/Modify Transient
- Load/Unload Transient

### DEBUG PACKAGE

The interactive debug package provides a set of functions to assist in program debugging. These functions are invoked and controlled from the system console. The following online utilities are provided:

- Diskette Initialization

This utility provides online initialization of diskettes.

- Define/Create/Build/Delete/Rename Data Sets

These utilities perform the following functions:

- DEFINE - The function of defining a disk or diskette containing logical volumes must be in Realtime Programming System format.
- CREATE - The function of assigning space on sectorized devices, including creation of logical volumes, partitioned data sets, consecutive or direct data sets, or members.
- BUILD - The function of building data set definitions in a task set library.
- DELETE - The function of deleting volumes, data sets, members or data set definitions on sectorized devices including the management of TOCs and partitioned data set directories.
- RENAME - The function of renaming a volume, data set, or member, including the handling of TOCs and partitioned data set directories.

**Realtime Programming System V4 (cont'd)**

- COMPRESS - This utility performs the function of copying partitioned data sets of volumes in place on sectorized devices to consolidate all available free space within one contiguous area.
- PATCH DISK/DISKETTE - This utility provides the functions of applying permanent fixes to data sets on DASD devices. Visual verification of the data to be replaced is provided before the users enter the new data.
- REPORT - This utility provides the ability to print data from the diskette and disk files to any of the Series/1 hard copy output devices. The user has the ability to print the file (or data set), TOCs, and partitioned data set directories. This utility also provides the ability to print a formatted dump for storage. The dump was previously taken either standalone or online.
- COPY - The COPY utility provides the function of doing either a selective or volume copy. The user has the ability to copy as follows:

From	To
Diskette, Disk	Diskette, Disk, Printer, Teletypewriter, Display

Selective copies allow the user to copy data sets, volumes, or members of data sets. Records may also be added to the end of a consecutive data set.

- MERGE - This utility provides the function of combining two partitioned data sets or volumes into a third partitioned data set or volume.
- IPLMAINT - This utility provides the functions to:
  - Prepare a diskette to IPL the standalone storage-to-diskette dump utility, and establish the system to be loaded from disk at IPL time.

**COMMUNICATIONS**

• **Communications Support**

Communications support is an integral part of Realtime Programming System data management and is accessed via the READ/WRITE interface. The support directs the transfer of data between user programs and remote stations. A remote station may be either a supported terminal or another computer system via binary synchronous communication. Facilities are provided to:

- Establish, control, and terminate user program access to remote stations.
- Transfer data between user programs and remote stations on point-to-point lines (either switched or nonswitched) or multipoint lines.
- The multipoint control support (for 2740 and 3270) provides capabilities for autopoll and poll list modification.

• **EXIO Support for Communications**

This facility allows the user to access the Binary Synchronous and Asynchronous communications features at a Basic level (EXIO). This basic access allows access to all facilities supported by the hardware features. The EXIO and the READ/WRITE support are mutually exclusive for an attachment.

• **BSC Initial Program Load (IPL)**

An IPL bootstrap program is provided, allowing a user program in a host Series/1 under the IBM Series/1 Realtime Programming System to transmit this bootstrap to a suitably configured remote Series/1 over a BSC line, causing the remote Series/1 to IPL from its own system residence device.

• **BSC Dump**

This facility allows a remote Series/1 at the request of the host Series/1, to transmit the contents of its dump data set to the host Series/1 for subsequent printing.

• **SNA Support**

The Realtime Programming System SNA support for the Series/1 user controls the management of sessions and the flow of data in an SNA network between a user program in the System/370 Host and a user program in the Series/1 operating as a cluster controller. This support provides for:

- System definition services
- Network attachment, activation, or deactivation services
- Session and message exchange services
- Activation of a Series/1 task set from the host

The Realtime Programming System provides a Data Flow Control level interface for support of multiple physical units (cluster controller) with multiple logical units in an SNA network controlled by a System/370 using OS/VS2 (SVS or MVS) and ACF/VTAM or ACF/TCAM, or in a network controlled by a System/370 using OS/VS2 with IMS/VS Version 1 Advanced Function for Commu-

nications. This allows multiple Series/1 user programs to be in session with multiple System/370 user programs.

• **SNA Compatibility**

The Realtime Programming System SNA support provides the following functions, as defined by Systems Network Architecture:

- SNA Physical Unit Type Support
- SNA Function Management Profiles 3 and 4 Support
- SNA Transmission Subsystem Profiles and 4 Support
- SDLC Secondary Station Support

This set of functional support allows the Series/1 to be defined as a Cluster Controller on an SNA/SDLC network controlled by a System/370 using OS/VS2 (SVS or MVS) and ACF/VTAM or ACF/TCAM through a 3705 Communications Controller using the Network Control Program (ACF/NCF/VS). This support also allows operation in a network controlled by a System/370 using OS/VS2 with IMS/VS Version 1 Advanced Function for Communications.

The following start/stop (Asynchronous) terminals are supported via features #1610, or #2091 and #2092:

- 2740 Communications Terminal, model 1, in point-to-point switched, point-to-point nonswitched, multipoint connections.
- 2740 Communications Terminal, model 2, in multipoint connections.
- 2741 Communications Terminal in point-to-point switched and point-to-point nonswitched connections.
- Teletype® Models ASR 33/35 Data Terminals, or equivalent, in point-to-point switched or point-to-point nonswitched connections. Determination of equivalency is a user responsibility.

The following start/stop (asynchronous) terminals are supported via features #2095 and #2096.

- Teletype® Models ASR 33/35 Data Terminals, or equivalent, in point-to-point switched or point-to-point nonswitched connections. Determination of equivalency is a user responsibility.
- 3101 Display Terminal, models 10, 12, 13, 20, 22, and 23, in EIA RS-232-C/CCITT V.24 mode operating on point-to-point switched or nonswitched lines. Supported as a Teletype® Models 33/35 equivalent device.

The following Binary Synchronous Terminals are supported via features #2074 or #2093 and #2094.

- BSC support for 3271 Control Unit models 1 and 2 with attached 3277, 3284, 3286, and 3288 terminals on a multipoint line.

**Note:** 3270 support is limited to communications support and does not include mapping services

- BSC support for 3275 Display Station, models 1 and model 2, on a switched point-to-point or a multipoint line.
- BSC support for 3274 Control Unit, models 1C and 51C, with attached 3277 and 3278 Display Stations; 3279 Color Display Stations; and 3284, 3286, 3287, 3288, and 3289 Printers on a nonswitched point-to-point or multipoint line.
- BSC support for 3276 Control Unit Display Station, models 1, 2, 3, and 4, with attached 3278 Display Stations; 3279 Color Display Stations; and 3278 and 3289 Printers on a nonswitched point-to-point or multipoint line.
- 5260 Retail System via the 5265 models A12, A22, A42, B12, B22, B42, using point-to-point BSC discipline as a System/3.
- 5280 Distributed Data System via Communications Adapter (#2500).
- 6670 Information Distribution with BSC feature in a switched or nonswitched point-to-point line.
- 3684 Point-of-Sale Control Unit (model 1 or 2) with BSC Communications on a switched or nonswitched point-to-point or nonswitched multi-point facility (as a System/3). A user-written 3684 program or the Host Command Processor (HCP) facility in the Series/1 utilizing Realtime Programming System Read/Write communications support.

The following Binary Synchronous CPU-to-CPU communications is supported via features #2074, or #2075, (not System/32 or System/34) or #2093 and #2094 (Series/1 appears as a System/3).

- CPU-to-CPU point-to-point (switched or nonswitched)
  - Another Series/1 using the Series/1 Realtime Programming System Versions 2, 3 or 4.
  - System/370 BTAM OS/VS1, OS/VS2 (SVS or MVS), or DOS/VS.

**Realtime Programming System V4 (cont'd)**

- System/370 TCAM OS/VS1 or OS/VS2 (TCAM does not support conversational mode).
- System/370 VTAM, DOS/VS.
- System/370 CICS/VS, OS/VS1 or, OS/VS2 or DOS/VS (BTAM only).
- System/32 under RPG programming facilities.
- System/34 under RPG programming facilities and the BSCCL (BSC Equivalence Link) feature of the SSP-ICF (Interactive Communications Feature).
- System/3 using CCP or RPG.
- CPU-to-CPU, Series/1 as a multipoint tributary
- System/370 BTAM OS/VS1
- System/370 IMS/VS OS/VS1 or OS/VS2 (BTAM only). IMS/VS support is via IRSS (Intelligent Remote Station Support) an IMS/VS protocol for the support of remote systems. A Series/1 user-written application program is required for the formatting and handling of messages in the proper IMS/IRSS formats.

**REALTIME PROGRAMMING SYSTEM RAS CHARACTERISTICS**

The Realtime Programming System provides a set of RAS facilities which are always included. Additional facilities may be optionally included which result in an extensive set of RAS functions.

**Error Response**

Detection of machine check or program check conditions, error logging and message generation are performed by supervisory functions in the Realtime Programming System.

**System Recovery**

Error Recovery Procedures provide the system with the capability of continuing operation if at all possible, in the case of software, hardware, and power failures. Task set and system restart and reloading are provided. If the system cannot continue normal execution, the system user is able to specify execution of a program which utilizes minimum system resources and can notify and prepare the external environment for the imminent loss of the system.

Failure of the disk unit that contains the system task set does not cause total system failure or initiate a reload of the supervisor. In the event of disk failure, programs that do not require that disk unit are able to continue operation. Disk service to other disk units continues. However, the next request for a system transient, with the exception of error logging, may cause an abnormal termination of the system.

**Automatic Device Backup**

This facility provides automatic switching from a failing primary device to a secondary device. If an unrecoverable I/O error occurs on a device with device backup, data is redirected from that device to its backup. The following combinations are supported for automatic device backup:

Teletypewriter primary to Teletypewriter backup (output only)

**Hardware Service Aids**

Maintaining error logs is a means of assessing hardware and software reliability. By using hardware error recording to monitor the system, users are made aware of marginally operating equipment. The type of intermittent failures of devices, channels, and CPU will be optionally recorded on a 4962 and 4963 disk. The error logs are used by customer engineers and users for diagnostic purposes. The user and the customer engineer are able to obtain dumps of disk-recorded logs.

The Realtime Programming System provides the following functions:

- Routines to handle the occurrence of a machine check. These routines provide the option of returning control to a user routine after the check has been cleared and optionally logged. The system passes the pertinent error data to the user.
- Support of Automatic Restart after Power Failures. Upon power restoration, a user-specified module is loaded.
- Support of Battery Backup Feature. Systems with the Battery Backup Feature and Timer Support notify the user of a power failure by dispatching a user-specified program. When the power is restored, Realtime Programming System dispatches a user-specified program and passes the duration of the power failure in minutes, seconds, and milliseconds. If the battery is exhausted, results will be the same as if the system does not have the Battery Backup Feature.
- In addition to the general purpose RAS aids, additional optional aids are provided for communications:
  - Communications Trace program which, when activated under user control, is designed to continuously record current communications activity in main storage. This facility works in conjunction with the general purpose I/O trace facility.

- Communications Online Test is an optional facility which provides a means of testing attached 2740 Model 1 terminals concurrent with user operation and determining proper operation of the communication link (lines and modems) as well as the terminal and system programming support.

**VERSION 4 ENHANCEMENTS**

Version 4 of the Realtime Programming System provides all the function included in Version 1 (5719-PC1), Version 2 (5719-PC2) and Version 3 (5719-PC3) plus the following additional function:

- Support for the 4963 Disk Subsystem.
- Support for the 4966 Diskette Magazine Unit.
- Support for attachment of a Series/1 as a Cluster Controller to a System/370 SNA network.
- Enhancements to BSC and Start/Stop Communications which include support of multipoint lines.
- A Command Language Facility which provides multiple concurrent users at supported terminal devices with a simple, easy-to-use interface to system software services.
- System dynamic allocation of control blocks which removes the need for users to determine requirements and pre-allocate control block stacks at application build and SYSGEN time.
- A dynamic device configuration capability which allows users to add devices to an operational system without the requirement to re-SYSGEN.
- Support for either a single address space or multiple address space environment (selected at SYSGEN).
- A dynamic transient pool facility which greatly improves system performance through the automatic retention in unmapped storage of frequently used supervisor transient programs. (Optional at SYSGEN for a multiple address space management system only.)
- Expanded data management facilities which support increased diskette capacity and automatic sequencing of multi-volume diskette data sets.
- External DSD table support which allows multiple copies of a single task set on disk to be loaded and executed concurrently with each copy utilizing different data set definitions and devices.
- An INSTALL command, available with the Command Language Facility, which greatly simplifies the installation of certain related licensed programs by automatically performing the required install procedures for the user.
- A much simplified and improved SYSGEN facility which significantly reduces the number of procedural steps and decisions required to be made by the user.
- Support of a system global DSD table which provides users with a type of system catalog facility for data set definitions (DSDs).
- Support of a dummy DSD which provides users with an easy way to suppress unneeded application output such as a voluminous printout.
- Expanded and enhanced utilities which include the removal of the requirement for the user to specify PARM=( ) when taking utility function defaults.
- Support of a generic system residence device name which reduces the number of DSDs that must be updated by the user whenever the system residence device is changed.
- Distribution of a Single Address Space Management Starter System and a Multiple Address Space Management Starter System which should meet the initial needs of most users such that a SYSGEN will not be required to create a system on which to begin.

**HIGHLIGHTS**

- SNA Support

The Realtime Programming System SNA support provides management of sessions and the flow of data in the SNA network between a user program in the System/370 host and a user program in the Series/1. This support provides for:

- Systems definition services
- Network activation/deactivation services
- Session activation/deactivation and message exchange services
- Activation of a Series/1 task set from the host

The Realtime Programming System provides a Data Flow Control level interface for support as multiple Logical Unit Cluster Controller on an SNA network controlled by a System/370 using DOS/VS, OS/VS1 or OS/VS2 (SVS or MVS) and ACF/VTAM or ACF/TCAM with ACF/NCP/VS or VTAM 2.0 or TCAM 10 with NCP 5.0. This allows multiple user programs to be in session with multiple System/370 user programs. This support may also be used to interface with IMS/VS Version 1. Multiple physical units

## Realtime Programming System V4 (cont'd)

may be active in the Series/1 at one time permitting simultaneous sessions with multiple System/370s.

### SNA Compatibility

The Realtime Programming System SNA support provides the following functions, as defined by Systems Network Architecture:

- SDLC Secondary Station Support
- SNA Physical Unit Type 2 Support
- SNA Function Management Profiles 3 and 4 Support
- SNA Transmission Subsystem Profiles 3 and 4 Support

- Multiple Address Space and Single Address Space Support

Either a multiple address space system or a single address space system may be generated. A multiple address space system requires a Storage Address Relocation Translator. A single address space system is restricted to 48K and 64K of storage unless the Storage Address Relocation Translator is used.

- 4963 and 4966 Support

The 4963 Disk Subsystem is supported for all functions previously supported on the 4962 Disk and with expanded utility functions. Ability to provide backup for the disk is enhanced by the availability of the 4966 Diskette Magazine Unit and the new utility functions.

- Communications Enhancements

(For a complete list of communications support, see the "Communications Section" above.) Additional Communications support in Version 4 includes support for the following:

- Start/Stop (Asynchronous) Terminal Support

- 2740 Communications Terminal, models 1 and 2, in multipoint connections.
- 2741 Communications Terminal in point-to-point switched and nonswitched connections.
- Teletype® Models ASR 33/35 Data Terminal or equivalent, in point-to-point switched or nonswitched connections via the recently announced Series/1 Programmable Multi-Line Communications Attachment (#2095 and #2096). (Determination of equivalency is a user responsibility.)
- 3101 Display Terminal, models 10, 12, 13, 20, 22, and 23, in EIA RS-232-C/CCITT V.24 mode operating on point-to-point switched or nonswitched lines. Supported as a Teletype® Model 33/35 equivalent device.

- Binary Synchronous Support

- 3271 Control Unit, models 1 and 2, with attached 3277, 3284, 3286, and 3288 terminals on a multipoint line.
- IBM 3275 Display Station, models 1 and 2, on a switched point-to-point or multipoint line.
- BSC support for 3274 Control Unit, models 1C and 51C, with attached 3277 and 3278 Display Stations; 3279 Color Display Stations; and 3284, 3286, 3287, 3288, and 3289 Printers on a nonswitched point-to-point or multipoint line.
- BSC support for 3276 Control Unit Display Station, models 1, 2, 3, and 4, with attached 3278 Display Stations; 3279 Color Display Stations; and 3278 and 3289 Printers on a non-switched point-to-point or multipoint line.

**Note:** 3270 support is limited to communications support and does not include mapping services.

- 5280 Distributed Data System via Communications Adapter (#2500).
- 6670 Information Distributor with BSC feature on a switched or nonswitched point-to-point line.
- System/370 OS/VS1, OS/VS2 IMS/V5 (BTAM only) in point-to-point switched and nonswitched connections. IMS/V5 support is via IRSS (Intelligent Remote Station Support) an IMS/V5 protocol for the support of remote systems. A Series/1 user-written application program is required for the formatting and handling of messages in the proper IMS/IRSS formats.
- System/370 OS/VS1 BTAM, Series/1 as a multipoint tributary.

- Dynamic Transient Pool Management

Dynamic Transient Pool Management maintains a pool of the most recently used system transients in unmapped storage. While in the pool, these transient programs will be executed with the performance advantage of a resident program. The dynamic transient pool handler will retain the most frequently used programs in storage thereby reducing the number of disk I/O refreshes required.

**Note:** The Dynamic Transient Pool Management facility is a SYSGEN selectable option for a multiple address space environment system only. This support is not available for a single address space environment system or for user transients.

- Expanded Diskette Data Management (for 4963/4966 SAVE/RESTORE)

Single density diskettes are supported and double density diskettes are supported on the 4966 diskette unit only.

A 512-byte physical sector size is also supported for non-system formatted diskette data sets at all levels of access. A 1,024-byte physical sector size is supported at the EXIO level only.

Volume sequencing support is now available for multivolume diskette data set processing.

- Command Language Facility

The new Series/1 Command Language Facility represents a significant enhancement to the Realtime Programming System's user interface.

The Command Language Facility provides online programming development and production system support to multiple users through a simplified command language interface.

Commands are processed in realtime by an interpretive compiler, which establishes the necessary execution environment prior to invoking requested services, such as the Series/1 Text Editor, PL/I, COBOL, FORTRAN compilers, macro assembler or Application Builder or user application programs. The ease of use of these commands reduces the amount of pre-planning and system knowledge required to use system services.

Programmer and operator productivity is significantly increased through minimization of keystrokes required for command entry. This is achieved by user-sensitive command syntax and effective default values within the logic of the commands. In addition, the multiterminal capability of this facility can increase productivity by supporting concurrent program development.

IBM provides a basic set of commands which may be modified or expanded through use of the Series/1 EXEC language, which is also provided. This permits users to write new commands, customized for their needs, not only for the purpose of aiding the program development process, but for generating commands that constitute production jobs and tasks. With the appropriate environmental setup, these commands can execute on production-oriented Series/1 systems.

The Command Language Facility executes with, and is part of, the Realtime Programming System Version 4 (5719-PC4) and requires the Program Preparation Subsystem Version 4 (5719-AS4) for some of its system facilities. It executes in a partition of the Realtime Programming System as a separate task set.

- External DSD Tables

An external DSD table is one that resides outside a task set library volume, on any direct access storage device, as any named data set or member of a partitioned data set. The use of an external DSD table may be optionally specified at task set execution time. This facility allows multiple copies of the same task set to be executed concurrently with each copy having a different DSD table active in order to access different data sets and devices.

- System Global DSD Table

The System Global DSD Table support allows the DSD table (DSDT) in the system task set to serve as a systemwide DSD table for all task sets. This provides a type of system catalog facility in that users can maintain all their Data Set Definitions (DSDs) in a single system data set which is automatically searched at execution time. The order of the system search for a given DSD is as follows:

1. The active DSDT of the appropriate executing task set.
2. The active DSDT of the currently active shared task set, if applicable.
3. The DSDT of the active System Task Set.

- DSD Dummy

With DSD DEV=DUMMY support, Data Set and Device Management services will provide successful return codes without actually performing the required I/O access functions if the generic device name DUMMY is specified in the corresponding DSD. This allows application programs to be tested without the need to patch out or remove I/O calls to the system for devices which may be unavailable or inoperative and provides an easy way to suppress application output such as unneeded voluminous printout.

**Realtime Programming System V4 (cont'd)**

- **Generic System Residence Device Name**  
The device name DISK is a generic name for the device from which system IPL occurs and from which the system task set is loaded into storage. All DSD references to the device name DISK will automatically go to the system resident device regardless of the actual name assigned at system generation time.
- **Improved SYSGEN**  
A greatly simplified SYSGEN is part of Version 4. This SYSGEN reduces considerably the number of procedure steps required prior to SYSGEN by automatically creating the work files, specification files, Systems Residence Volume, DSDs, control block requirements, rollin/rollout requirements and TPLIB size. New tuning options exist which reduce the number of lines displayed to the user and the number of decision points during the question and answer session. Also answers are checked for inconsistencies, duplicate names, addresses, omissions and proper combinations.
- **Utility Enhancements**  
The online system utilities:  
– Now provide facilities for obtaining a formatted report of the contents of a DSD table.  
– No longer require the user to specify PARMs=( ) when taking the utility function defaults.  
– No longer automatically terminates a utility session for "data set or DSD not found" conditions which are detected while processing a "delete" command entered from a data set on a non-interactive device such as a disk or diskette.  
  
Standalone disk/diskette SAVE/RESTORE facilities are available for the following device combinations:  
– 4963 Disk Subsystem/4966 Diskette Magazine Unit.  
– 4962 fixed Disk Storage Unit/4964 Diskette Unit.
- **Install Command**  
A new INSTALL command, operating under the Command Language Facility, greatly facilitates the installation of certain licensed programs prior to or after SYSGEN. By issuing the command and specifying the program order number, the Command Language Facility and associated programs will automatically perform the install procedure.
- **Dynamic Device Configuration**  
Additional Devices, of like type as those specified during SYSGEN, may dynamically be added "online" to an already operational system. This enhancement, applicable for most IBM supported devices, will eliminate the requirement to do a system generation to add devices of like type, thereby decreasing SYSGEN time and output. Start Device Commands for these devices may be placed into the "IPL Data Set" and processed at IPL time or may be issued later from the Operator Console. Thus, the user may increase the number of I/O devices in the system dynamically without the need to re-SYSGEN.
- **Dynamic Control Blocks**  
The system will dynamically allocate control blocks required during execution of an application. The user (optionally) no longer needs to specify at Application Build, the number of control blocks required.  
  
For a system task set, control blocks are allocated for dynamic storage of the system partition which is specified at installation time via the IPL MAINT utility command; for a user task set, control blocks are allocated from the Variable Control Block Area (VCBA) specified at application build time.
- **Pre-Package Systems**  
A single address space management system is distributed to support users of 4952, 4953 and 4955 processors with 64K bytes of storage without the Storage Address Relocation Translator.  
  
A multiple address space management system is distributed to support users of 4955 processors with at least 96K bytes of storage and equipped with the Storage Address Relocation Translator.  
  
These pre-packed systems should meet most user's needs, thus removing the requirement for a customized SYSGEN. By taking advantage of the Dynamic Device Configuration and the Dynamic Transient Pool Management features, users can use these systems for both program development and production work.

**Devices**

The 4963 Disk Subsystem and 4966 Diskette Magazine Unit are functionally compatible with the 4962 Disk Storage Unit and the 4964 Diskette Unit, respectively. Therefore, any program using the 4962 and 4964 through the operating system GET/PUT or READ/WRITE support will run with the new devices in a similar fashion. This applies to the

Series/1 FORTRAN, PL/I and COBOL compilers which produce object programs that access the new devices through the operating system interfaces.

**Note:** EXIO access is by definition device dependent and is therefore not transparent to the user.

**Device Support**

The Realtime Programming System Version 4 supports the 4952, 4953 or 4955 Processors and the following processor options:

- #3920 Floating Point Processor (4955 only)
- #5650 Programmer's Console
- #6335 Storage Address Relocation Translator (4955 models B and D only)

In addition, multiples of the following devices and features are supported:

4962 models 1, 1F, 2, 2F, 3 and 4	Disk
4963 models 23A, 23B, 29A, 29B, 58A, 58B, 64A and 64B	Disk Subsystem
4964 model 1	Diskette
4966 model 1	Diskette Magazine Unit
4969	Magnetic Tape Drive**
4973 models 1 and 2	Line Printer
4974 model 1	Printer
4978	Display (as 4979) or Programming RPO
4979 model 1	Display Station
3101	Display Terminal (as Teletype® Model ASR33/35 equivalent device)
4982 model 1	Sensor I/O
4987	Programmable Communica- tions Subsystem**
4993	Channel Attach
4999 models 1 and 2	Battery Backup

**Features**

#1200	System/370 Channel Attachment **
#1210	5250 Information Display System Attachment**
#1560	Integrated DI/DO
#1565	Channel Repower
#1610	Asynchronous Communications Single-Line Control
#2091	Asynchronous Communications 8-Line Control
#2092	Asynchronous Communications 4-Line Adapter
#2074	Binary Synchronous Communications Single-Line Control
#2075	Binary Synchronous Communications Single-Line Control/High Speed
#2093	Binary Synchronous Communications 8-Line Control
#2094	Binary Synchronous Communications 4-Line Adapter
#2090	SDLC Single-Line Control
#2095	Feature-Programmable 8-Line Multi-Line Communi- cations Controller
#2096	Feature-Programmable 4-Line Multi-Line Communi- cations Attachment
#7840	Timer
#7850	Teletypewriter Attachment (supported for use with Teletype® Models ASR 33/35)

**Note:** Device and feature performance is dependent upon hardware configuration, Realtime Programming System generation options, and application program design.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

® Registered trademark of Teletype Corporation.  
\*\* Requires separate licensed program.

## Realtime Programming System V4 (cont'd)

### HARDWARE REQUIREMENTS

The minimum system after initially loading the disk and when the application program executes without hard copy output, system console operations, and data interchange is:

<b>Processor</b>	IBM 4952, 4953, 4955 for a single address space management environment system or IBM 4952 or 4955 (model B or D equipped with Storage Address Relocation Translator #6335 or model E) for a multiple address space management environment system.
<b>Storage</b>	48K bytes (64K bytes required for multiple address space environment).
<b>Disk</b>	1- IBM 4962 model 1, 1F or 3 or 4963 Disk Storage Unit.

The minimum hardware configurations to support System Generation and System Installation using the supplied Starter Systems is:

<b>Processor</b>	IBM 4952, 4953 or IBM 4955 for a single address space management environment system or an IBM 4955 (model B or D equipped with Storage Address Allocation Translator #6335 or model E) for a multiple address space management environment system.
<b>Storage</b>	64K bytes for single address space management environment or 96K for multiple address space management environment.
<b>Disk/Diskette</b>	1 each - diskette and disk drive in any combination, selected from supported models of IBM 4962 Disk Storage Unit, IBM 4963 Disk Subsystem, IBM 4964 Diskette Unit, and IBM 4966 Diskette Magazine Unit.
<b>Printer</b>	1 - IBM 4973 Line Printer or 1 - IBM 4974 Printer
<b>Operator Station</b>	1 - IBM 4979 Display Station or 1 - IBM 4978 Display Station (as 4979 only) or 1 - IBM 3101 Display Terminal (as Teletype® Models ASR33/35 equivalent device) or 1 - Teletypewriter Adapter #7850 with Teletype® Models ASR 33/35 or equivalent device

Attachment to an SNA network requires SDLC Single Line Control (#2090).

To support BSC IPL and BSC DUMP, the Series/1 host system must have any of the BSC communications features (#2074, #2075, #2093/#2094). The remote system must have one of the BSC single line features (#2074, #2075).

The hardware requirements for the storage overlay capability include the Storage Address Relocation Translator Feature #6335 in a 4955 model B or D or 4955 model E and a minimum of 64K bytes of physical storage.

### SOFTWARE REQUIREMENTS

None

### COMPATIBILITY

#### Files

Complete compatibility with files supported by the IBM Series/1 Realtime Programming System Version 1 (5719-PC1), Version 2 (5719-PC2) or Version 3 (5719-PC3) is provided. Any data file written using any of these systems is directly usable by the other. Compatibility with external (to Series/1) diskette devices is maintained by using Basic Exchange format. See the *IBM Diskette General Information Manual* (GA21-9187).

#### Programs

Problem state source programs which assemble or compile and execute on the Realtime Programming System Version 3 (5719-PC3) will also assemble or compile and execute on The Realtime Programming System Version 4 (5719-PC4).

Problem state source programs which assemble or compile and execute on the Realtime Programming System Version 1 (5719-PC1) or Version 2 (5719-PC2) may require source modifications to assemble or compile and execute on the Realtime Programming System Version 4 (5719-PC4).

In any case, Version 1 or Version 2 problem state programs require reassembly and rebuilding to prepare them to execute on Version 4.

In addition Version 3 problem state programs, with the exception of those programs using the BSC IPL bootstrap facilities, require no reassembly. Most Version 3 problem state programs need only be installed on a Version 4 system to execute. In some cases, VCBA space may need to be increased.

Results and output generated from selected Realtime Programming System-based programs invoked under the Command Language Facility are identical to that which would be experienced when invoking these programs and functions via alternate means (for example, Job Stream Processor).

**Note:** Only Version 4 of the Program Preparation Subsystem supports the Command Language Facility.

Customer-written programs included with the supervisor must be written in accordance with the internal supervisor programming conventions for 5719-PC4 which are different from those of 5719-PC1, 5719-PC2 and 5719-PC3.

The following Series/1 Licensed Programs are compatible with the Series/1 Realtime Programming System Version 4.

- Series/1 Program Preparation Subsystem Version 3 (5719-AS3)
- Series/1 Program Preparation Subsystem Version 4 (5719-AS4)
- Series/1 FORTRAN IV Compiler and Object Support Library (5719-FO1) Version 1.3
- Series/1 FORTRAN IV Realtime Subroutine Library (5719-FO3) Version 1.2
- Series/1 FORTRAN IV Realtime Subroutine Library (5719-FO4) Version 2.0
- Series/1 Mathematical and Functional Subroutine Library (5719-LM1) Version 1.2
- Series/1 Mathematical and Functional Subroutine Library (5719-LM2) Version 2.2
- Series/1 PL/I Compiler and Resident Library (5719-PL1) Version 1.2
- Series/1 PL/I Transient Library (5719-PL3) Version 1.2
- Series/1 COBOL Compiler and Resident Library (5719-CB1)
- Series/1 COBOL Transient Library (5719-CB2)
- Series/1 Sort/Merge (5719-SM1)
- Series/1 4987 Programmable Communications Subsystem Preparation Facility (5719-CS0)
- Series/1 4987 Programmable Communications Subsystem Execution Support (5719-CS1)
- Series/1 4987 Programmable Communications Subsystem Extended Execution Support (5719-CS2)
- Series/1 Indexed Access Method (5719-AM1)
- Series/1 5250 Information Display System (5719-TA1)
- Series/1-System/370 Channel Attach Program (5719-CA1)
- Series/1 4969 Magnetic Tape Drive (5719-TA4)

The following Series/1 Licensed Programs - PRPQs are compatible with the Series/1 Realtime Programming System Version 4 (5719-PC4). For details on these programming RPQs, refer to the respective programs.

- Series/1 Realtime Programming System Basic Sort Programming RPQ P82573 (5799-TBP) Version 1 Modification Level 1
- Series/1 Remote Job Entry Programming RPQ P82575 (5799-TBK)
- Series/1 Realtime Programming System Indexed Access Method Programming RPQ P82570 Version 3 (5799-TCB)
- Series/1 Realtime Programming System 4978 Display Station Support Programming RPQ P2572 (5799-TCE) Version 3
- Series/1 Realtime Programming System Disk Spooling Programming RPQ P82574 Version 3 (5799-TCH)
- Series/1 Realtime Programming System Transient Activity Tool Programming RPQ P82606 Version 1 (5799-TDG)
- Series/1 Realtime Programming System Multiple Terminal Manager RPQ P82596 (5799-TCY)

**Realtime Programming System V4 (cont'd)****Program Preparation (5799-TCL)**

The IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3) or the IBM Series/1 Program Preparation Subsystem Version 4 (5719-AS4) is required to prepare programs to execute on the IBM Series/1 Realtime Programming System Version 4 (5719-PC4). If the Command Language Facility will be used, then 5719-AS4 is required as commands have been written to the Program Preparation Subsystem Version 4 function level.

The Base Program Preparation Facilities (5719-PA1) cannot be used to prepare programs to run with the Realtime Programming System.

**Required EC Levels**

The required engineering change level for all models of the 4955 is EC 375013. The 4955 model B must also have EC 578550.

The required engineering change levels for 5719-PC4 for the IBM 4962 Disk Unit are EC 829868 and EC 578573. This applies to the IBM 4962 Disk Unit Serial numbers 10001 through 10188.

**Note:** Implementation of engineering changes is handled by Field Engineering.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Programming System Summary (GC34-0285) ... IBM Series/1 Realtime Programming System Version 4: Supervisor Macro Programmer's Guide (SC34-0205) ... IBM Series/1 Realtime Programming System Version 4: Data Management Macro Programmer's Guide (SC34-0206) ... IBM Series/1 Realtime Programming System Version 4: Binary Synchronous and Start/Stop Communications Macro Programmer's Guide (SC34-0207) ... IBM Series/1 Realtime Programming System Version 4: Operator Commands and Utilities (SC34-0208) ... IBM Series/1 Realtime Programming System Version 4: Generation and Installation Procedures (SC34-0204) ... IBM Series/1 Realtime Programming System Version 4: Macro Reference (SC34-0211) ... IBM Series/1 Realtime Programming System Version 4: Messages and Codes (SC34-0209) ... IBM Series/1 Realtime Programming System Version 4: Problem Determination (SC34-0219) ... IBM Series/1 Realtime Programming System Version 4: Control Blocks (SC34-0210) ... IBM Series/1 Realtime Programming System Version 4: System Network Architecture Support Macro Programmer's Guide (SC34-0228) ... IBM Series/1 Realtime Programming System Version 4: Command Language Facility User's Guide (SC34-0299) ... IBM Series/1 Realtime Programming System Version 4: Command Language Facility Command Reference Summary (SX34-0026) ... IBM Series/1 Realtime Programming System Version 4: Command Language Facility Language Reference Summary (SX34-0027) ... IBM Series/1 Realtime Programming System Version 4: Design Guide (SC34-0242) ... IBM Series/1 Realtime Programming System Version 4: Licensed Program Specification (GC34-0202) ... IBM Series/1 Authorized Program Analysis Report (APAR) User's Guide (GC34-0099)*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**REALTIME PROGRAMMING SYSTEM VERSION 5  
5719-PC5**

**PURPOSE**

The IBM Series/1 Realtime Programming System (also referred to as the operating system) is a control system through which a user can install, operate, and maintain system programs, application programs, and data. It is a full function multiprogramming, multitasking, event-driven, disk/diskette-based system. The operating system manages physical resources - processor, storage, and devices. Its supervisor, data management, and communications services are a controlled interface between application programs and the Series/1 hardware. The operating system supports the terminal-transaction environment and supplies the environment for both realtime and batch applications.

**DESCRIPTION**

The Realtime Programming System Version 5 (5719-PC5) operates in a multiple address space environment only. Multiple address space management provides for isolation between task sets and the use of up to 512K bytes of processor storage.

• **Multiprogramming/Multitasking**

The operating system is a multiprogramming/multitasking system. It allows multiple programs within the system to be processed concurrently by interleaving their execution.

• **Event-driven**

Task sets are collections of programs, data, and control information which reside in partitions - one per partition.

Task sets are queued for execution in partitions based on the occurrence of the following events:

- External (process interrupt)
- Time of day
- Time interval, either single or repetitive
- Operator request
- Program request
- Host request for session establishment with an assigned logical unit (LU)

• **Disk/Diskette Based**

The control system consists of resident and transient programs. These programs reside in a system task set library on disk or diskette. User task set libraries can also reside on disk or diskette.

Diskette-based systems will have less capacity and performance than disk-based systems and must be custom-generated and tuned for specific application environments. Customers should contact their marketing representative for assistance in determining whether or not a diskette-based system can be generated to satisfactorily meet their requirements.

• **Supervisor Services**

The supervisor controls the allocation and distribution of the physical resources of the system: Storage, processor, and devices. It manages programs and their interaction through a set of system management services that manipulate resources and programs on a logical level. The supervisor performs services and functions such as:

- Primary and secondary storage management
- Partition and task set management
- Multiple dynamic partitions per address space
- Multiple concurrent shared task sets
- Task and program management
- Dynamic transient pool management for supervisor transients
- Event and queue management
- Global queue services (across partitions)
- Serially reusable resource management
- Timer management and services
  - Feature #7840
  - 4952 Native Clock/comparator
- Error management and logging
- Class interrupt management
- Operator interface management
- Management of the interface between subsystems and terminals

• **Data Management**

Data set management provides services such as:

- Three levels of access - basic, physical, and logical
- Two access methods - sequential and direct
- Three data set organizations - consecutive, random, and partitioned.

• **DPIO Support**

- 3101 Display Terminal
- 4962 and 4963 Disks
- 4964 and 4966 Diskette Unit
- 4965 Diskette Drive and I/O Expansion Unit (also 4952 model C Diskette Drive)

- 4969 Magnetic Tape\*\*
- 4973 Line Printer
- 4974 Printer
- 4975 Printer
- 4978 Display
- 4979 Display Station
- 5225 Printer\*\*
- 5251 models 1 and 2 Display Terminals\*\*
- 5252 model 1 Display Terminal\*\*
- 5256 models 1, 2, and 3 Printers\*\*
- #7850 Teletypewriter Adapter
- 6733 Typewriter Communication Module\*\*\* (with Electronic Typewriter 85)

\*\* Separate licensed program.  
\*\*\* As a Teletype® Model 33/35.

• **Sensor I/O Support**

- Analog I/O (Single or Multiple Point)
- Digital I/O

• **Utilities**

The operating system has a set of utilities for the installation and maintenance of programs and data. Included are the Transient Activity and the Automatic Patch Application Tool.

• **Command Language Facility (Optional)**

The Realtime Programming System Version 5 command language facility consists of an initialization task set, the S1/EXEC interpreter with a language and a set of IBM-supplied commands written in the S1/EXEC language. The facility provides such functions as:

- Multiple concurrent user capability
- Commands processed by a realtime interpreter which invokes requested services
- Tutorial support
- A set of commands which may be supplemented by user-written commands
- Command capability to perform I/O to/from data sets or printers, as well as user terminals

• **Problem Determination**

The operating system has debugging aids that enable a user to find and correct errors in problem and supervisor programs. Through the interactive debug facility, a user can display and modify a register, processor storage, disk, and diskette, as well as set address stops to monitor the status of executing programs.

• **Service Aids**

- I/O Trace
- Storage Patch and Dump
- SVC Trace
- Online Error Log Report
- Patch Application Tool

• **System Initialization**

• **SNA Support**

The Realtime Programming System base SNA support provides the following functions, as defined by Systems Network Architecture:

- SNA Physical Unit Type 2 support
- SNA Function Management Profiles 3 and 4 Support
- SNA Transmission Subsystem Profiles 3 and 4 Support
- SDLC Secondary Station Support
- Data Flow Control Level Interface
- Multiple Physical and Logical Units
- System Definition Services
- Network Attachment, Activation, or Deactivation Services
- Session and Message Exchange Services
- Activation of a Series/1 Task Set from the Host

This set of functional support allows the Series/1 to be defined as a Cluster Controller on an SNA/SDLC network controlled by a System/370 using OS/VS2 (SVS or MVS) with one of the following access methods:

- ACF/VTAM
- ACF/TCAM
- VTAM Version 2
- TCAM Version 10 with NCP Version 5

through a 3705 Communications Controller using the appropriate version of the Network Control Program.

This support also allows operation in a network controlled by a System/370 using OS/VS2 with IMS/VS Version 1 Advanced Function for Communications and System/370 CICS/VS Version 1.5.

## Realtime Programming System V5 (cont'd)

### • Start/Stop Support

The following start/stop (asynchronous) terminals are supported via features #1610, or #2091 and #2092:

- 2740 Communications Terminal, model 1, in point-to-point switched, point-to-point nonswitched, multipoint connections.
- 2740 Communications Terminal, model 1 or 2, in multipoint connections.
- 2741 Communications Terminal in point-to-point switched and point-to-point nonswitched connections
- 3101 Display Terminal, models 10, 12, 13, 20, 22, and 23 (in character or block mode), or equivalent device, in point-to-point switched or nonswitched connections. Determination of equivalency is a user responsibility.

The following start/stop (asynchronous) terminals are supported via features #1310, #2095/#2096:

- 3101 Display Terminal, models 10, 12, 13, 20, 22, and 23 (in character or block mode), or equivalent devices in point-to-point switched or nonswitched connections. Determination of equivalency is a user responsibility.

The following systems are supported via features #1610, #2091/#2092, or #2095/#2096:

- IBM Personal Computer with the Asynchronous Communications Adapter, in switched and point-to-point nonswitched connections. The IBM Personal Computer licensed program - Asynchronous Communications Support, or a user-written IBM Personal Computer program can communicate with a user-written program in the Series/1 using Realtime Programming System Read/Write communications support.
- System/23 Datamaster with the Communications Adapter Feature and utilizing the Asynchronous Communications licensed program, in switched and point-to-point nonswitched connections.

The following system is supported via features #1310, #1610, #2091/#2092, or #2095/#2096:

- Displaywriter System with a Communications Adapter and utilizing the Asynchronous Communications licensed program, in switched and point-to-point nonswitched connections. The Displaywriter can operate in either of two asynchronous communications modes: 2741 (emulates the 2741 Communications Terminal), and TTY (emulates a teletypewriter).
- 6733 Typewriter Communication Module (with attached IBM Electronic Typewriter 85) in point-to-point switched or nonswitched connections as a Teletype® Model 33/35.

### • BSC Support

The following Binary Synchronous Terminals are supported via features #1310, #2074, #2075, #2080 or #2093 and #2094:

- BSC support for 3271 Control Unit, models 1 and 2, with attached 3277, 3284, 3286, and 3288 terminals on a multipoint line. Note: 3270 support is limited to communications support and does not include mapping services.
- BSC support for 3275 Display Station, models 1 and 2, on a switched point-to-point or multipoint line.
- BSC support for 3274 Control Unit, models 1C and 51C, with attached 3277 and 3278 Display Stations, 3279 Color Display Stations, and 3284, 3286, 3287, 3288, and 3289 Printers on a nonswitched point-to-point or multipoint line.
- BSC support for 3276 Control Unit Display Station, models 1, 2, 3, and 4, with attached 3278 Display Stations; 3279 Color Display Stations; and 3287 and 3289 Printers on a nonswitched point-to-point or multipoint line.
- 3741 Data Station on a switched or nonswitched point-to-point line with the Expanded Communications Feature (#1685).
- 5260 Retail System via the 5265, models A12, A22, A42, B12, B22, B42, using point-to-point BSC discipline as a System/3.
- 5280 Distributed Data System via the 5285 or 5288 with Communications Adapter Feature (#2500) on a switched point-to-point or nonswitched point-to-point or multipoint line. (5280 appears as a 3741)
- 6670 Information Distributor with BSC feature on a switched or nonswitched point-to-point line. (See the *Programmer's Guide* for Communicating with the 6670 Information Distributor (BSC Environment) for details on the 6670.)
- 3684 Point-of-Sale Control Unit, models 1 or 2, with BSC Communications on a switched or nonswitched point-to-point or nonswitched multipoint facility (as a System/3). A user-written 3684 program or the Host Command Processor (HCP) facility in the 3684 can communicate with a user-written program in the Series/1 utilizing Realtime Programming System Read/Write communications support. (See the M3684 pages.)
- 4975, models 1R, 2R, via #1310 only.

The following system is supported via features #2074 or #2093/#2094:

- System/23 Datamaster with the Communications Adapter feature and utilizing the Binary Synchronous Communications licensed program, in switched and point-to-point nonswitched connections. The System/23 Datamaster supports the line protocol of the 3741 Data Station.

The following system is supported via features #1310, #2074, or #2093/#2094:

- Displaywriter System with a Communications Adapter and utilizing the Binary Synchronous Communications licensed program, in switched and point-to-point nonswitched connections. The Displaywriter System emulates 2770/3780 line protocol.

The following Binary Synchronous CPU-to-CPU communications are supported via features #1310, #2074, #2075, or #2080 (not System/32) or #2093 and #2094 (Series/1 appears as a System/3).

CPU-to-CPU point-to-point (switched or nonswitched)

- Another Series/1 using the Series/1 Realtime Programming System Versions 2, 3, 4, or 5.
- System/370 BTAM OS/VS1, OS/VS2 (SVS or MVS), or DOS/VS.
- System/370 TCAM OS/VS1 or OS/VS2 (TCAM does not support conversational mode).
- System/370 VTAM, DOS/VS.
- System/370 CICS/VS, OS/VS1, OS/VS2, or DOS/VS (BTAM only)
- System/32 under RPG programming facilities.
- System/34 under RPG programming facilities and the BSCCL (BSC Equivalence Link) feature of the SSP-ICF (Interactive Communications Feature).
- System/3 using CCP or RPG.
- System/38 via RPG III or COBOL application programs.

CPU-to-CPU, Series/1 as a multipoint tributary.

- System/370 BTAM OS/VS1.
- System/370 IMS/VS, OS/VS1, or OS/VS2 (BTAM only). IMS/VS support is via Intelligent Remote Station Support (IRSS), an IMS/VS protocol for the support of remote systems. A Series/1 user-written application program is required for the formatting and handling of messages in the proper IMS/IRSS formats.

### VERSION 5 ENHANCEMENTS

Version 5 of the Realtime Programming System provides all the functions included in Version 1 (5719-PC1), Version 2 (5719-PC2), Version 3 (5719-PC3), and Version 4 (5719-PC4), excluding single address space management plus the following additional functions:

#### • Support for New Series/1 Large System Processor

##### - 4955 model F Support

Version 5 is designed to effectively support the larger 4955 model F processor.

This larger processor provides a maximum of 512K bytes of storage. The additional storage will allow room for more programs and data, multiple Shared Task Sets, larger and more applications, and increased number of Command Language Facility users in logically expanded D-Space.

##### - Logically Expanded D-Space

Supervisor Data Space (D-Space) has been logically extended beyond its current 64K byte limit by employing unmapped storage to hold user control modules. The effect of this is to provide a greater capacity for more devices and task sets.

##### - Secondary Storage Services

With the introduction of a new facility called "Secondary Storage Services", a partition size may be extended beyond 64K bytes by requesting that a pool of additional processor storage be allocated at Task Set load time.

##### - Multiple Shared Task Sets

More than one shared task set can be active at a time. This allows each shared task set to be tailored to the requirements of the applications which share it and avoids the need to combine all sharable data and programs into one large task set. This new capability can also result in more of the address space being available to the application program.

#### • More Effective Support of Small Processors

##### - 4952 model C Support

**Realtime Programming System V5 (cont'd)**

As a result of several enhancements, Version 5 more effectively supports the 4952 processor with a maximum of 128K bytes of storage. These enhancements are: Full support of the integrated clock/comparator, better storage utilization by making more functions SYSGENable and loadable Binary Synchronous/Asynchronous communications support.

• Improved SYSGEN and Installation

– Integrated Products

Version 5 has greatly improved in the area of SYSGEN and installation. The 4978, Spool and Transient Activity Tool support previously offered as separately licensed programs, have been fully integrated into Version 5. In addition, to fully provide what is needed for application development, the User Macro Library, SYSGEN programs, and the Command Language Facility are now packaged in Version 5 of the Series/1 Program Preparation Subsystem (5719-AS5). The Command Language Facility also remains as an option in Version 5 of the Realtime Programming System for production system use. Command Language Facility disk space requirements have been reduced for the non-development environments.

– Standard System

To reduce the need to SYSGEN, a standard (pre-built) system is provided. This system is quite comprehensive and will normally support a large number of different development configurations and uses, as well as having application to many production system environments. The minimum processor storage required by the standard system is 192K bytes. An installation system residing on diskette will also be provided and may be used to install a customized system on a processor with 128K bytes or more of storage.

– SYSGEN Improvements

If the need exists to generate a customized system, various improvements to SYSGEN have been made. A SYSGEN will be easier, more accurate, and faster through reduced questions, automatic answer verification, fewer assemblies, and the ability to restart SYSGEN at various points.

– Patch Application Tool Enhancements

To facilitate installing APAR fixes, the Patch Application Tool supports all Realtime Programming System-based products which have Central Service support and automatically allocates and maintains a single patch log. It will also automatically allocate a system patch backup volume if needed.

• Improved System Usability and Application Productivity

– SNA Enhancements

Improved usability and productivity is a key objective in Version 5. The segmentation of messages is now provided in the Systems Network Architecture (SNA) support. To provide increased connectivity to System/370 system facilities, Unbind/Hold and Full Duplex are also provided. In addition, the SNA buffer pool has been removed from supervisor data space (D-space) to reduce the SNA demands on this limited resource and to support more Logical Units (LUs).

– New Operator Commands

To improve usability and the operational characteristics of the system, additional system operator commands are supplied to display the System Scheduler Table, set the date in Gregorian format showing month, day, and year, and to IPL a Realtime Programming System. In addition, there are commands to display spooling jobs, delete, hold, expedite, or release a spool job, and define subsystem and terminals to the Terminal Controller.

– Common Terminal Controller

In view of the increased processor sizes now supported, several subsystems (IBM and User) may typically co-exist on a single processor. To facilitate users switching between subsystems, a Common Terminal Controller has been provided. The controller will dynamically connect a terminal to a specific subsystem when a user logs on (LOGON) and later disconnect and reconnect it to another subsystem. This support is SYSGENable. The Command Language Facility and the Multiple Terminal Manager PRPQ Version 2.1 support the Common Terminal Controller.

– Dynamic Partitions

Multiple dynamic partitions are now allowed in an address space.

– Interpartition Communication

Because larger applications will be possible, communication between portions of an application, specifically task sets, will become desirable. The new global queue facility provides cross partition communication without the need for a shared task set.

– Command Language Facility Enhancements

Additional commands and changed commands have been provided with the Command Language Facility to define a line or matrix printer, invoke a character FONT definition task set, invoke the Patch Application Tool, simplify dumping a 4969 Magnetic tape data set, print the formatted online error log report, and to queue a task set for execution. Also provided are the Series/1 EXEC System commands to read or write to the user's terminal, create a DSD and clear or query the console stack. There are also extended capabilities that can be used in writing commands, such as the ability to perform I/O from an EXEC command file. The latter will allow a user to write extremely powerful Series/1 EXEC command procedures. In addition, the Install command can be used to install all supported licensed programs.

– Improved Publications

Many of the existing publications have been split to improve usability. New publications have been introduced to better accelerate understanding of the Realtime Programming System Version 5 features and facilities.

– Debug

To improve usability, the Debug Facility has been enhanced to support multiple users, to provide commands for HELP and single instruction step, and to allow single command syntax and hardcopy output.

– Online Error Log Report Facility

This new facility will execute "online" under the operating system. This utility will format and print the system error logs without requiring the system operation to be terminated.

– Spool Enhancements

With the inclusion of the improved SPOOL function into Version 5, certain key enhancements have been made. They are as follows:

- Multiple Output Classes
- Forms Control
- Multiple Copies Control
- Improved Separator Page Support
- Spooling of System Messages
- Reduction of dynamic storage requirements in system data space

• New I/O Device Support

Support under Version 5 of the Realtime Programming System is provided for the following new I/O devices:

Model/Feature	Device
#1310	Multifunction Attachment
#1400	Local Communications Controller**
#2080	Synchronous Communications Single-Line Control/High Speed, BSC nonswitched (verified Series/1-to-Series/1 only) and SDLC non-switched to 9600 bps (verified Series/1-to-370 connection)
4975	Printer (all models)
4965	Diskette Drive and I/O Expansion Unit (also included in 4952 C)
3101 model 20, 22, 23	Display Terminal, models 20, 22 or 23 in full screen mode
5225 (as a 5256)	Printer** (via RPQ D02322)
6733 (as a TTY 33/35)	Typewriter Communication Module (with attached IBM Electronic Typewriter 85)

\*\* Supported as a separately licensed program.

Devices

The 4975 Printer and the 4965 Diskette Drive and I/O Expansion Unit are functionally compatible with the 4974 Printer and the 4964 Diskette Unit, respectively. Any program using the 4974 or 4964 through the operating system GET/PUT or READ/WRITE support, will run with the new devices in a similar fashion. Use of the additional features provided by the 4975 printers will require appropriate program changes.

This applies to the Series/1 FORTRAN, PL/I, and COBOL compilers which produce object programs that access the new devices through the operating system interfaces.

Note: EXIO access is device dependent by definition and is therefore not transparent to the user.

\*\* Supported by separate licensed programs

PROGRAM PRODUCTS

**Realtime Programming System V5 (cont'd)**

**Device Support**

The Realtime Programming System Version 5 supports the 4952 models A, B, and C and the 4955 models D, E, and F and the following processor options:

- #3920 Floating Point Processor (4955 only)
- #5650 Programmer's Console
- #6335 Storage Address Relocation Translator (4955 model D only)

In addition, multiples of the following devices and features are supported:

3101 models (10, 12, 13, 20, 22, 23)	Display Terminals
4962 models 1, 1F, 2, 2F, 3, and 4	Disk
4963 models 23A, 23B, 29A, 29B, 58A, 58B, 64A and 64B	Disk Subsystem
4964 model 1	Diskette
4965	Diskette Drive and I/O Expansion Unit
4966 model 1	Diskette Magazine Unit
4969 model 1	Magnetic Tape Drive**†
4973 models 1 and 2	Line Printer
4974 model 1	Printer
4975 models 1L, 2L, 1R, 2R	Printer
4978	Display
4979 model 1	Display Station
4982 model 1	Sensor I/O†
4987	Programmable Communications Subsystem**†
4993	Channel Attachment
4999 models 1 and 2	Battery Backup
5225 as a 5256 (via RPQ D02322)	Printer**†
5251 models 1 and 2	Information Display Stations**†
5252 model 1	Information Display Station**†
5256 models 1, 2, and 3	Printers**†
6733 (as a TTY 33/35)	Typewriter Communication Module

**Features**

#1200	System/370 Channel Attachment**
#1210	5250 Information Display System Attachment**†
#1310	Multifunction Attachment
#1400	Local Communications Controller**†
#1560	Integrated DI/DO†
#1565	Channel Repower
#1610	Asynchronous Communications Single-Line Control
#2000	Communications Indicator Panel
#2074	Binary Synchronous Communications Single-Line Control
#2075	Binary Synchronous Communications Single-Line Control/High Speed
#2080	Synchronous Communications Single-Line Control/ High Speed, BSC nonswitched (verified Series/1-to-Series/1 only) and SDLC nonswitched to 9600 bps (verified Series/1-to-370 connection)
#2090	SDLC Single-Line Control
#2091	Asynchronous Communications 8-Line Control

#2092	Asynchronous Communications 4-Line Adapter
#2093	Binary Synchronous Communications 8-Line Control
#2094	Binary Synchronous Communications 4-Line Adapter
#2095	Feature Programmable 8-Line Multiline Communications Controller
#2096	Feature-Programmable 4-Line Multiline Communications Attachment
#7840	Timer
#7850	Teletypewriter Adapter (supported for use with the 3101 model 1 or 2 Display Terminal or the Teletype® Models 33/35 as a 4979 or 3101 equivalent or 6733)
D02038	4978 Attachment (RPQ)
**	Available in separately licensed program.
†	Not within the prebuilt standard system; requires Custom SYSGEN to include support.
®	Registered Trademark of the Teletype Corporation.
	<b>Note:</b> Device and feature performance is dependent upon hardware configuration, Realtime Programming System generation options, and application program design.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system after installation of the system and when the application program executes without hard copy output, system console operations, and data interchange is:

<b>Processor</b>	IBM 4952 or 4955 (model D equipped with Storage Address Relocation Translator #6335 or models E or F)
<b>Storage</b>	128K bytes
<b>Disk*</b>	1 - IBM 4962 Disk Storage Unit (all models) or a 4963 Disk Subsystem (all models)

\* See prior note regarding diskette-based system

The minimum hardware configurations to support System Generation, and supported by the supplied Standard System is:

<b>Processor</b>	IBM 4955 models E or F
<b>Storage</b>	192K bytes minimum
<b>Disk/ Diskette</b>	1 each - diskette and disk drive in any combination, selected from supported models of IBM 4962 models 3 or 4 Disk Storage Unit, IBM 4963 Disk Subsystem, IBM 4964 Diskette Drive or IBM 4965 Diskette Drive and I/O Expansion Unit and IBM 4966 Diskette Magazine Unit
<b>Printer</b>	1 - IBM 4973 Line Printer or 1 - IBM 4974 Printer or 1 - IBM 4975 Printer
<b>System Console</b>	1 - IBM 4979 Display Station or 1 - IBM 4978 Display Station or 1 - IBM 3101 Display Station attached via: <ul style="list-style-type: none"> <li>• #1310 Multifunction Attachment (IBM 3101 models 10, 12, 13, 20, 22 or 23 on the first address, IBM 3101 models 13 or 23 on any address)</li> <li>• #1610 Asynchronous Communications Single-Line Control (IBM models 10, 12, 13, 20, 22 or 23)</li> <li>• #2091/#2092 Asynchronous Communication 8-line control and 4-line adapter (IBM 3101 models 10, 12, 13, 20, 22 or 23)</li> </ul>

PROGRAM PRODUCTS

Realtime Programming System V5 (cont'd)

- #2095/#2096 Feature- Programmable 8-line multiline communications controller and 4-line attachment (IBM 3101 models 10, 12, 13, 20, 22 or 23) or  
1 - Teletypewriter Adapter (#7850) with the IBM 3101 model 10, 12, 13, 20, 22, 23 Display or IBM 6733 Teletypewriter Communication Module (with attached Electronic Typewriter 85) or equivalent Teletypewriter device.

Attachment to an SNA network requires SDLC Single-Line Control (#2090) or Synchronous Communications Single-Line Control/High Speed (#2080).

To support BSC IPL and BSC DUMP, the Series/1 host system must have any of the BSC communications features (#1310, #2074, #2075, #2080, #2093/#2094). The remote system must have one of the BSC single-line features (#1310, #2074, #2075, #2080). BSC IPL and BSC DUMP are not supported on multipoint lines.

SOFTWARE REQUIREMENTS: None

COMPATIBILITY

Files

Complete compatibility with files supported by the Series/1 Realtime Programming System Version 1 (5719-PC1), Version 2 (5719-PC2), Version 3 (5719-PC3), or Version 4 (5719-PC4) is provided. Any data file written using any of these systems is directly usable by the other. Compatibility with external (to Series/1) diskette devices is maintained by using Basic Exchange format. See the *IBM Diskette General Information Manual* (GA21-9187).

Programs

Single Address Space Systems (64K bytes or less) are not supported by this Version of the Realtime Programming System.

Problem state source programs which assemble (or compile) and execute on the Realtime Programming System Version 3 (5719-PC3) or on a Version 4 (5719-PC4) Multiple Address Space Management (MASM) system, will also assemble (or compile) and execute on the Realtime Programming System Version 5 (5719-PC5).

In any case, Versions 1 or 2 problem state programs require reassembly and rebuilding to prepare them to execute on Version 5.

With the availability of logically expanded "D Space", Version 5 problem state programs may need to increase VCBA space.

In addition, Versions 3 and 4 problem state programs (with the exception of those programs using the BSC IPL bootstrap facilities) require no reassembly to execution Version 5. Most Version 3 and 4 problem state programs need only be installed on a Version 5 system to execute. In some cases, VCBA Space may need to be increased.

Customer-written programs included with the supervisor must be written in accordance with the internal supervisor programming conventions for 5719-PC5. These are different from those of 5719-PC1, 5719-PC2, 5719-PC3, and 5719-PC4, and may result in changes to existing user-written extensions.

Programs using the SVC interface to SPOOL commands will not operate on Version 5; using the TMON Macro of the Transient Activity Tool requires assembly and rebuilding with Version 5. Programs written to execute using the 4978 Programming RPQ may require code changes, reassembly, and rebuilding with Version 5 to emulate the Programming RPQ processing.

The following Series/1 Licensed Programs are compatible with the Series/1 Realtime Programming System Version 5:

- Series/1 Indexed Access Method (5719-AM1)\*
- Series/1 Indexed Access Method Version 2 (5719-AM2)\*\*
- Series/1 Program Preparation Subsystem Version 5 (5719-AS5)
- Series/1 System/370 Channel Attach Program (5719-CA1)\*
- Series/1 COBOL Compiler and Resident Library (5719-CB1)
- Series/1 COBOL Transient Library (5719-CB2)
- Series/1 COBOL Compiler and Resident Library Version 2 (5719-CB7)\*\*
- Series/1 COBOL Transient Library Version 2 (5719-CB8)\*\*
- Series/1 Communications Monitor Version 1 (5719-CM1)\*
- Series/1 4987 Programmable Communications Subsystem Preparation Facility (5719-CS 0)
- Series/1 4987 Programmable Communications Subsystem Extended Execution Support (5719-CS2)\*
- Series/1 FORTRAN IV Compiler and Object Support Library Version 2.0 (5719-FO2)

Series/1 FORTRAN IV Realtime Subroutine Library Version 2 (5719-FO4)

Series/1 Mathematical and Functional Subroutine Library Version 2 (5719-LM2)

Series/1 PL/I Compiler and Resident Library Version 2 (5719-PL2)

Series/1 PL/I Transient Library Version 2 (5719-PL4)

Series/1 Realtime Programming System Screen Format Design Aid Utility (5719-SF1)

Series/1 Realtime Programming System Screen Format Presentation Support (5719-SF2)\*

Series/1 Sort/Merge (5719-SM1)

Series/1 Realtime Programming System SNA Extended Support (5719-SN1)\*

Series/1 5250 Information Display System (5719-TA1)\*

Series/1 4969 Magnetic Tape Drive (5719-TA4)

The following Series/1 licensed programs - PRPQs are compatible with the Series/1 Realtime Programming System Version 5 (5719-PC5).

- Series/1 Remote Job Entry Programming RPQ P82575 (5799-TBK)
- Series/1 Packet Network Support Programming RPQ P10008 (5799-TCP)\*
- Series/1 Remote Management Utility Programming RPQ P82597 (5799-TDH)
- Series/1 Realtime Programming System Multiple Terminal Manager Programming RPQ P82622 (5799-TDX) Version 2
- Series/1 Job Stream Processor Programming RPQ P82635 (5799-TEC)
- Series/1 SNA Remote Management Utility Programming RPQ P82639 (5799-TEF)\*

Program Preparation

The Series/1 Program Preparation Subsystem Version 5 (5719-AS5) is required to prepare programs to execute on the Series/1 Realtime Programming System Version 5 (5719-PC5).

The Base Program Preparation Facilities (5719-PA1) cannot be used to prepare programs to run with the Realtime Programming System.

Device Address Assignment

The configuration must also have the following standard address assignments. The Standard System supports these minimum requirements:

Description	Decimal Address	Hexadecimal Address
4962 Disk Unit	03	03
4963 Disk Subsystem	72	48
IBM diskette drive available in		
4952 Processor, model C	68	44
4964 Diskette	02	02
4965 Diskette Drive and I/O Expansion Unit	68	44
4966 Diskette Magazine	34	22
4973 Line Printer	33	21
4974 Printer	01	01
4975 Printer (see #1310)		
4978 Display Station	36	24
4979 Display Station	04	04
#1310 Multifunction Attachment	88	58
• 3101 models 13 or 23 (EIA RS-422-A interface)	89	59
• 4975 model 1L	90	5A
• 4975 model 2L	91	5B
#1610 Asynchronous Communications Single Control	08	08

\* Requires SYSGEN; not included in prebuilt standard system.  
\*\* Requires Realtime Programming System support.



PROGRAM PRODUCTS

**Realtime Programming System V5 (cont'd)**

#2091 / #2092 Asynchronous Communications Multicontrol	96	60
#2095 / #2096 Feat. Programmable Comm.	96	60
#7850 Teletypewriter Adapter	00	00

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System Version 5: Reference Summary (SX34-0061) ... IBM Series/1 Authorized Program Analysis Report (APAR) User's Guide (GC34-0099) ... IBM Series/1 Programming System Summary (GC34-0285). IBM Series/1 Realtime Programming System Version 5: Glossary and Subject Index (GC34-0350) ... Licensed Program Specifications (GC34-0351) ... Concepts and Facilities (GC34-0358) ... Standard System Installation Guide (SC34-0359) ... Command Language Facility User's Guide (SC34-0362) ... Supervisor Services Programming Guide (SC34-0363) ... Operator Commands and Utilities (SC34-0364) ... Data Management Programming Guide (SC34-0365) ... Macro Reference (SC34-0367) ... Messages and Codes (SC34-0368) ... Systems Network Architecture Support Programming Guide (SC34-0370) ... Systems Network Architecture Support Installation Guide (SC34-0371) ... Problem Determination (SC34-0372) ... Control Blocks (SC34-0373) ... Binary Synchronous and Start/Stop Communications Programming Guide (SC34-0422)*

## PROGRAM PRODUCTS

**SERIES/1 REALTIME PROGRAMMING SYSTEM  
VERSION 6 RELEASE 1 (5719-PC6)****PURPOSE**

The Series/1 Realtime Programming System has been enhanced to provide the Series/1 user with improved performance, ease-of-use, serviceability and data integrity.

The Realtime Programming System performance improvements may result in increased application throughput and an increase in the number of devices supported by a Series/1 application.

Ease-of-use enhancements such as full screen menus are provided that allow interactive users to conveniently access functions and applications from their terminals.

Serviceability extensions can result in increased availability of the Series/1 to the user by aiding in determining device condition and providing more information for problem determination.

Duplex volume support, which is available when utilizing at least two disks, provides automatic and transparent data integrity to the application program and the end user.

The Realtime Programming System Multiprocessing feature is announced to offer functions which provide improved processing capability and system availability through multiple processor configurations. A Multiprocessing feature system consists of multiple (2 to 16) Series/1 processors connected by the Local Communications Controller (#1400). In addition to the Realtime Programming System functions, the new feature supports interconnected multiple processors with a single system image, distribution of system operations and applications across processors and non-disruptive horizontal growth.

**HIGHLIGHTS**

- Duplex volumes
- Program segmentation services
- Command Language Facility enhancements
- Serviceability extensions
- Patch Application Tool
- I/O performance improvements
- 4969 Magnetic Tape support
- SNA-Extended support
- 4956 Processor 512K support
- Disk seek statistics
- Other enhancements:
  - All system messages contain node name, the date and the time of day
  - Operator commands display the system and the node status
  - Single or multiple system console control terminals
- New Integrated System Support

The following enhancements will be available August 26, 1983.

- 4956 Processor Support
- 4967 Disk Unit Support
- SNA Enhancements
- High-Level Language Support
- Virtual Device Interface Support
- X.21 Circuit Switched Support

**HIGHLIGHTS OF THE MULTIPROCESSING FEATURE**

- All Realtime Programming System functions
- Multiple processors with a single system image
- Distributed functions
- Non-disruptive growth
- Dynamic system configuration
- Two-channel switch support (#7900)

**DESCRIPTION**

**Duplex Volumes:** When at least two disks are available, any application volume can be declared to be duplexed (a disk can contain one or more volumes, a volume can contain one or more data sets). The Realtime Programming System and the Multiprocessing feature services automatically and transparently keep duplex copies of the volumes. In the event of a volume failure, the system automatically and transparently commences using the second copy of the volume. The terminal designated to receive system messages is notified of the change in volume use and the failure is recorded in the system log.

When any required repairs are completed, the unit can be returned to the system. At this point, a user-invoked system utility (RECOVER) will automatically make the down-level volume identical with the other copy. Application access to the volumes need not be suspended while the re-synchronization is being made. Once the re-synchronization is completed, normal duplex volume support functions are resumed.

The Indexed Access Method is compatible with this function. Refer to the Indexed Access Method (5719-AM2) pages for details.

**Program Segmentation Services:** The Realtime Programming System and the Multiprocessing feature support a new type of program segment and facilities for loading (LOADP) and unloading (UNLOADP) of these segments. These segments are referenced by external names (one to eight EBCDIC characters) and can be loaded and relocated anywhere within the storage previously acquired by the Assembler language application program.

This support provides the Assembler language application program with the capability of creating a dynamic set of storage-resident subroutines that are immediately available for execution.

**Command Language Facility Enhancements:** The Command Language Facility is included as a standard part of Realtime Programming System and the Multiprocessing feature. In addition to the previous command mode of operation, the Realtime Programming System and the Multiprocessing feature provide a new set of full screen menus that allow interactive users to conveniently access system functions and application programs from their terminals. Each user has a choice of command mode or menu mode of operation. In menu mode, the defaults are displayed on the menu; users need only enter the required parameters and if necessary, change the defaults.

Many menus also allow the user to enter a single line command. When the user knows the command format, time can be saved by directly entering the command. When the command function completes, the menu is again displayed.

When the menu names are known, the user can go directly from menu to menu without processing intervening menus. These time saving features can assist in improving end user productivity.

**Serviceability Enhancements:** The Realtime Programming System and the Multiprocessing feature provide two enhancements for serviceability:

- Additional error log record types
  - New log record types are written for changes in duplex volume status and errors in inter-node communication. These log entries improve the ability of the customer and the IBM Service Representative to perform problem determination and to determine system status.
- Online device tests
  - The Realtime Programming System and the Multiprocessing feature allow the system operator to use a set of simple commands to test (exercise) all the IBM disks, diskettes, printers, the floating-point and timer processor features, and most displays attached to the system. This permits the condition of the attached IBM devices to be judged by examining the results of the tests and the Realtime Programming System or the Multiprocessing feature error log.
  - This information is used to help determine when to call the IBM Service Representative to schedule repair or corrective actions.

**Patch Application Tool:** The patch application tool provides the mechanism to apply online patches to the supported products on the system. The patch is applied to the copy of the program on the disk, and therefore will be reflected the next time the program is loaded. Patches to programs loaded at system initialization will be reflected at the next system initialization.

**I/O Performance Improvements:** To more effectively support larger quantities of devices on a node and to provide more effective support of uniprocessor configurations, the Realtime Programming System and the Multiprocessing feature have new I/O support for the disks, diskettes, printers, 4978 Display, 4979 Display and the Asynchronous Attachment feature (#7850).

This implementation can provide better response time and throughput. The implementation is completely transparent to problem state programs.

**4969 Magnetic Tape Support:** The 4969 magnetic tape support is an integral part of Realtime Programming System and the Multiprocessing feature. It is possible to dump and restore disk (except the systems residence disk), while the system is operating.

**SNA-Extended Support:** SNA-Extended support is now provided as part of the base operating system support.

**Disk Seek Statistics:** The user may request that the accesses to physical disk locations be traced. The execution of a new command produces a report that can be used to determine if the volume or dataset placement

PROGRAM PRODUCTS

**Series/1 Realtime Programming System V6 R1 (cont'd)**

on the disk is optimal. By analyzing this report, a user can determine the distribution of the disk accesses between long and short disk arm movement. If there is a predominance of longer access times due to disk arm movements, the System Utilities can be used to reorganize volume or data set locations on the disk, which could result in improved response time and throughput.

**Other Enhancements:** The Realtime Programming System and the Multiprocessing feature provide system management functions, such as:

- Operator commands display the system and the node status
- All system messages contain the node name, the date, and the time of day
- Single or multiple operator console control terminals

**Available in First Service Release:**

**4956 Processor Support:** Realtime Programming System supports all of the features of the new processor including the floating-point feature, the integrated clock/comparator, and the one megabyte of storage. The system allows up to 512K bytes of storage to be mapped. The balance of the storage (if any) can be used by applications through secondary storage services.

The Multiple Terminal Manager (5719-MT1) and the Indexed Access Method (5719-AM2) products will also use additional storage to improve application response time and throughput.

**4967 Disk Unit Support:** Realtime Programming System supports the new large capacity 4967 Disk Unit. Support is consistent and compatible with support for existing disk products. All existing user applications will execute without modification. The cache facility support is transparent to user applications.

**SNA Enhancements:** Systems Network Architecture support is enhanced by:

- Dynamic Network Definition
- Dynamic Device Generation

**Dynamic Network Definition:** A network definition mechanism is provided to dynamically specify network parameters, function previously available only during the SYSGEN process. If at least one SNA network is defined during SYSGEN, additional networks can be defined and activated without requiring a new SYSGEN.

**Dynamic Device Generation:** An SDLC device definition mechanism is provided to dynamically start SDLC devices. If at least one SNA network is defined during SYSGEN, additional SDLC devices can be started without requiring another SYSGEN. Thus, additional devices can be added to the system without disrupting system operation.

**High-Level Language Support:** To enhance high-level language (COBOL, FORTRAN and PL/I) application use of the new larger 4956 Processor and to take advantage of certain Realtime Programming System services, high-level languages will be able to access:

- Secondary Storage Services (PL/I only)
- LOADP/UNLOADP Services
- Global Queue Services

This access will be provided through supplied, callable subroutines.

**Virtual Device Interface Support:** Virtual Device Interface Support provides a user with the capability to develop a system that supports a new terminal device, or a device emulator program, as the system console or display device.

Existing display applications using the READ/WRITE or GET/PUT level of support may use the new terminal device or device emulator as its input/output device with no changes.

**X.21 Circuit-Switched Support:** Operations on X.21 circuit-switched public data networks are supported in binary synchronous and SNA/SDLC modes in compliance with the CCITT X.21 recommendation. Functions provided are:

- Full Address Calling
- Call Establishment
- Call Acceptance
- Direct Call
- Abbreviated Address Calling
- Closed User Group (and with Outgoing Access)
- Calls Barred
- Multiple Lines at Same Address
- Charge Transfer
- Connect when Free
- Redirected Calls

- Dynamic Registration/Cancellation
- Dynamic Facility Request

The following network features are not supported:

- Multiple Addressing (broadcast)
- Charge Advice
- Delayed Delivery
- Selective Direct Call
- Calling Line ID
- Called Line ID

The X.21 Circuit-Switched Support contains:

- The external interfaces to enable the application program or system operator to connect to the X.21 network.
- Status for the X.21 Circuit-Switched network in the system error log.
- Interfaces to support binary synchronous and SNA/SDLC.

**New Integrated System Support:** Realtime Programming System Version 6 supports all of the features of the New Integrated System, models 4954-30D, 4956-30D and 4965-30D. The support is transparent to high-level language programs and Assembler language programs that use the READ/WRITE or GET/PUT interfaces. The Realtime Programming System Version 6 will also support the cache feature of the disk unit, transparent to the application programs.

**DESCRIPTION OF THE REALTIME PROGRAMMING SYSTEM MULTIPROCESSING FEATURE**

Each Series/1 processor can be dedicated to performing unique work, being a backup processor, or a combination of both. Each processor may have its own disks, printers, communications lines, etc., or it may share certain types of devices that are attached to other processors. Except when the execute I/O (EXIO) interface is used, the Realtime Programming System Multiprocessing feature manages the logical sharing of devices to enable applications to transparently use devices that are not attached to the processor in which they are executing.

Disks, diskettes, printers, and certain displays are the devices that do not have to be attached to the processor in which the application is executing. These devices can be attached to any processor in the system. The Realtime Programming System Multiprocessing feature transparently manages the flow of data to and from applications to these devices.

This distribution of system and application function has the potential for providing highly reliable and available operations through redundant resources. It also permits modular, incremental growth as application requirements expand.

A simple, straightforward command set is used to assign system functions and to support processors within the system. Applications can be assigned to processors using the same command set. Once these assignments have been made, they are repeated automatically any time the system is initialized for operation.

**Multiple Processors with a Single System Image:** The Realtime Programming System Multiprocessing feature supports from 2 to 16 processors with a single system image. Through the use of distributed function, most of the resources of each processor are available to the entire system. The entire system can be controlled from one system operator console. This reduces the complexity of system management and operation.

**Distributed Function:** The Realtime Programming System Multiprocessing feature is implemented to permit the distribution of system and application workload among the processors of the Realtime Programming System Multiprocessing feature. This option allows one or more processors to serve interactive displays and terminals, dedication of one or more processors to process disk input and output operations, and one or more processors to operations such as batch jobs and printer output spooling. This distribution of system function, applications, and resources can result in improved system throughput and availability.

The following devices and features can not be distributed:

- Sensor I/O
- Programmable Communications Subsystem
- 4969 Tape Magnetic Tape Unit
- 370 Channel Attach
- SNA/SDLC
- Binary Synchronous Communications
- Asynchronous Communications

**Non-Disruptive Growth:** The Realtime Programming System Multiprocessing feature allows the incremental addition of devices, features,

PROGRAM PRODUCTS

**Series/1 Realtime Programming System V6 R1 (cont'd)**

and other system options in a manner that does not require the entire system to be stopped.

Even processors and their attached I/O may be added in a manner that does not require the entire system to be stopped or quiesced.

**Dynamic System Configuration:** The system configurator program allows the user to examine and modify the configuration of the system.

The configurator program allows the user to:

- Display the configuration of each node in the system
- Name each node
- Designate whether each node is to be brought online at system initialization
- For each node:
  - Designate which task set is to be the system task set
  - Allocate storage
  - Display devices at the node
  - Name the devices
  - Designate if the Indexed Access Method (5719-AM2) is to run at that node and if it is to have a backup Indexed Access Method on another node
  - Assign devices to the Terminal Controller
  - Establish the System Network Architecture support at the node
  - Display and modify system parameters

**Two-Channel Switch Support (#7900):** Support will be provided to allow devices attached to the Two-Channel Switch to be switched to another processor. User-designated devices and applications can be restarted on a backup processor.

**4968 Autoload Streaming Magnetic Tape Unit:** In order to provide customers with planning information, IBM will include 4968 Autoload Streaming Magnetic Tape Unit support in the Realtime Programming System Version 6, in the first quarter of 1984.

**SYSTEM SERVICES**

In addition to the above support, the Realtime Programming System and the Multiprocessing feature provide operating system services and communications support for the following:

- Task Management
- Storage Management
- Task Set Management
- Event Management
- Queue Management
- Timer Management
- Serially Reusable Resource Management
- Interrupt Management
- Error Management
- Command Language Facility
- Operator Interface
- Data Set Management
- Support for the following devices:
  - 3101 Display Terminal
  - 4962 and 4963 Disks
  - 4964, 4965, and 4966 Diskette Units
  - 4965 Diskette Drive and I/O Expansion Unit
  - 4969 Magnetic Tape
  - 4973, 4974, 4975 Printers
  - 4978, 4979 Displays
  - (#7850) Teletypewriter Attachment
- 4967 Disk Unit
- Sensor I/O
- Stand-Alone Utility functions
- General Purpose Utility functions
- Service Aids
- System Initialization
- Asynchronous Communications support:
  - The following start/stop (asynchronous) terminals are supported via features #1610, or #2091/#2092:
    - 2740 Communications Terminal, mdl 1, in point-to-point switched, point-to-point nonswitched, multipoint connections

- 2740 Communications Terminal, mdl 1 or 2, in multipoint connections
- 2741 Communications Terminal in point-to-point switched and point-to-point nonswitched connections
- 3101 Display Terminal, mdls 10, 12, 13, 20, 22, and 23 (in character or block mode) or equivalent device, in point-to-point switched or nonswitched connections. Determination of equivalency is a user responsibility.
- The following start/stop (asynchronous) terminals are supported via features #1310, #2095/#2096:
  - 3101 Display Terminal, mdls 10, 12, 13, 20, 22, and 23 (in character or block mode) or equivalent device, in point-to-point switched or nonswitched connections. Determination of equivalency is a user responsibility.
- The following systems are supported via features #1610, #2091/#2092, or #2095/#2096:
  - IBM Personal Computer with the Asynchronous Communications Adapter in switched and point-to-point nonswitched connections. The IBM Personal Computer licensed program - Asynchronous Communications Support, or a user-written IBM Personal Computer program, can communicate with a user-written program in the Series/1 using Realtime Programming System READ/WRITE communications support.
  - System/23 Datamaster with the Communications Adapter feature and utilizing the Asynchronous Communications licensed program, in switched and point-to-point nonswitched connections.
- The following system is supported via features #1310, #1610, #2091/#2092, or #2095/#2096:
  - 6580 Displaywriter System with a Communications Adapter and utilizing the Asynchronous Communications licensed program, in switched and point-to-point nonswitched connections. The Displaywriter can operate in either of two asynchronous modes:
    - 2741 (emulates the 2741 Communications Terminal)
    - TTY (emulates a teletypewriter)
- Binary Synchronous Communications support:
  - The following Binary Synchronous Terminals are supported via features #1310, #2074, #2075, or #2093/#2094:
    - BSC support for the 3271 Control Unit mdls 1 and 2 with attached 3277 Terminal and 3284, 3286, 3287, and 3288 Printers on a multipoint line.
 

**Note:** 3270 support is limited to communications support and does not include mapping services.
    - BSC support for 3274 Control Unit, mdls 1C, 21C, 31C and 51C with attached 3277 and 3278 Display Stations, 3279 Color Display Stations, and 3230, 3262, 3268, 3284, 3286, 3287, 3288, and 3289 Printers on a nonswitched point-to-point or multipoint line.
    - BSC support for 3275 Display Station, mdls 1 and 2, on a switched point-to-point or multipoint line.
    - BSC support for 3276 Control Unit Display Station, mdls 1, 2, 3, and 4 with attached 3278 Display Stations, 3279 Color Display Stations, and 3230, 3262, 3268, 3287 and 3289 Printers on a nonswitched point-to-point or multipoint line.
    - 3684 Point-of-Sale Control Unit, mdls 1 or 2 with BSC Communications on a switched or nonswitched point-to-point or nonswitched multipoint facility (as a System/3). A user-written 3684 program or the Host Command Processor (HCP) facility in the 3684 can communicate with a user-written program in the Series/1 utilizing Realtime Programming System READ/WRITE communications support. (See the M3684 pages for details.)
    - 3741 Data Station on a switched or nonswitched point-to-point line or on a multipoint line with the Expanded Communications feature, #1685.
    - 4975 Printer, mdls 01R and 02R via the #1310 only.
    - 5260 Retail System via the 5265 mdls A12, A22, A42, B12, B22, B42 using point-to-point BSC discipline as a System/3.
    - 5280 Distributed Data System via the 5285 or 5288 with Communications Adapter feature (#2500) on a switched or nonswitched point-to-point or multipoint line. (5280 appears as a 3741.)
    - 6670 Information Distributor with BSC feature on a switched or nonswitched point-to-point line. (See the *Programmer's Guide for Communicating with the IBM 6670 Information Distributor (BSC Environment)* for details on the 6670).

PROGRAM PRODUCTS

Series/1 Realtime Programming System V6 R1 (cont'd)

- The following system is supported via features #2074 or #2093/#2094:
  - System/23 Datamaster with the Communications Adapter feature and utilizing the Binary Synchronous licensed program, in switched and point-to-point nonswitched connections. The System/23 Datamaster supports the line protocol of the 3741 Data Station.
- The following system is supported via features #1310, #2074, or #2093/#2094:
  - 6580 Displaywriter System with a Communications Adapter and utilizing the Binary Synchronous Communications licensed program, in switched and point-to-point nonswitched connections. The Displaywriter System emulates 2770/3780 line protocol.
- The following Binary Synchronous CPU-to-CPU communications are supported via features #1310, #2074, or #2075 (not System/32), or #2093/#2094. The Series/1 appears as a System/3.
  - CPU-to-CPU point-to-point, switched or nonswitched:
    - Another Series/1 using the Series/1 Realtime Programming System, Version 6
    - Another Series/1 using the Series/1 Realtime Programming System, Version 6 Multiprocessing feature
    - Another Series/1 using the Series/1 Realtime Programming System, Version 5, Version 4, Version 3, or Version 2
    - System/3 using CCP or RPG
    - System/32 under RPG programming facilities
    - System/34 under RPG programming facilities and the BSCEL (BSC Equivalence Link) feature of the SSP-ICF (Interactive Communications Feature).
    - System/38 via RPG III or COBOL Application Programs
    - S/370 BTAM OS/VS1, OS/VS2, (SVS or MVS), or DOS/VS
    - S/370 CICS/VS, OS/VS1, OS/VS2, or DOS/VS (BTAM only)
    - S/370 TCAM OS/VS1 or OS/VS2 (TCAM does not support conversational mode).
    - S/370 VTAM, DOS/VS
  - CPU-to-CPU, Series/1 as a multipoint tributary:
    - S/370 BTAM OS/VS1
    - S/370 IMS/VS, OS/VS1, or OS/VS2 (BTAM only). IMS/VS support is via Intelligent Remote Station Support (IRSS), an IMS/VS protocol for the support of remote systems. A Series/1 user-written application program is required for the formatting and handling of messages in the proper IMS/IRSS formats.
- SDLC and System Network Architecture support:
  - Data flow control level user interface
  - Presentation services level user interface (SNA-Extended interface)
  - Network activation and deactivation services
  - Session and message exchange services
  - Multiple physical and logical units
  - SNA Physical Unit Type 2
  - SNA Function Management Profiles three and four
  - SNA Transmission Subsystem Profiles three and four
  - SDLC secondary station
  - System definition services
  - Activation of a task set from the host

This functional support allows the Realtime Programming System to be defined as a Cluster Controller on an SNA/SDLC network controlled by a S/370 and ACF/VTAM or ACF/TCAM through a 3705 Communications Controller using the Network Control Program (ACF/NCP/VS). This support also allows operation in a network controlled by a S/370 with IMS/VS Version 1 Advanced Function for Communications and S/370 CICS/VS Version 1.5.

The data flow control level user interface consists of a set of macros which allow Series/1 user applications to communicate with host subsystems or applications. These macros are at a low level and provide a high degree of control over SNA formats and protocols.

The presentation services level user interface (SNA-Extended interface) also consists of a set of macros which allow program-to-program communications. These macros are at a higher level than those for the data flow control level user interface level and reduce the amount of programming required for message exchange. This interface allows Series/1 user applications to connect to host subsystem applications as any of the following logical units:

- IMS/VS Secondary Logical Unit Type P
- CICS/VS 3790 Full Function Logical Unit
- CICS/VS 3650 Pipeline Logical Unit

**Device Support:** The Realtime Programming System supports the 4954, 4955 and 4956 processors, when these systems have at least 192K bytes of storage attached. The following options are also supported:

- #3920 Floating-Point Processor (4955)
- #3925 Floating-Point Processor (4954, 4956)
- #5650 Programmer's Console (4955)
- #5655 Programmer's Console (4954, 4956)

In addition, multiples of the following devices and features are supported:

- 3101 Display Terminal, mdl's 10, 12, 13, 20, 22 and 23
- 3102 Printer (when attached to a 3101 auxiliary interface)
- 4962 and 4963 Disk Units
- 4964 and 4966 Diskette Units
- 4965 DASD Storage and Expansion Unit
- 4967 Disk Unit
- 4973, 4974 and 4975 Printers
- 4978 and 4979 Displays
- 4982 Sensor I/O (1)
- 4987 Programmable Communications Subsystem (1, 2)
- 4993 Channel Attachment (1, 2)
- 4999 Battery Backup

**Notes:**

1. Not required in Standard System; requires a system generation to include the support.
2. Available in separately licensed programs.

**Features:**

S/370 Channel Attachment	#1200
Multifunction Attachment	#1310
Local Communications Controller	#1400
Integrated DI/DO	#1560
Channel Repower	#1565
Asynchronous Communications	
Single-Line Control	#1610
Communication Indicator Panel	#2000
Binary Synchronous Communications	
Single-Line Control	#2074
Binary Synchronous Communications	
Single-Line Control/High Speed	#2075
Synchronous Communications	
Single-Line Control/High Speed	#2080
SDLC Single-Line Control	#2090
Asynchronous Communications	
8-Line Control	#2091
Asynchronous Communications	
4-Line Control	#2092
Binary Synchronous Communications	
8-Line Control	#2093
Binary Synchronous Communications	
4-Line Adapter	#2094
Feature Programmable 8-Line	
Multiline Communications Controller	#2095
Feature Programmable 4-Line	
Multiline Communications Attachment	#2096
Timer	#7840
Teletypewriter Attachment	#7850
Two-Channel Switch	#7900
Asynchronous Terminal 8-Line	
Adapter (RQP)	D02350

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Development:** The minimum configuration required to install the system and to perform a system customization (if required) is:

- 192K-byte IBM 4954, 4955, or
- 256K-byte IBM 4956 processor
- Diskette
  - One IBM 4964 Diskette Unit, or
  - One IBM 4965 Diskette Drive and I/O Expansion Unit, or
  - One IBM 4966 Diskette Magazine Unit

PROGRAM PRODUCTS

Series/1 Realtime Programming System V6 R1 (cont'd)

- Disk
  - One IBM 4963 Disk Subsystem (any model)
  - One IBM 4967 Disk Unit
- Timer
  - An IBM 4955 Processor must have a #7840 timer feature
- Printer
  - One IBM 4973 Printer, or
  - One IBM 4974 Printer, or
  - One IBM 4975 Printer
- Operator Station
  - One IBM 4978 Display Station, or
  - One IBM 4979 Display Station, or
  - One #7850 Teletypewriter adapter with the IBM 3101 mdl 10, 12, 13, 20, 22, or 23 Display, or an equivalent device, or
  - One IBM 3101 Display Station, attached via:
    - #1310 Multifunction Attachment [ IBM 3101 mdls 13 or 23 on the second address (MFA port 1) ]
    - #1610 Asynchronous Communications Single-Line Control (IBM 3101 mdls 10, 12, 13, 20, 22, or 23)
    - #2091/#2092 Asynchronous Communication 8-Line Control and 4-Line Adapter (IBM 3101 mdls 10, 12, 13, 20, 22 or 23)
    - #2095/#2096 Feature Programmable 8-Line multiline communications controller and 4-Line Attachment (IBM 3101 mdls 10, 12, 13, 20, 22, or 23)
    - #2095/D02350 Asynchronous Direct 8-Line RS422A Adapter (IBM 3101 mdls 10, 12, 13, 20, 22 and 23)

Production: The minimum configuration after installation of the system and after completing any system customization is the same as for installation and customization with the following exceptions:

- Disk
  - One IBM 4962 Disk Storage Unit (any model)

Applications may require additional features, attachments, devices, and/or storage. Duplex volumes require two disk units.

**SPECIFIED OPERATING ENVIRONMENT for the MULTIPROCESSING FEATURE**

**HARDWARE REQUIREMENTS**

The Multiprocessing feature has been designed to run with the Realtime Programming System, Version 6 minimum hardware configuration except:

- 256K-byte IBM 4954, 4955 or 4956 Processor
- One #1400 Local Communications Controller (two are recommended for redundancy, horizontal growth and continuous service).

Nodes 2 through 16 are the same as node 1 except the following:

- IBM 4962 Disk Storage Unit may be used
- Diskette is not required except to run stand-alone utilities or diagnostics.
- Printer is not required.

Application(s) may require additional features, attachments, devices and/or storage.

**SOFTWARE REQUIREMENTS (None)**

**COMPATIBILITY**

**IBM LICENSED PROGRAMS - NATIVE SUPPORT:** The following Series/1 licensed programs are compatible with the Realtime Programming System and the Multiprocessing feature.

The asterisk (\*) denotes the products that require a service release or special feature to operate in the Realtime Programming System and the Multiprocessing feature environment. The release or feature will be available at first customer ship of the Realtime Programming System, Version 6 and the Multiprocessing feature.

IBM Series/1 Program Preparation Subsystem, Version 6, 5719-AS6

IBM Series/1 Advanced Remote Job Entry, 5719-RJ6

IBM Series/1 COBOL Compiler and Resident Library, Version 2, 5719-CB7

IBM Series/1 COBOL Transient Library, Version 2, 5719-CB8

IBM Series/1 FORTRAN Compiler and Object Library, Version 2, 5719-FO2

IBM Series/1 FORTRAN Realtime Subroutine Library, Version 2, 5719-FO4

IBM Series/1 Mathematical and Functional Subroutine Library, Version 2, 5719-LM2

IBM Series/1 Communications Monitor, Version 2, 5719-CM2

IBM Series/1 Remote Manager, 5719-RM6

IBM Series/1 X.25/HDLC Communications Support, 5719-HD1

IBM Series/1 Indexed Access Method, Version 2, 5719-AM2 \*

IBM Series/1 Job Stream Processor Programming RPQ P82635, 5799-TEC

IBM Series/1 Multiple Terminal Manager, Version 3, 5719-MT1 \*

IBM Series/1 PASCAL Compiler and Object Library Programming RPQ P82659, 5799-TEQ

IBM Series/1 PL/I Compiler and Resident Library, 5719-PL2

IBM Series/1 PL/I Transient Library, 5719-PL4

IBM Series/1 Programmable Communications Subsystem Preparation Facility, 5719-CS0

IBM Series/1 Programmable Communications Subsystem Extended Execution Support, 5719-CS2 \*

IBM Series/1 Query, 5719-XR2

IBM Series/1 SNA Remote Management Utility Programming RPQ P82639, 5799-TEF

IBM Series/1 Sort/Merge, 5719-SM1\*

IBM Series/1 System/370 Channel Attach Program, 5719-CA1 \*

**IBM LICENSED PROGRAMS - HOST SUPPORT:** The following licensed programs are compatible with the Realtime Programming System and the Multiprocessing feature. They support the Realtime Programming System and the Multiprocessing feature, by providing S/370 MVS support to develop applications that will execute on the Realtime Programming System and the Multiprocessing feature.

Host PL/I for Realtime Programming System, 5798-NZJ

Host COBOL for Realtime Programming System Programming RPQ P82648, 5799-TEP

IBM S/370 Host Program Preparation Facilities for the Series/1 Realtime Programming System Version 6 Programming RPQ P82725, 5799-BNA.

**CONVERSION**

The Realtime Programming System and the Multiprocessing feature contain all the function and device support provided by Realtime Programming System Version 5, except:

- Prebinding, including data sets, queues, and task sets is not supported.
- Rollout/Rollin is not supported.
- Message Buffering is not supported.
- Reusable task sets are not supported.
- Logging support is not optional.
- Full class interrupt support is not optional.
- Control module mapping support is not optional.
- Terminal controller support is not optional.
- Device level access (e.g., OPEN at the device level) requires new parameters if used with duplex volumes.
- The system error log is 256-byte records; in Realtime Programming System Version 5, the records were 128 bytes.
- Timers are required.
- The 4952 Processor is not supported.
- Only I/D split systems are supported.
- Series/1 5250 Information Display System (5719-TA1) is not supported.
- The following are system configuration options in the Realtime Programming System or the Multiprocessing feature:
  - Application program capability to request a system restart (IPL).
  - Application program capability to set the time of day.

**DATA:** Complete compatibility with volumes supported by Realtime Programming System, Version 5, is provided by Realtime Programming System and the Multiprocessing feature. Any data volume written by either Realtime Programming System, Version 5, Realtime Programming System, Version 6, or the Multiprocessing feature is directly usable by the other system. Duplexed volumes will not be maintained

## PROGRAM PRODUCTS

**Series/1 Realtime Programming System V6 R1 (cont'd)**

by Realtime Programming System, Version 5. Realtime Programming System or Multiprocessing feature duplex volumes should be converted to simplex before they are used by Realtime Programming System, Version 5.

The error log data set created by one system cannot be used by the other system, because of the record size and format difference.

The Realtime Programming System or the Multiprocessing feature provide data exchange with other systems by means of diskettes and nine-track magnetic tape. The diskettes can be IBM standard Basic Exchange, Type E Exchange, or Type H format. The tapes must be DOS/VS compatible nine-track non-labeled or standard label tapes.

**PROGRAMS:** Subject to the compatibility constraints given above, user-written Realtime Programming System, Version 5 programs need only be installed on the Realtime Programming System Version 6 or the Multiprocessing feature to execute.

For programs executing on Realtime Programming System Versions 1 through 4, refer to the Realtime Programming System, Version 5, pages.

Customer-written programs included with the supervisor must be rewritten in accordance with the internal supervisor conventions for Realtime Programming System or the Multiprocessing feature. These are substantially different than Realtime Programming System, Version 5, and may result in changes to user-written extensions.

**SECURITY/INTEGRITY**

User management is responsible for evaluating, selecting, applying and implementing security and auditability features, and for the appropriate administrative and application controls.

For applications in which sensitive data is sent over external communication facilities, user management may wish to augment those facilities with the application of cryptography.

**PERFORMANCE CONSIDERATIONS**

The operating system has features which may help improve the performance of an application, such as:

- Dynamic transient pool management
- Secondary storage services
- Resident/transient module selection
- Logical expansion of supervisor data space

Actual performance is dependent upon many factors; for example, the system hardware configuration, Realtime Programming System generation options selected, application program design, how often programs must access devices, etc. Analysis is required to evaluate expected performance.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System, Version 6: Glossary and Subject Index (GC34-0473) ... Licensed Program Specifications (GC34-0460) ... System Planning Guide (GC34-0489) ... Concepts and Facilities (GC34-0471) ... Standard System Installation Guide (SC34-0467) ... Command Language Facility User's Guide (SC34-0462) ... Supervisor Services Programming Guide (SC34-0469) ... Operator Commands and Utilities (SC34-0465) ... Data Management Programming Guide (SC34-0468) ... Macro Reference (SC34-0463) ... Messages and Codes (SC34-0464) ... Systems Network Architecture Support Programming Guide (SC34-0511) ... Systems Network Architecture Support Installation Guide (SC34-0512) ... Problem Determination (SC34-0470) ... Control Blocks (SC34-0472) ... Binary Synchronous and Start/Stop Communications Programming Guide (SC34-0478) ... System Customization Guide (SC34-0466).*

**RPQs ACCEPTED:** Yes

**REALTIME PROGRAMMING SYSTEM  
PL/I COMPILER AND RESIDENT LIBRARY VERSION 1  
(5719-PL1)  
PL/I TRANSIENT LIBRARY VERSION 1 (5719-PL3)**

**PURPOSE**

The IBM Series/1 PL/I is a subset of American National Standard Programming Language PL/I (ANS X3.53 1976) plus additional language functions to support coding realtime applications. The PL/I compiler permits users to use the full capability of the hardware and operating system functions. The language has full function language capabilities that can be used for real time, scientific and commercial applications. Series/1 PL/I is extremely useful in writing applications for plant and laboratory automation, process control, report generation, problem solution and sensor-based application.

PL/I allows the programmer to express in a 'natural' syntax many functions of the Series/1 Realtime Programming System which would require CALLs in FORTRAN or require Assembler language usage. As a result, user application programs are easier to read, understand, debug, maintain and modify.

Series/1 PL/I consists of two licensed programs: a) compiler and resident subroutine library and b) transient subroutine library. The resident library contains frequently used routines used by user's application. These routines are included in the user's task set during execution of the Application Builder and, as a result, performance of a user's application is significantly enhanced by eliminating loading of these functions during execution time. The transient library contains less frequently used routines such as I/O transmission, error handling and conversion routines. These functions are dynamically loaded into a user's shared task set at execution time, thus permitting storage savings in a user's partition with minimal impact on performance.

**HIGHLIGHTS**

The Series/1 PL/I language is extensive in function aimed at allowing users to develop application programs that can be extended or changed. Highlights of the PL/I offering include:

- Language (realtime) Extensions
- Input/Output (I/O) Capability
- Message Buffering
- Multiple Data Types and Organizations
- Easy Data Manipulation Features
- Additional Features

**DESCRIPTION**

**Realtime Extension**

One of the key features of the Series/1 PL/I offering is the capability of allowing the user to develop a complete realtime application without the need to know Assembler language. The requirement has been expressed by the user for a language that offers realtime facilities as part of its syntax; that is, not through subroutine calls. To achieve this goal, a set of PL/I realtime language extensions were developed which allow starting of asynchronous tasks and programs and synchronization of their execution. Event handling and resource control statements allow you to easily code applications that invoke response to realtime events and resolution of resource contention. The following contains an explanation of these extensions.

**Features**

**Multitasking Services**

The statements associated with multitasking and their functions are:

<b>RUN</b>	Invokes a task or program.
<b>STOP</b>	Causes termination of a program or task.
<b>UNSCHEDULE</b>	Eliminates the scheduling of a task or program that has already been scheduled.
<b>TRANSFERTO</b>	Stops the current program, and activates another program in the same partition.

The PL/I coder is able to terminate a program or task when control for the task reaches a RETURN or END statement for the procedure invoked as a TASK or when control for any task reaches a STOP statement.

PL/I permits users to share data between tasks in a user partition: through the Application Builder facilities PL/I users can also take advantage of sharing data across partitions.

**Timer Services**

The programmer is provided with a facility to request a program to be suspended for a specified time interval. The user is provided a CALL facility for setting the DATE and TOD clock.

The PL/I coder may schedule a program or task to execute on a periodic basis, at a particular time-of-day, and after a specified timer

interval. A facility is provided to add and delete programs or tasks from the scheduler services on program request.

**Resource Management**

The programmer is provided a facility to synchronize tasks and programs by using locks. The language is extended to allow the user to control serially reusable resources and request/release resources for task synchronization. This provides users with a deadlock avoidance facility, and permits effective utilization of the system resources. In a multitasking environment, several tasks may want to update a file simultaneously. With this facility, a user may ensure that only one task could be executed at a time to ensure proper file update.

**Event Facilities**

The PL/I programmer may define events and start/resume execution of a particular program upon the occurrence of an event. Facilities are provided for the synchronization of task execution through WAIT/POST facilities. Thus, event handling facilities provide some predefined relationship between PL/I tasks running asynchronously.

Events that are supported are I/O completion, task completion, timer, and user-defined. The user is able to suspend a task until a single event occurs or any of a list of events occur.

**Built-in Functions**

The multitasking built-in functions are used during multitasking and during asynchronous I/O operations. They allow the user to investigate the current state of execution of a task or asynchronous I/O operation. The function names and definitions are:

<b>COMPLETION</b>	Returns the completion value of a given event. The event can be associated with completion of a task or completion of an I/O operation.
<b>STATUS</b>	Returns the status value of a given event.
<b>PRIORITY</b>	Returns the priority of a task.

**PL/I Sensor I/O**

PL/I permits the user to utilize current PL/I record I/O to access analog and digital data for both input and output. Sensor I/O records, which are described in the ENVIRONMENT attribute, may be either type S (sequential sampling) or type R (random sampling). PL/I access to records in an Analog or Digital I/O file can be SEQUENTIAL, KEYED SEQUENTIAL or DIRECT.

PL/I supports Series/1 sensor I/O, and also provides a GAIN option with a scaling factor (range code) that can override the standard representation.

**I/O Capability**

Realtime Programming System Data Management provides the PL/I user with I/O services. The PL/I user has facilities to access standard Series/1 I/O devices. PL/I uses both physical and logical I/O (that is, READ/WRITE or GET/PUT). The types supported include SEQUENTIAL, DIRECT, and TRANSIENT files, with data file record format FFB, FBS, FVB, and VBS being supported. Data files may exist on two types of magnetic media:

- 1) Fixed Disk
- 2) Removable Diskette

Series/1 PL/I includes both stream and record I/O capabilities. Stream I/O statements read and write data with a minimum programming effort because automatic formatting and conversion are provided. The following specific options are available:

- List-directed I/O. This facility allows you to input and output data with automatic formatting and conversion.
- Edit-directed I/O. A full range of format items, including picture qualifications and control, allows you to generate complex reports with a minimum of programming effort.

Record I/O statements allow you to have more control over your I/O. The following options are available:

- Consecutive I/O. This facility is available through the use of the READ, WRITE, and REWRITE statements. You can improve your execution-time performance by using the EVENT options for asynchronous I/O.
- Direct I/O. This facility is available through the use of the READ, WRITE, DELETE and REWRITE statements with the KEY option. Asynchronous direct I/O is also permitted.
- Sensor I/O. The facility for handling both sequential and random sampling of analog and digital I/O is available through the use of the READ and REWRITE statements.
- Transient Files. This form of file organization allows the user to communicate data with the Realtime Programming System data

## Realtime Programming System PL/I V1 (cont'd)

queues using PL/I READ and WRITE statements. The PL/I program can detect and handle the empty queue situation by coding an ON-unit for the PENDING ON-condition.

The file types supported for sectorized devices (fixed disk and removable diskette) are:

- Sequential
- Direct
- Partitioned

The PL/I user has the ability to add and update records to a sequential DASD file. When using direct files, the user has the ability to access the record by relative record number. The user has the ability of supporting direct data files containing over 250,000 records.

The PL/I user has the option to bind I/O devices and data sets during a) program preparation and maintenance, that is, a compile, link-edit, library store, system generation, pre-execution utility, as well as, b) execution, that is, open time. Option (a) provides the user with the ability to achieve his higher performance requirements with a minimum storage penalty and minimum disk reads to find location of programs and data.

### Message Buffering

The Realtime Programming System provides a disk message buffering facility to the following sequential output devices:

- TTY Operator Station
- 4973 Printer
- 4974 Printer

In addition, an interface is available to the message buffering function to allow the user to interface additional devices to the message buffering facility. The message buffering facility is handled logically as a priority queue. The system will complete outputting a message before another message is printed. Message buffering in the operating system is a transparent facility to PL/I and, as such, is available to the PL/I user.

### Data Types and Organization

Series/1 PL/I supports arithmetic data, string data, arrays, structures and program control data. The wide variety of data types and array handling supported allow PL/I users to implement a large collection of programs such as system type applications, data base applications, manipulation of large collections of different types of data, scientific applications requiring arithmetic and floating point operation and commercial applications using PICTURE formatting and decimal arithmetic. In addition, the ability to organize data in a PL/I program through PL/I structures, for example, has an added benefit as a documentation aid. The different data types can be organized and structured much more easily than other languages.

Some of the different PL/I data types are:

- Arithmetic data can be represented in either binary or decimal radix and can be either fixed or floating-point.
- Fixed point binary word and double word precisions are supported. Decimal fixed point data can have up to 15 digit positions.
- String data can be either bit or character, with fixed or varying length attributes.
- Program control data can be label, event, activation, lock or pointer. Entry and file parameters are also supported.
- PL/I data may be organized into arrays of up to 15 dimensions, or in structures (hierarchical collections of data, not necessarily of the same type).

### Data Manipulation Features

Series/1 PL/I supports major PL/I operators, data types, and statements. Of particular interest are:

- String operations, including substrings, concatenation, and general Boolean operations
- Full set of language built-in functions, including mathematical functions, string functions, and array functions.
- Structure assignment.
- Automatic data conversion in expressions.
- Generalized subscripting.
- Full support for internal and external procedures.
- Control structures including IF--THEN, IF--THEN--ELSE, DO, and DO--WHILE.

Other Series/1 PL/I capabilities that make it suitable as a general application development tool are:

- PL/I coded programs have the capability for entering a user-written error-handling block (entering an ON unit) when an execution error is detected. This can be for device or format errors in I/O, subscript range, and string size range, as well as a wide variety of other language-defined error conditions. The ON handling facility provides PL/I users with extensive run-time error-handling facilities. As a result, users are able to checkout program errors and install their application.
- PL/I supports both the 64-character set and the restricted 48-character set.
- The following features are supported in PL/I:
  - Conversion of mixed data types in expressions
  - Disk read and write
  - Repetitive specification of data items (GET and PUT)
  - General Condition names (ON, REVERT, and SIGNAL)
- Storage efficiency gained by the generation of reentrant code and support for automatic storage allocation.
- Program modularity and interface checking provided by the PL/I block structure and scope rules and the ENTRY attribute.
- The following user-oriented debug aids are provided:
  - Extensive compiler error messages
  - Extensive compiler listing aids
  - Snapshot trace
  - Subscript range checking at execution time
  - String range checking at execution time
  - Conversion condition checking and fix-up capability of execution data
- The user is not required to write Assembler language code in order to compile or execute PL/I-coded program(s). A user may choose, of course, to write assembler code, generally as CALLable subprograms, to achieve code secrecy, faster execution speed, tighter code or some non-PL/I supported function.

PL/I and PL/I coded programs use only the data set organizations and access methods defined by the operating system.

### Communications with FORTRAN and Assembler

Subject to certain rules, the compiler allows communication between PL/I object modules and FORTRAN or Assembler object modules. Data may be passed as arguments and must conform to standard interface conventions.

### PL/I RAS

Series/1 PL/I supplies compile-time error detection to analyze statement syntax and program structure errors.

The compiler provides debugging aids to decrease the time and effort required for program checkout. It permits efficient use of the language with respect to both compilation and execution. You can use options to request optional compiler facilities.

Syntax errors, errors of inconsistency, such as contradictory variable declarations, and detectable semantic errors occurring in the source program, are all diagnosed and reported in a meaningful form.

Series/1 PL/I supplies comprehensive object-time diagnostics at execution-time to test for and recognize I/O and arithmetic function errors and pass control to user-defined error routines. It also provides a calling trace facility, subscript and string range checking (option).

### CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The PL/I compiler operates in the batch environment of the IBM Series/1 Program Preparation Subsystem under the IBM Series/1 Realtime Programming System. The PL/I-generated object code, after processing by the Application Builder, runs as either a batch task set or as a realtime task set under control of the IBM Series/1 Realtime Programming System.

The compiler operates on the IBM 4952, IBM 4953 or IBM 4955 Processors in the batch environment of the IBM Series/1 Program Preparation Subsystem and uses the floating-point emulator of the IBM Series/1 Realtime Programming System when the floating-point feature is not installed and floating-point operations are required. Programs heavily using floating-point arithmetic and running with the Floating-Point Emulator will experience performance degradation relative to the same program using the floating-point hardware feature. Use of decimal arithmetic instead of floating-point is strongly



PROGRAM PRODUCTS

Realtime Programming System PL/I V1 (cont'd)

recommended when the floating point hardware feature (#3920) is not available.

Floating-point support is required at compilation time and execution time if the PL/I program contains either floating-point data or binary data of precision 16 or greater.

The minimum system required for compilation or Application Build is:

Processor	IBM 4952 (models A or B), IBM 4953 (models A, B, C, or D), or IBM 4955 Processor (models A, B, C, D, or E)
Storage	Compilation: 64K minimum system including at least a 28K partition for the Compiler Application Build: 48K minimum system including at least a 16K partition for the Application Builder
Disk/Diskette	1 - IBM 4962 model 2 or 2F or 4 Disk Storage Unit (combination disk/diskette unit) or 1 - IBM 4962 model 1 or 1F or 3 Disk Storage Unit or 1 - IBM 4963 Disk Subsystem may be used and 1 - IBM 4964 Diskette Unit or 1 - IBM 4966 Diskette Magazine Unit
Printer	1 - IBM 4974 Printer or 1 - IBM 4973 Line Printer
Operator Station	IBM 4979 Display Station or 1 - Teletypewriter Adapter #7850 supported for use with Teletype ® Models ASR 33/35

The minimum system required to execute in a realtime or batch partition is:

Processor	IBM 4952, IBM 4953 or IBM 4955 Processor
Storage	48K minimum system
Diskette	1 - IBM 4962 models 1 or 1F or 3 Disk Storage or 1 - IBM 4963 Disk Subsystem and 1 - IBM 4964 Diskette Unit or 1 - IBM 4966 Diskette Magazine Unit
Operator Station	IBM 4979 Display Station or 1 - Teletypewriter Adapter #7850 with Teletype® Models ASR 33/35 or an ASCII equivalent device

SOFTWARE REQUIREMENTS

Licensed programs required for compilation and application build:

- IBM Series/1 Realtime Programming System Version 1 Modification Level 1 (5719-PC1)  
or
- IBM Series/1 Realtime Programming System Version 2 (5719-PC2)  
or
- IBM Series/1 Realtime Programming System Version 3 (5719-PC3)  
or
- IBM Series/1 Realtime Programming System Version 4 (5719-PC4)
- IBM Series/1 Program Preparation Subsystem Version 1 Modification Level 1 (5719-AS1)  
or
- IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2)  
or
- IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3)  
or
- IBM Series/1 Program Preparation Subsystem Version 4 (5719-AS4)
- IBM Series/1 PL/I Compiler and Resident Library (5719-PL1)

Execution in a Realtime Partition

- IBM Series/1 Realtime Programming System Version 1 Modification Level 1 (5719-PC1)  
or
- IBM Series/1 Realtime Programming System Version 2 (5719-PC2)  
or
- IBM Series/1 Realtime Programming System Version 3 (5719-PC3)  
or
- IBM Series/1 Realtime Programming System Version 4 (5719-PC4)

IBM Series/1 PL/I Transient Library (5719-PL3)

Execution in a Batch Partition

- IBM Series/1 Realtime Programming System Version 1 Modification Level 1 (5719-PC1)  
or
- IBM Series/1 Realtime Programming System Version 2 (5719-PC2)  
or
- IBM Series/1 Realtime Programming System Version 3 (5719-PC3)  
or
- IBM Series/1 Realtime Programming System Version 4 (5719-PC4)
- IBM Series/1 Program Preparation Subsystem Version 1 Modification Level 1 (5719-AS1)  
or
- IBM Series/1 Program Preparation Subsystem Version 2 (5719-AS2)  
or
- IBM Series/1 Program Preparation Subsystem Version 3 (5719-AS3)  
or
- IBM Series/1 Program Preparation Subsystem Version 4 (5719-AS4)
- IBM Series/1 PL/I Transient Library (5719-PL3)

DATA SECURITY

PL/I object program structure and language provide controlled addressability to user data. Data with the internal attribute, for example, is not known outside the declaration block. This facility permits users to access data in a fashion which is consistent with declared data attributes and source language scope.

In addition, the PL/I STRINGRANGE and SUBSCRIPTRANGE error conditions restrict the application program from referencing data which lies beyond the declared extents and lengths of arrays and strings.

DOCUMENTATION

(available from Mechanicsburg)

IBM Series/1 PL/I: Introduction (GC34-0084) ... IBM Series/1 PL/I: Language Reference Manual (GC34-0085) ... IBM Series/1 PL/I: User's Guide (SC34-0086) ... IBM Series/1 PL/I: Messages (SC34-0088) ... IBM Series/1 PL/I Compiler and Resident Library: Licensed Program Specifications (GC34-0090) ... IBM Series/1 PL/I Transient Library: Licensed Program Specifications (GC34-0092) ... IBM Series/1 PL/I: Execution Logic Manual (SY34-0086)

TERMS and CONDITIONS: See PP Index



## PROGRAM PRODUCTS

**REALTIME PROGRAMMING SYSTEM  
PL/I COMPILER AND RESIDENT LIBRARY VERSION 2  
(5719-PL2)  
PL/I TRANSIENT LIBRARY VERSION 2 (5719-PL4)**

**PURPOSE**

The IBM Series/1 PL/I Version 2 is a subset of American National Standard Programming Language PL/I (ANSI X3.53 - 1976) plus additional language functions to support coding realtime applications. The PL/I compiler permits users to use the full capability of the hardware and operating system functions. The language has full function language capabilities that can be used for realtime, scientific and commercial applications. Series/1 PL/I is extremely useful in writing interactive applications for plant and laboratory automation, process control, report generation, problem solution and sensor-based applications.

Series/1 PL/I Version 2 represents a significant advantage for the Series/1 high-level language user. Users can write entire applications in a high-level language that provides interactive terminal handling facilities, communications via binary synchronous or START/STOP disciplines to other processors and to terminals, and index capability for data base management, all using highly optimized Series/1 code. The objective of this product is to allow Series/1 users with little knowledge of the actual hardware or operating system to develop highly sophisticated applications with easy-to-use, high productivity characteristics. In addition to the ANSI X3.53-1976 standard language facilities available in Version 1 of Series/1 PL/I, this product also provides more language capability which brings the product closer to the full ANSI X3.53 - 1976 standard as understood and interpreted by IBM as of September, 1979.

PL/I programs can be used with the Multiple Terminal Manager Programming RPQ (5799-TCY). These facilities offer another alternative to allow PL/I programs to execute in an interactive environment where one or more applications can run concurrently with more than one terminal.

PL/I allows the programmer to express in a 'natural' syntax many functions of the Realtime Programming System which would require CALLs in FORTRAN or require Assembler language usage. As a result, the user's application programs are easier to read, understand, debug, maintain and modify.

Series/1 PL/I Version 2 consists of two licensed programs: a) compiler and resident library, and b) transient library. The resident library contains frequently used routines used by an application. These routines are included in the user's task set during execution of the Application Builder, and as a result, performance of the application is significantly enhanced by eliminating the loading of these functions during execution time. The transient library contains less frequently used routines such as I/O transmission, error handling and conversion routines. These functions are dynamically loaded into a shared task set at execution time, thus permitting storage savings in a user's partition with minimal impact on performance.

These products provide all the facilities of and are extensions to the Series/1 PL/I products (5719-PL1 and 5719-PL3 respectively). Series/1 PL/I Version 2 compiler and application programs execute under Version 3 or Version 4 (5719-PC3 or 5719-PC4) of the Realtime Programming System and Version 3 (5719-AS3) or Version 4 (5719-AS4) of the Program Preparation Subsystem.

**HIGHLIGHTS**

Series/1 PL/I Version 2 language is extensive in function, aimed at allowing users to develop application programs that can be easily modified and maintained. Highlights of the PL/I Version 2 include:

- Full Screen Support
- Extended Coverage of ANS PL/I
- Code Optimization
- New Device Support (4969 Magnetic Tape Subsystem and 5250 Information Display System)
- Language (realtime) Extensions
- Input/Output (I/O) Capability
- Communications Support
- Indexed Access Method Support
- Multiple Data Types and Organizations
- Easy Data Manipulation Features
- Additional Language Features (not available in PL/I Version 1, 5719-PL1 and 5719-PL3)
- Sort/Merge Support

**DESCRIPTION****Full Screen Support**

Full Screen Support under PL/I Version 2 is a subset of RECORD I/O and STREAM I/O, where the user can access terminal devices (4978, 4979 and 5251) that are accessible through the Realtime Programming System. Access to this I/O mode is controlled through the use of ENVIRONMENT options on a FILE declaration statement.

- Record I/O

This support significantly extends PL/I user control of these devices and permits REGIONAL data sets to be directed to the screen, in addition to CONSECUTIVE data sets. With this capability, users can deal with the whole screen, split the screen, control coordinate (X,Y) positions, write-protect selected fields to the screen, scatter write, sound the tone alarm and scroll, depending on device type. Program function keys may also be associated with PL/I event variables.

- Stream I/O

In stream I/O an INTERACTIVE mode is now provided. In this mode, GET and PUT statements may be directed to a single open stream file. Automatic buffer purging is provided when a GET statement follows a PUT to the same file. This allows user supplied prompting messages to appear in the proper sequence.

**Additional Data Attributes**

The additional data attributes being provided are:

- PICTURE
- DEFINED and POSITION
- AUTOMATIC with INITIAL
- FILE VARIABLE
- ENTRY VARIABLE
- PROGRAM VARIABLE

These are useful features required in commercial applications which are also common in PL/I products available on larger IBM systems. The inclusion of these facilities will also provide easier migration of a majority of existing PL/I programs from larger IBM data processing systems to Series/1.

**Allocate/Free Statements**

A new function is added to the compiler to allow the PL/I programmer to control the allocation and freeing of dynamic storage during execution. The statements supported are:

- ALLOCATE
- FREE

In the event that insufficient storage is available to fill a request for allocation, the STORAGE condition is raised and the user may decide how he wishes to proceed, as with other PL/I error conditions.

**Fixed Block Regional**

Fixed block (FB) is accepted as a valid environment option for a Regional file. This feature permits short length records to be blocked within 256-byte sector boundaries and thus allows users to optimize space on Series/1 direct access devices.

**Built-In Functions (BIF's)**

The new built-in functions expand the productivity of the PL/I programmer in handling arithmetic, string and array data.

- Arithmetic BIF's (built in functions)

- ADD	- FLOOR	- ROUND
- ATANH	- MAX	- SINH
- CEIL	- MIN	- SUBTRACT
- COSH	- MOD	- TANH
- DIVIDE	- MULTIPLY	- TRUNC

- String BIF's

- TRANSLATE
- VALID
- VERIFY

- Array BIF

- SUM

- I/O BIF

- PAGENO

## Realtime Programming System PL/I V2 (cont'd)

### Pointer Qualification

Explicit pointer qualification is now available. This extension facilitates list processing applications.

### Generated Code Optimization

The PL/I Version 2 compiler analyzes object-code logic and then eliminates most unnecessary instructions. This results in saving execution time and storage space. Code optimizations provided include:

- Improved register allocation
- Anchor pointing in compound IFs
- Use of byte immediate instructions in place of word immediate instructions where applicable
- Use of storage-to-storage operations
- Use of MVWS instruction where offsets and registers permit
- Use of Jump instruction for short Branch instructions
- Library call code improvements

### PL/I Sort Capability

Sort/Merge functions available with the Series/1 Sort/Merge licensed program (5719-SM1) are now supported via the CALL PLISRT interface.

### Realtime Extensions

One of the key features of the Series/1 PL/I offering is the capability of allowing the user to develop a complete realtime application without the need to know Assembler language. The requirement has been expressed by the user for a language that offers realtime facilities as part of its syntax; that is, not through subroutine calls. To achieve this goal, a set of PL/I realtime language extensions are provided which allow starting of asynchronous tasks and programs, and synchronization of their execution. Event handling and resource control statements allow users to easily code applications that invoke response to realtime events and resolution of resource contention. The following contains an explanation of these extensions.

### Multitasking Services

The statements associated with multitasking and their functions are:

RUN	Invokes a task or program
STOP	Causes termination of a program or task
UNSCHEDULE	Eliminates the scheduling of a task or program that has already been scheduled by the RUN statement
TRANSFER TO	Stops the current program, and activates another program in the same partition

The PL/I programmer is able to terminate a program or task when control for the task reaches a RETURN or END statement for the procedure invoked as a TASK, or when control for any task reaches a STOP statement.

PL/I permits users to share data between tasks in a user partition through the Application Builder facilities. PL/I users can also take advantage of sharing data and subroutines across partitions through the shared task set.

### Timer Services

The programmer is provided with a PL/I language facility to request a program to be suspended for a specified time interval. The user is provided a CALL facility for setting the DATE and TOD (time-of-day) clock.

The PL/I programmer may schedule a program or task to execute on a periodic basis, at a particular time-of-day, and after a specified time interval. A facility is provided to add and delete programs or tasks from the scheduler services on program request. Programs and tasks may also be scheduled to run on the occurrence of a process interruption.

### Resource Management

The language is extended to allow the user to control serially reusable resources and request/release resources for task synchronization by the introduction of a LOCK variable. This provides users with a deadlock avoidance facility, and permits effective utilization of the system resources. For example, in a multitasking environment several tasks may want to update a file simultaneously; with this facility a user may ensure that only one task could execute the file update at one time.

### Event Facilities

The PL/I programmer may define events and start/resume execution of a particular task upon the occurrence of an event. Facilities are provided for the synchronization of task execution through WAIT/POST facilities. Thus, event handling facilities can provide some predefined relationship between PL/I tasks running asynchronously.

Events that are supported are I/O completion, task completion, time of day, time interval, process control, display device function key and user-defined. The user is able to suspend a task until a single event occurs or any of a list of events occur.

### Built-in Functions

The multitasking built-in functions are used during multitasking and during asynchronous I/O operations. They allow the user to investigate the current state of execution of a task or asynchronous I/O operation. The function names and definitions are:

COMPLETION	Returns the completion value of a given event. The event can be associated with completion of a task or completion of an I/O operation.
STATUS	Returns the status value of a given event.
PRIORITY	Returns the priority of a task.

### PL/I Sensor I/O

PL/I permits the user to utilize current PL/I record I/O to access analog and digital data for both input and output. Sensor I/O records, which are described in the ENVIRONMENT attribute, may be either type S (sequential sampling) or type R (random sampling). PL/I access to records in an Analog or Digital I/O file can be SEQUENTIAL, KEYED SEQUENTIAL or DIRECT.

PL/I sensor I/O also provides a GAIN option with a scaling factor (range code) that can override the standard representation.

### I/O Capability

The Realtime Programming System Data Management provides the PL/I user with I/O services. The PL/I user has facilities to access standard Series/1 I/O devices. PL/I uses both physical and logical I/O (that is, READ/WRITE or GET/PUT). The types supported include SEQUENTIAL, DIRECT, and TRANSIENT files with data file record format F, FB, FBS, V, VB, and VBS being supported. Data files may exist on three types of magnetic media:

1. Fixed Disk
2. Removable Diskette
3. Magnetic Tape (excludes spanned records)

Series/1 PL/I includes both stream and record I/O capabilities. Stream I/O statements read and write data with a minimum programming effort, because automatic formatting and conversion are provided. The following specific options are available:

- List-directed I/O. This facility allows you to input and output data with automatic formatting and conversion.
- Edit-directed I/O. A full range of format items, including picture formats and control formats, allows users to generate complex reports with a minimum of programming effort.

Record I/O statements allow more control over I/O. The following options are available:

- Sequential I/O. This facility is available through the use of READ, WRITE, DELETE and REWRITE statements. It is often possible to improve execution-time performance by using the EVENT options for asynchronous I/O.
- Direct I/O. This facility is available through the use of READ, WRITE, DELETE and REWRITE statements with the KEY option. Asynchronous direct I/O is also permitted.
- Sensor I/O. This facility for handling both sequential and random sampling of analog and digital I/O is available through the use of the READ and REWRITE statements.
- Transient Files. This form of file organization allows the user to communicate data with the Realtime Programming System data queues using PL/I READ and WRITE statements. The PL/I program can detect and handle the empty queue situation by coding an ON-unit for the PENDING ON-condition.
- Communications

Communications under PL/I gives the user capability to communicate with Binary Synchronous and START/STOP devices through the Realtime Programming System communications interfaces. All communications are a subset of RECORD I/O with no new language, only new ENVIRONMENT options. This facility is provided through a direct PL/I interface to normal operating system/subsystem functions.

These communications functions allows flexibility in developing terminal applications in PL/I and will permit:

- Communications between multiple Series/1 machines
- Series/1 to System/370
- Installation of PL/I programs in Binary Synchronous and Start/Stop environments

## Realtime Programming System PL/I V2 (cont'd)

### Indexed Access Method Support

The PL/I compiler now supports INDEXED (keyed) files in addition to CONSECUTIVE and REGIONAL files. This support includes new file environment options and support for non-numeric keys. Record types are fixed format, blocked or unblocked. Indexes associated with the data set are used by the Indexed Access Method to locate records when the key is supplied. Both the Indexed Access Method Licensed Program (5719-AM1) and Indexed Access Method PRPQ (5799-TCB) are supported. Both sequential and direct processing of indexed files is permitted.

The file types supported for sectorized devices (fixed disk and removable diskette) are:

- Sequential
- Direct
- Partitioned

The PL/I user has the ability to add and update records to a sequential DASD file. When using direct files, the user has the ability to access the record by relative record number. The user has the ability of supporting direct data files containing over 250,000 records.

The PL/I user has the option to bind I/O devices and data sets during a) program preparation, that is, a compile, application build and install, as well as, b) execution, that is, open time. Option (a) provides the user with the ability to achieve his higher performance requirements with a minimum storage penalty and minimum disk reads to find location of programs and data. Option b) allows flexibility in assigning different data sets to a file at execution time.

### Data Types and Organization

Series/1 PL/I Version 2 supports arithmetic data, string data, arrays, structures and program control data. The wide variety of data types and array handling supported allow PL/I users to implement a large collection of programs such as system type applications, data base applications, manipulation of large collections of different types of data, scientific applications requiring arithmetic and floating point operation and commercial applications using PICTURE variables and formatting and decimal arithmetic. In addition the ability to organize data in a PL/I program through PL/I structures has an added benefit as a documentation aid. The different data types can be organized and structured much more easily than in other languages.

Some of the different PL/I Version 2 data types are:

- Arithmetic data can be represented in either binary or decimal radix and can be either fixed or floating-point.
- Fixed point binary word and double word precision are supported. Decimal fixed point data can have up to 15 digit positions.
- String data can be either bit or character, with fixed or varying length attributes.
- Program control data can be label, format, event, file, activation, program, lock, entry or pointer.
- PL/I data may be organized into arrays of up to 15 dimensions, or in structures (hierarchical collections of data, not necessarily of the same type).

### Data Manipulation Features

Series/1 PL/I supports major PL/I operators, data types and statements. Of particular interest are:

- String operations, including substrings, concatenation, and general boolean operations.
- Full set of language built-in functions, including mathematical functions, string functions and array functions.
- Structure assignment.
- Automatic data conversion in expressions.
- Generalized subscripting.
- Full support for internal and external procedures.
- Control structures including IF--THEN, IF--THEN--ELSE, DO and DO--WHILE.

Other Series/1 PL/I Version 2 capabilities that make it suitable as a general application development tool are:

- PL/I-coded programs have the capability for entering a user-written error-handling block (entering an ON unit) when an execution error is detected. This can be for device or format errors in I/O, subscript range and string size range, as well as a wide variety of other language-defined error conditions. The ON handling facility provides PL/I users with extensive run-time error-handling facilities. As a result, users are able to checkout program errors and install their application.
- PL/I supports both the 64-character set and the restricted 48-character set.

### The following features are supported in PL/I:

- Conversion of mixed data types in expressions
- Repetitive specification of data items (GET and PUT)
- General condition names (ON, REVERT, and SIGNAL)
- Storage efficiency gained by the generation of reentrant code and support for automatic storage allocation.
- Program modularity and interface checking provided by the PL/I block structure and scope rules and the ENTRY attribute.
- The following user-oriented debug aids are provided:
  - Extensive compiler error messages
  - Extensive compiler listing aids
  - SNAP on an ON statement
  - Subscript range checking at execution time
  - String range checking at execution time
  - Conversion condition checking and fix up capability of execution data
- The user is not required to write Assembler language code in order to compile or execute PL/I-coded program(s). A user may choose, of course, to write assembler code, generally as CALLable subprograms, to achieve code secrecy, faster execution speed, lower storage requirements or some non-PL/I supported function.

PL/I and PL/I-coded programs use only the data set organizations and access methods defined by the operating system.

### Communications with FORTRAN, COBOL, and ASSEMBLER

Subject to certain rules, the compiler allows communication between PL/I object modules and FORTRAN, COBOL or Assembler object modules. Data may be passed as arguments and must conform to standard interface conventions. PL/I register conventions and error handling conventions must also be preserved.

### PL/I RAS

IBM Series/1 PL/I Version 2 supplies compile-time error detection to analyze statement syntax and program structure errors.

The compiler provides debugging aids to decrease the time and effort required for program checkout. It permits efficient use of the language with respect to both compilation and execution. You can use options to request optional compiler facilities.

Syntax errors, errors of inconsistency, such as contradictory variable declarations, and detectable semantic errors occurring in the source program are all diagnosed and reported in a meaningful form.

IBM Series/1 PL/I Version 2 supplies comprehensive diagnostics at execution time to test for and recognize I/O and arithmetic function errors and pass control to user-defined error routines. It also provides a calling trace using ON-SNAP condition, subscript and string range checking (option).

### Devices Supported

- The IBM products supported are the following:

- |                 |                          |
|-----------------|--------------------------|
| – Processors    | – 4952, 4953, 4955       |
| – Diskette      | – 4964, 4966             |
| – Fixed Disk    | – 4962, 4963             |
| – Printer       | – 4973, 4974, 5256       |
| – CRT/Keyboard  | – 4979, 4978, 5251, 5252 |
| – Magnetic Tape | – 4969                   |

- Subsystem
- Sensor I/O
- 4982

### Features

- Floating Point Processor - #3920
- Storage Address Translator - #6335
- Teletypewriter Adapter - #7850 (supported for use with Teletype® Models ASR 33/35 or equivalent device)
- Timer - #7840
- Native Attach Sensor I/O - #1560
- Binary Synchronous Communications - point to point, switched and nonswitched
  - Series/1 to System/370
  - Series/1 to Series/1
- Start/Stop (asynchronous) Communications Terminal Support
  - 2740 model 1 communication terminals
  - Teletype® Models ASR 33/35 or equivalent device.

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All I/O devices are accessed through Realtime Programming System control program services, and all disks and diskettes supported by Versions 3 or 4 of Realtime Programming System are supported. Floating-point is required, either by hardware feature or by emulation (performance degradation may occur if emulation is used).

### CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.



## PROGRAM PRODUCTS

**Realtime Programming System PL/I V2 (cont'd)****SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

In addition to the minimum requirement for IBM Series/1 Realtime Programming System Version 3 or 4, and Version 3 or Version 4 of the Program Preparation Subsystem, the storage requirements are:

- For compilation using Realtime Programming System Version 3 or 4 with Multiple Address Space Management: 64K system including at least a 26K partition for the compiler and 2K control module in the operating system partition.
- For compilation using Realtime Programming System Version 4 with Single Address Space Management: 64K system including at least a 28K partition for the compiler.

The minimum system required to execute a PL/I Version 2 object program in a realtime partition or batch partition is:

Processor	IBM 4952 or 4953 or 4955 Processor
Storage	48K (64K on 4952)
Disk	1 - IBM 4962 or 4963 Disk

For details on system requirements for the IBM Series/1 Realtime Programming System Version 3 or 4 and the IBM Series/1 Program Preparation Subsystem Version 3 or 4, see the respective pages.

**SOFTWARE REQUIREMENTS**

The following licensed programs are required if the associated PL/I language function is used:

- Sort/Merge (5719-SM1) required support for calling the Sort facility
- Indexed Access Method Programming RPQ (5799-TCB) either for Realtime Programming System Version 3 or Version 4  
or  
Indexed Access Method Licensed Program (5719-AM1) for Realtime Programming System Version 3 or Version 4 required support for indexed I/O.
- IBM 4978 Display Support Version 3 PRPQ (5799-TCE) for the extended features of screen support on the 4978
- IBM 5250 Information Display System Licensed Program (5719-TA1) for 5250 support
- IBM 4969 Magnetic Tape Subsystem (5719-TA4) for using magnetic tape

**COMPATIBILITY**

- PL/I Version 2 (5719-PL2 and 5719-PL4) is upward compatible with PL/I Version 1 (5719-PL1 and 5719-PL3) at the source program level.
- PL/I Version 2 is a compatible subset of ANS PL/I with realtime language extensions added.

**DATA SECURITY**

PL/I object program structure and language provide controlled addressability to user data. Data with the internal attribute, for example, is not known outside the declaration block. This facility permits users to access data in a fashion which is consistent with declared data attributes and source language scope.

In addition, the PL/I STRINGRANGE and SUBSCRIPTRANGE conditions can be used to restrict the application program from referencing data which lies beyond the declared extents and lengths of arrays and strings.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System PL/I Compiler and Resident Library Version 2: Licensed Program Specifications (GC34-0281) ... IBM Series/1 Realtime Programming System PL/I Transient Library Version 2: Licensed Program Specifications (GC34-0282) ... IBM Series/1 PL/I: Realtime Programming System Language Reference (GC34-0085) ... IBM Series/1 PL/I: Realtime Programming System User's Guide (SC34-0086) ... IBM Series/1 PL/I: Realtime Programming System Execution Logic Manual (SY34-0086) ... IBM Series/1 PL/I: Messages (SC34-0088)*

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE  
PL/I COMPILER and RESIDENT LIBRARY (5719-PL5)  
PL/I TRANSIENT LIBRARY (5719-PL6)**

These products are licensed programs working under the Event Driven Executive Basic Supervisor and Emulator Versions 1.1 or 2.

**PURPOSE**

The IBM Series/1 Event Driven Executive PL/I is a subset of American National Standards Institute Programming Language PL/I (ANSI X3.53 1976), as understood and interpreted by IBM as of July 1979, plus additional language functions to support coding multitasking applications. The PL/I compiler permits users to use the functional capability of the operating system for commercial, scientific and interactive applications.

PL/I allows the programmer to express in a 'natural' syntax many functions of the Event Driven Executive operating system which would require CALLs in FORTRAN or require Assembler language or Event Driven Executive language usage. As a result, the user's application programs are easier to read, understand, debug, maintain and modify.

Event Driven Executive PL/I represents a significant advantage for the Series/1 high-level language user. Users can write entire applications in a high-level language that provides interactive terminal handling facilities, communications via binary synchronous or START/STOP disciplines to other processors and terminals, and indexed files for data base management. This product allows Series/1 users with little knowledge of the actual hardware or operating system to develop sophisticated applications with high programmer productivity.

PL/I programs can be used with the Event Driven Executive Multiple Terminal Manager licensed program (5719-MS1). This facility offers another alternative to allow PL/I programs to execute in an interactive environment where one or more applications can run concurrently.

Event Driven Executive PL/I consists of two licensed programs: a) compiler and resident library, and b) transient library. The resident library contains frequently used routines which are combined with the user's program through the linkage editor. As a result, performance of a user's application is significantly enhanced by eliminating loading of these functions during program execution. The transient library is required for program execution and contains less frequently used routines such as I/O transmission, error handling and conversion routines. These functions are dynamically loaded during program execution and remain in storage only as long as they are required by the program. This permits storage savings in a user's partition with minimal impact on performance.

**HIGHLIGHTS**

The Event Driven Executive PL/I language is extensive in function, aimed at allowing users to develop application programs that can be easily modified and maintained. Highlights include:

- Multitasking Extensions
- I/O Capability
  - Stream I/O
  - Record I/O
  - Communication Support
  - Indexed Access Method Support
  - Full Screen Support
  - Magnetic Tape Subsystem
- Data Types and Organization
- Data Manipulation Features
- Extensive Coverage of ANSI PL/I
- Code Optimization
- Language (realtime) Extensions

**DESCRIPTION**

**Multitasking Extensions**

One of the key features of Series/1 PL/I is the capability of allowing the user to develop a complete multitasking application without the need to know Assembler language. The requirement has been expressed by the user for a language that offers multitasking facilities as part of its syntax; that is, not through subroutine calls. To achieve this goal a set of PL/I multitasking language extensions is provided which allows starting of asynchronous tasks and programs, and synchronization of their execution. Event handling and resource control statements allow you to easily code applications that invoke response to events and resolution of resource contention. The following contains an explanation of these extensions.

- Multitasking Services

The statements associated with multitasking and their functions are:

RUN	Invokes a task or program
STOP	Causes termination of the issuing task

The PL/I programmer is able to terminate a program or task when control for the task reaches a RETURN or END statement for the procedure invoked as a TASK or when control for any task reaches a STOP statement.

In addition, the CALL statement may be used to access subroutines written in Event Driven Language instructions.

- Resource Management

The language is extended to allow the user to control serially reusable resources and request/release resources for task synchronization by the introduction of a LOCK variable. This provides users with a deadlock avoidance facility and permits effective utilization of the system resources. In a multitasking environment several tasks may want to update a file simultaneously. With this facility a user may ensure that only one task could be executed at a time to ensure proper file update.

The statements associated with these functions are:

LOCK	Request a LOCK variable
UNLOCK	Release a LOCK variable

- Event Facilities

The PL/I programmer may define events and start/resume execution of a particular task upon the occurrence of an event. Facilities are provided for the synchronization of task execution through WAIT/POST facilities. Thus, event handling facilities provide some predefined relationship between PL/I tasks running asynchronously.

Events that are supported are I/O completion, task completion and user-defined. The user is able to suspend a task until an event occurs.

- Reentrant Programs

All programs produced by the compiler are reentrant. This allows common code to be shared among multiple tasks.

- Built-in Functions

The multitasking built-in functions are used during multitasking and during asynchronous I/O operations. They allow the user to investigate the current state of execution of a task or asynchronous I/O operation. The function names and definitions are:

COMPLETION	Returns the completion value of a given event. The event can be associated with completion of a task or completion of an I/O operation.
STATUS	Returns the status value of a given event.
PRIORITY	Returns the priority of a task.

**I/O Capability**

The Event Driven Executive Data Management provides the I/O services used by PL/I. The PL/I user has facilities to access standard Series/1 I/O devices through PL/I files. The file types supported include SEQUENTIAL and DIRECT files. Data files may exist on three types of magnetic media:

1. Fixed disk
2. Removable diskette
3. Magnetic tape (available with Event Driven Executive Version 2)

Series/1 PL/I includes both stream and record I/O capabilities. Stream I/O statements read and write data with a minimum programming effort, because automatic formatting and conversion are provided. The following specific options are available:

- List-directed I/O. This facility allows users to input and output data with automatic formatting and conversion.
- Edit-directed I/O. A full range of format items, including picture formats and control formats, allows users to generate complex reports with a minimum of programming effort.
- Stream I/O is to printers and terminals only.

Record I/O statements allow users to have more control over I/O. The following options are available:

- Consecutive I/O. This facility is available through the use of the READ, WRITE, and REWRITE statements. Often users can improve execution-time performance by using the EVENT options for asynchronous I/O.
- Regional I/O. This facility is available through the use of READ, WRITE, DELETE and REWRITE statements with the option of specifying the relative record number using the key option. Asynchronous direct I/O is also permitted.

**EDX PL/I (cont'd)**

- Blocking of Consecutive and Regional files is supported.
- Record I/O is to disk(ette) and tape only with the exception of Record I/O full screen support.
- Communications I/O. Communications under PL/I provide the capability to communicate with binary synchronous and Start/Stop devices through the Event Driven Executive communications interfaces. Communications support is a subset of RECORD I/O with no new language, only new ENVIRONMENT options. This facility is provided through a direct PL/I interface to the operating system/subsystem function.

These communication functions allow greater flexibility in developing terminal applications in PL/I and will permit:

- Communications between multiple Series/1s
- Series/1 to System/370
- Use of PL/I programs in other Binary Synchronous and Start/Stop environments

- Indexed Access Method I/O. The PL/I compiler supports INDEXED files in addition to CONSECUTIVE and REGIONAL files. This support includes file environment options to describe the length and location of character keys within the data records. Record types are fixed format, blocked or unblocked. Use of this support requires the Indexed Access Method licensed program (5719-AM3).

**Full Screen Support**

Full Screen Support is provided through RECORD I/O and STREAM I/O where the user can access the 4978 and 4979 Display Terminals. Access is controlled through the use of ENVIRONMENT options on a FILE declaration statement.

**- Record I/O**

This support significantly extends application control of these devices by permitting REGIONAL data sets to be directed to the display. With this capability, users can deal with the whole screen, control coordinate (X,Y) positions, write-protect selected fields on the screen, and scatter write. The program can also deal with program function keys using PL/I EVENT variables.

**- Stream I/O**

In stream I/O, an INTERACTIVE mode is now provided to simplify writing a prompt message to the display and reading the responses. In this mode, GET and PUT statements may be directed to a single open stream file, eliminating the requirement for two separate files - one for input and one for output. Automatic buffer purging is provided when a GET statement follows a PUT to the same file so the output data is written to the display before the read request is sent to the device.

**Magnetic Tape Subsystem Support**

The PL/I programmer can sequentially access data stored on the Magnetic Tape Subsystem using the Series/1 4969 Magnetic Tape support available with the Event Driven Executive Version 2 (5719-XS2).

**Data Types and Organization**

Series/1 PL/I supports arithmetic data, string data, arrays, structures and program control data. The wide variety of data types and array handling supported allows PL/I users to implement a large collection of programs such as system functions, data base applications, manipulation of large collections of different data types, scientific applications requiring arithmetic and floating-point operation, and commercial applications using PICTURE variables and formatting and decimal arithmetic. In addition, the ability to organize data in a PL/I program through PL/I structures has an added benefit as a documentation aid. The different data types can be organized and structured much more easily than in most other languages.

Some of the different PL/I data types are:

- Arithmetic data can be represented in either binary or decimal radix and can be either fixed or floating point.
- Fixed point binary word and double word precision are supported. Decimal fixed point data can have up to 15 digit positions.
- String data can be either bit or character, with fixed or varying length attributes.
- Program control data can be label, format, event, file, entry, activation, program, lock or pointer.
- PL/I data may be organized into arrays of up to 15 dimensions, or in structures (hierarchical collections of data, not necessarily of the same type).

**Data Manipulation Features**

Series/1 PL/I supports major PL/I operators, data types, and statements. Of particular interest are:

- String operations, including substrings, concatenation, and general boolean operations.

- A set of language built-in functions, including mathematical functions, string functions and array functions.
- Structure assignment.
- Automatic data conversion in expressions.
- Generalized subscripting.
- Control structures including IF-THEN, IF-THEN-ELSE, DO, and DO-WHILE.

Other Series/1 PL/I capabilities that make it suitable as a general application development tool are:

- PL/I-coded programs have the capability for entering a user-written error-handling block (entering an ON unit) when an execution error is detected. This can be for device or format errors in I/O, subscript range and string size range as well as a wide variety of other language-defined error conditions. The ON handling facility provides PL/I users with extensive run time error-handling facilities. As a result, users are able easily to check out program errors and install their application.
- PL/I supports both the 64-character set and the restricted 48-character set.
- The following features are supported:
  - Conversion of mixed data types in expressions
  - Repetitive specification of data items (GET and PUT)
  - General condition names (ON, REVERT, and SIGNAL)
- Storage efficiency gained by the generation of reentrant code and support for automatic storage allocation.
- Program modularity and interface checking provided by the PL/I block structure and scope rules and the ENTRY attribute.
- The following user-oriented debug aids are provided:
  - Extensive compiler error messages
  - Extensive compiler listing aids
  - Snap option on an ON-statement
  - Subscript range checking at execution time
  - String range checking at execution time
  - Conversion condition checking and fix up capability of execution data
- The user is not required to write Assembler language code in order to compile or execute PL/I-coded program(s). A user may choose, of course, to write Assembler code, generally as CALL'able subprograms, to achieve code secrecy, faster execution speed, lower storage requirements or some non-PL/I supported function.
- Extensive coverage of ANSI PL/I

Additional features of ANSI PL/I supported in Series/1 Event Driven Executive PL/I are:

The additional data attributes being provided are:

- PICTURE
- DEFINED and POSITION
- AUTOMATIC with INITIAL
- FILE VARIABLE
- PROGRAM VARIABLE
- ENTRY VARIABLE

These useful features, which are also common in PL/I products available on larger IBM systems, are required in most commercial applications. The inclusion of these facilities also provides easier conversion of some existing PL/I programs from larger IBM data processing systems to Series/1.

**Allocate/Free Statements**

A new function is added to the compiler to allow the PL/I programmer to dynamically control the allocation and freeing of storage during execution. The statements supported are:

**ALLOCATE**

**FREE**

In the event that insufficient storage is available to fill a request for allocation, the STORAGE condition is raised and the program may decide how to proceed, as with other PL/I error conditions.

**Built-in Functions (BIFs)**

The built-in functions expand the productivity of the PL/I programmer in handling arithmetic, string and array data.

- Arithmetic BIFs (built-in functions)

ADD	FLOOR	ROUND
ATANH	MAX	SINH
CEIL	MIN	SUBTRACT



PROGRAM PRODUCTS

EDX PL/I (cont'd)

- |  |                |                 |               |
|--|----------------|-----------------|---------------|
|  | COSH<br>DIVIDE | MOD<br>MULTIPLE | TANH<br>TRUNC |
|--|----------------|-----------------|---------------|
- String BIFs
    - VERIFY
    - TRANSLATE
    - VALID
  - Array BIF
    - SUM
  - I/O BIF
    - PAGENO

- |                                |                           |
|--------------------------------|---------------------------|
| <b>Storage</b>                 | 64K                       |
| <b>Disk</b>                    | 1 - IBM 4962 or 4963 Disk |
| <b>Diskette</b>                | IBM 4964, 4966            |
| <b>Printer</b>                 | IBM 4973, 4974            |
| <b>Keyboard/CRT</b>            | IBM 4979, 4978            |
| <b>Magnetic Tape Subsystem</b> | IBM 4969                  |
- Teletypewriter Adapter #7850 supported for use with Teletype® Models ASR 33/35 or equivalent device

Pointer Qualification

The explicit pointer qualification operator is available. This extension facilitates list processing applications.

Code Optimization

The PL/I compiler analyzes program logic and then eliminates many unnecessary instructions. This results in saving execution time and storage space. Code optimization provided includes:

- Improved register allocation
- Anchor pointing in compound IFs
- Use of byte immediate instructions in place of word immediate instructions
- Use of storage-to-storage operations
- Use of MVWS instruction where offsets and registers permit
- Use of Jump instruction for short Branch instructions
- Library call code improvements

PL/I Sort Capability

Sort/Merge functions available on the Series/1 Sort/Merge Licensed Program (5719-SM2) are now supported via the CALL PLISRT interface.

Support for Event Driven Executive operating system services

Although PL/I supplies extensive coverage of operating system services through PL/I language, certain applications may require additional system services. The CALL statement may be used to access system services unique to a user's application by calling a user subroutine written in EDL.

PL/I RAS

Series/1 PL/I supplies compile-time error detection to analyze syntax of statements and program structure errors.

The compiler provides debugging aids to decrease the time and effort required for program checkout. It permits efficient use of the language with respect to both compilation and execution.

Syntax errors, errors of inconsistency, such as contradictory variable declarations, and detectable semantic errors occurring in the source program are all diagnosed and reported in a meaningful form.

Series/1 PL/I supplies comprehensive diagnostics at execution time such as I/O and arithmetic function errors and passes control to user-defined error routines. It also provides a calling trace using ON-SNAP feature, subscript and string range checking (option).

Communications with Other Languages

Subject to certain rules, the compiler allows communication between PL/I object modules and FORTRAN, COBOL, Macro Assembler, or Event Driven Executive Language programs. Data may be passed as arguments and must conform to standard interface conventions. PL/I register conventions and error handling conventions must be preserved.

All I/O devices are accessed through the Event Driven Executive control program services.

CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

HARDWARE REQUIREMENTS

In addition to the minimum requirement for the IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Versions 1.1 or 2, the storage requirements are:

- For compilation using Event Driven Executive Versions 1.1 or 2: minimum system for native program preparation plus at least 28K of storage for the compiler.

The minimum system required to execute an Event Driven Executive PL/I object program is:

Processor IBM 4952 or 4953 or 4955 Processor

Features

- Floating-Point feature - #3920 (4955 only)
- Storage Address Translator - #6335 (4955 B only)
- Timer - #7840
- Binary Synchronous Communication -
  - Series/1 remote communication to Series/1 or System/370 via point-to-point (switched or nonswitched) binary synchronous line
- Asynchronous Communication (Start/Stop)
  - Series/1 remote connection to 2741 or Teletypewriter Adapter #7850 via point-to-point (nonswitched) start/stop line

SOFTWARE REQUIREMENTS

Licensed programs required for:

Compilation

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Version 1.1 (5719-XS1) or Version 2 (5719-XS2)
- IBM Series/1 Event Driven Executive PL/I Compiler and Resident Library (5719-PL5)
- IBM Series/1 Event Driven Executive Utilities Version 1.1 or 2 (5719-UT3 or 5719-UT4)

Program Preparation

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Version 1.1 (5719-XS1) or Version 2 (5719-XS2)
- IBM Series/1 Event Driven Executive Program Preparation Facility (5719-XX2) or Event Driven Executive Macro Assembler (5719-ASA)
- IBM Series/1 Event Driven Executive PL/I Compiler and Resident Library (5719-PL5)
- IBM Series/1 Event Driven Executive Utilities (5719-UT3 or 5719-UT4)

Program Execution

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator Version 1.1 (5719-XS1) or Version 2 (5719-XS2)
- IBM Series/1 Event Driven Executive PL/I Transient Library (5719-PL6)
- IBM Series/1 Event Driven Executive Utilities Version 1.1 or 2 (5719-UT3 or 5719-UT4)

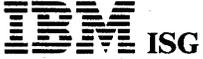
Additional Licensed Programs

The following licensed programs are required if the associated functions are used:

- Sort/Merge (5719-SM2)  
Required support for CALL PLISRT
- Indexed Access Method (5719-AM3)  
Required support for indexed I/O
- IBM 4969 Magnetic Tape Subsystem for using tape available with Event Driven Executive Version 2 (5719-XS2)
- IBM Series/1 Event Driven Executive Multiple Terminal Manager (5719-SM1)  
Optional Support for terminal I/O and screen support handling

COMPATIBILITY

- Event Driven Executive PL/I (5719-PL5 and 5719-PL6) is a compatible subset of PL/I Version 2 (5719-PL2 and 5719-PL4) running on the Realtime Programming System at the source program level.
- Event Driven Executive PL/I is a compatible subset of ANSI PL/I if the Series/1 realtime extension features are not used.



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PP 5719-PL5.4

May 83

Major Revision

PROGRAM PRODUCTS

EDX PL/I (cont'd)

DATA SECURITY

PL/I object program structure and language provide controlled addressability to user data. Data with the internal attribute, for example, is not known outside the declaration block. This facility permits users to access data in a fashion which is consistent with declared data attributes and source language scope.

In addition, the PL/I STRINGRANGE and SUBSCRIPTRANGE error conditions restricts the application program from referencing data which lies beyond the declared extents and lengths of arrays and strings.

DOCUMENTATION

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive PL/I Messages (SC34-0156) ... IBM Series/1 Event Driven Executive PL/I Language Reference (GC34-0147) ... IBM Series/1 Event Driven Executive PL/I User's Guide (SC34-0148) ... IBM Series/1 Event Driven Executive PL/I Licensed Program Specifications for Compiler and Resident Library (5719-PL5) (GC34-0145) ... IBM Series/1 Event Driven Executive PL/I Licensed Program Specification for Transient Library (5719-PL6) (GC34-0146) ... IBM Series/1 Event Driven Executive PL/I Execution Logic Manual (GC34-0149)*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**SERIES/1 EVENT DRIVEN EXECUTIVE  
ADVANCED REMOTE JOB ENTRY  
VERSION 1 (5719-RJ1)**

**PURPOSE**

The Series/1 Event Driven Executive Advanced Remote Job Entry (ARJE) licensed program provides remote job entry workstation support for the Series/1 user with RJE support in an SNA network or BSC environment.

**HIGHLIGHTS**

- **MRJE:** Multi-leaving Remote Job Entry support for Binary Synchronous Communications (BSC).
- **SNA RJE:** Multiple Logical Unit Systems Network Architecture (SNA) support for Synchronous Data Link Control (SDLC).
- **Unattended Operation:** ARJE allows unattended operation by having ARJE commands on disk/diskette, and support for dynamic punch file allocation and delayed activation.
- **Full Function RJE:** In addition to standard RJE capabilities, ARJE has console support with status reporting and journaling, data decompression, and printer form support.
- **ARJE Commands:** ARJE commands have been designed for ease-of-use, and are identical for MRJE or SNA RJE operation.
- **Host Remote Job Entry Subsystems:** ARJE supports the following:

<b>BSC</b>	<b>SDLC</b>
OS/VS2 JES2	OS/VS2 JES2
OS/VS2 JES3	OS/VS2 JES3
VM/370 RSCS	DOS/VSE VSE POWER

**DESCRIPTION**

The Series/1 Advanced RJE program supports both BSC and SNA/SDLC host connections, allowing the Series/1 installation to conform to the protocol required by the host system. The desired line protocol is selected when the Series/1 program is installed. User RJE commands are independent of line protocol.

The BSC option provides a multi-leaving RJE (MRJE) workstation over a point-to-point (switched or nonswitched) connection, appearing to the host as an IBM System/3 with console support.

The SDLC option provides an SNA RJE workstation over a point-to-point (switched or nonswitched) or multipoint connection. The Series/1 appears to the host as a PU-T2 with up to four LU type 1's.

The user can also place advanced RJE commands in a direct access data set, and the program will read these commands as if they were entered from a display terminal. If desired, the Series/1 program can be activated in a wait state, to begin execution when called by the host system.

The Advanced RJE program allows the Series/1 user to query the host system as to the status of previously submitted jobs. Standard inquiry commands are supported. Facilities are also provided to record the RJE console activity on a Series/1 data set for subsequent printing.

Output from a host can be printed directly or spooled to direct access data sets for later printing or other processing. Punched output received from the host is always placed in a dynamically allocated data set.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM Series/1 Event Driven Executive Advanced Remote Job Entry licensed program requires the following hardware for execution:

- **Processor**
  - IBM 4952, 4954, 4955 or 4956.
- **Storage (BSC Environment)**
  - 96K bytes minimum. This includes 30K for ARJE and 5.5K (in any partition) for the &DISKUT3 utility. The \$DISKUT3 utility is loaded when required for data management functions (Open, Seteod, Allocate, etc.) and unloaded when the function is complete.
- **Storage (SNA Environment)**
  - 128K bytes minimum. This includes 30K for ARJE, 5.5K (in any partition) for \$DISKUT3, and a minimum of 32K for the EDX SNA program. The \$DISKUT3 utility is loaded when required for data management functions (Open, Seteod, Allocate, etc.) and unloaded when the function is complete.
- **Disk/Diskette** - One each disk and diskette drive supported by EDX using the EDL READ/WRITE Instructions.
- **Printer** - Any printer supported by EDX using the EDL PRINTTEXT instruction.

- **System Console** - Any EDX-supported interactive terminal that allows use of the EDL READTEXT/WRITE/PRINTTEXT instructions, supports an attention key, and allows program loading (\$L command).
- **Communications** - One of the following communications adapters:
  - #1310 - Multi-function Attachment (BSC mode)
  - #2074 - BSC Single-Line Control
  - #2075 - BSC Single-Line Control
  - #2080 - X.21 Adapter (BSC/SDLC mode) under V.35 Interface
  - #2093/2094 - BSC 8-Line Control and 4-Line Adapter
  - #2090 - Synchronous Data Link Control - Single-Line Control

**SOFTWARE REQUIREMENTS**

The following IBM licensed programs are prerequisites for the execution of the IBM Event Driven Executive Advanced Remote Job Entry licensed program (5719-RJ1):

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator licensed program Version 3 (5719-XS3) or Version 4 (5719-XS4).
- IBM Series/1 Event Driven Executive Utilities licensed program Version 3 (5719-UT5) or Version 4 (5719-UT6).
- IBM Series/1 Event Driven Executive Systems Network Architecture licensed program (5719-SX1) for SNA operation.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Advanced Remote Job Entry: Licensed Program Specifications ... User's Guide ... Reference Card.*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**IBM SERIES/1 REALTIME PROGRAMMING SYSTEM  
ADVANCED REMOTE JOB ENTRY  
5719-RJ6**

**DESCRIPTION**

The IBM Series/1 Realtime Programming System Advanced Remote Job Entry (ARJE) Licensed Program executes as an application program on the Realtime Programming System (RPS). The ARJE Licensed Program supports the use of an IBM Series/1 as a remote job entry workstation using either Systems Network Architecture (SNA) or Multileaving Binary Synchronous Communications (BSC).

Advanced Remote Job Entry supports:

- **MRJE**  
Multileaving Remote Job Entry (MRJE) support for Binary Synchronous Communications (BSC).
- **SNA RJE**  
Multiple Logical Unit Systems Network Architecture (SNA) support for Synchronous Data Link Control (SDLC).
- **Unattended Operation**  
ARJE allows unattended operation by having ARJE commands on disk/diskette, and support for dynamic punch file allocation, and auto answer.
- **Full Function RJE**  
In addition to standard RJE capabilities, ARJE has full function console support with status reporting and journaling, data decompression, and printer form support.
- **ARJE Commands**  
ARJE commands have been designed for ease of use and are identical for MRJE or SNA RJE operation.
- **Host Remote Job Entry Subsystems**  
ARJE supports the following:

BSC	SDLC
OS/VS2 JES2	OS/VS2 JES2
OS/VS2 JES3	OS/VS2 JES3
VM/370 RSCS	DOS/VSE VSE/POWER

**HIGHLIGHTS**

The ARJE licensed program is an application program loaded by the terminal operator or another RPS application program. The purpose of the program is to provide the RPS user with the ability to participate in an SNA network or BSC environment as an RJE workstation. It will allow the user who has created a job stream via RPS edit facilities to transmit that job stream to a host job entry subsystem for processing. Upon completion, the output from the job stream(s) will normally be sent back to the workstation for punching (routed to an RPS data set) and/or printing.

- **MRJE**  
The Binary Synchronous Support for point-to-point (switched or nonswitched) communication is with the ARJE Multileaving Remote Job Entry (MRJE) option. Multileaving is a term which describes a computer-to-computer communications technique developed for use by the HASP system. It has since been implemented by other IBM RJE programming systems. It permits the intermixing of input and output data streams on the communication lines. It is fully synchronized, two directional transmission of a variable number of data streams between the Series/1 and a host system. The Series/1 appears as a System/3 with console support to the host job entry subsystems.
- **SNA RJE**  
The Systems Network Architecture (SNA) RJE option of ARJE supports (switched or nonswitched) point-to-point or multipoint Synchronous Data Link Control protocol. The Series/1 ARJE has Multiple Logical Unit support under a single workstation providing up to four LU to LU sessions. ARJE uses Logical Unit Type 1 protocols for session communication with the host job entry subsystems.
- **Unattended Operation**  
Three ARJE capabilities, i.e., ARJE commands in a disk/diskette data set, dynamic punch file allocation, and auto answer, enable the workstation to operate without the user being physically present.  
The ARJE user can place ARJE commands in a disk/diskette data set in addition to entering them at his workstation display terminal. These ARJE commands will be read in and processed just as if they were entered at the display.  
The user can also activate ARJE in a "wait" state (auto answer), to establish the connection with the host job entry subsystem when a call is received from the host. Thus, Series/1 site personnel can perform other functions while ARJE is executing.  
The punched output received by ARJE is always placed in a Realtime Programming System disk/diskette data set. This data set is allocated by ARJE (dynamic allocation).

- **Full Function RJE**

The workstation console function gives the user the ability to query the host system as to the status of a submitted job and/or query the host for any other normally allowed information (i.e., system status etc.). Facilities are also provided to allow a user to record ARJE console activity to an RPS data set for subsequent printing (called journaling).

The print output received by ARJE may be either printed directly on an available physical printer or, through the use of the RPS spool function, placed in a disk/diskette spool data set for printing at a later time. The use of the spool facility to store output on a diskette allows the user to transport that data to another RPS Series/1 for printing. Facilities exist in the RPS spool function to allow the user to control the printing of specific jobs from the spool processor output queue. ARJE supports 3211/3203-4 Forms Control Blocks for printed data. The FCB parameters are: Lines per inch, form end (page length), and page line to channel assignments (i.e., for each "select vertical channel" command received from the host, ARJE will skip to a specific line on the current printer page). A utility will be provided with ARJE to allow the user to define FCBs corresponding to the FCB/forms requests that may be sent by the host.

- **ARJE Commands**

The ARJE commands are single line commands with parameters that can be specified by the user. These commands are summarized below:

- Help -- Print a list of the commands
- Readfile -- Identify a command/data file to be processed
- Printer -- Alter current ARJE printer assignment
- Punch -- Modify punch specifications
- Library -- Change library environment
- Attend -- Change operational mode (attended/unattended)
- Status -- Report current ARJE status
- Journal -- Turn on/off journal activity
- Operator -- Transmit host operator command

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The Series/1 Realtime Programming System Advanced Remote Job Entry requires the following hardware for installation:

- A Series/1 4954 or 4955 processor.
- One of the following disk/diskette devices:
  - 4962 Disk Storage Unit (all models).
  - 4963 Disk Storage Unit (all models).
  - 4964 Diskette Storage Unit.
  - 4965 Diskette and I/O Expansion Unit.
  - 4966 Diskette Magazine Unit.
- One of the following interactive devices:
  - 4978 Display Station.
  - 4979 Display Station.
  - 3101 Display Terminal Model 1 or 2 or Typewriter Models ASR33/ASR35 or equivalent teletypewriter device attached by any of the following:
    - #7850 Teletypewriter Adapter (3101 or ASR33/35 or equivalent).
    - #2095/ #2096 Feature- Programmable Adapter D02350 (3101 only)
    - #1610 Asynchronous Single Line Adapter (3101 only).
    - #2091/ #2092 Asynchronous Multi-line Adapter (3101 only).
- One of the following adapters:
  - #1310 Multi-function Attachment (BSC mode).

## PROGRAM PRODUCTS

**Series/1 Advanced Remote Job Entry (cont'd)**

- #2074 Binary Synchronous Communications Single Line Control.
- #2075 Binary Synchronous Communications Single Line Control.
- #2080 X.21 Adapter (BSC/SDLC mode) under V.35 Interface.
- #2093 Binary Synchronous Communications 8-Line Control
- #2094 Binary Synchronous Communications 4-Line Adapter
- #2090 Synchronous Data Link Control - Single Line Control

- Optionally, one of the following:

- 4973 Line Printer.
- 4974 Matrix Printer.
- 4975 Matrix Printer (via #1310 MFA).

**SOFTWARE REQUIREMENTS**

The following IBM licensed programs or functionally equivalent programs are prerequisites for the installation of the IBM Series/1 Realtime Programming System Advanced Remote Job Entry Licensed Program (5719-RJ6):

- IBM Series/1 Realtime Programming System Version 5 (5719-PC5).

For SNA RJE option only of ARJE:

- IBM Series/1 Realtime Programming System Systems Extended Network Architecture Support Licensed Program (5719-SN1).

The Series/1 Realtime Programming System Advanced Remote Job Entry Licensed Program requires an additional 26K bytes of storage.

**DOCUMENTATION**

*IBM Series/1 Realtime Programming System Advanced Remote Job Entry Licensed Program Specification ... IBM Series/1 Realtime Programming System Advanced Remote Job Entry User's Guide ... IBM Series/1 Realtime Programming System Advanced Remote Job Entry Reference Card.*

**PROGRAMMING RPQs**

PRPQs will be accepted. Response time will depend upon complexity.

PROGRAM PRODUCTS

**SERIES/1 EVENT DRIVEN EXECUTIVE  
REMOTE MANAGER  
5719-RM1**

**PURPOSE**

The Series/1 Event Driven Executive Remote Manager enables the Series/1 to participate in the Communications Network Management (CNM) environment. The Remote Manager will interface to existing host IBM CNM programs to provide the Series/1 with central network management.

**HIGHLIGHTS**

The Remote Manager allows Series/1 networks to be managed and operated through the communication network management programs available on IBM host processors (S/370, 30XX, and 43XX). Effective network management is made possible with the Network Communications Control Facility (NCCF) licensed program and related communications network management (CNM) programs.

The Remote Manager is designed to communicate with the following host CNM programs:

- Network Communications Control Facility (NCCF)
- Network Problem Determination Application (NPDA)
- Host Command Facility (HCF)
- Distributed Systems Executive (DSX)

There are three major functions which are provided by the Remote Manager:

1. Host Operator Facility allows a host 3270 terminal operator to act as a local Series/1 operator. The host operator can issue commands, invoke system utilities, and run application programs. The host operator can communicate with any Event Driven Executive program which communicates with a local Series/1 terminal (4979) in line-by-line mode.

The host 3270 terminal operator, using the HCF licensed program and the Remote Manager, is able to:

- Display system status, examine error logs, run utilities, start and stop applications in an effort to effect problem determination.
  - Act as the console operator on an unattended Series/1.
2. Relay and Node Data Services: The facility to transmit data between a Series/1 and the host using the Distributed Systems Executive (DSX) as the transmission vehicle and the resource management and tracking vehicle. It is the direction of the Distributed Systems Executive (DSX) licensed program to support this facility in a subsequent release or version.
  3. Alert Processing: The facility to route Series/1 hardware and software error indications to the host to alert network operators of real or potential problems with Series/1 network operation. It is the direction of the Network Problem Determination Application (NPDA) licensed program to support this facility in the next available version or release.

**DESCRIPTION**

The IBM Series/1 Remote Manager will allow a Series/1 to be centrally managed and operated by host communication network management functions for IBM's System Network Architecture (SNA) with Advanced Communication Function.

Briefly these products are:

- Network Communications Control Facility (NCCF) is a licensed program designed to let you control, record, and automate various operator tasks. NCCF is the program base for many CNM functions. It is a VTAM or TCAM application program in OS/VS1, OS/VS2 (MVS), and VSE.
- Network Problem Determination Application (NPDA) is a licensed program that executes in conjunction with NCCF. NPDA allows an NCCF operator to display Series/1 network problem determination data.
- Host Command Facility (HCF) is a licensed program that allows an NCCF operator access to Series/1 console functions.
- Distributed Systems Executive (DSX) is a licensed program that provides Central Library Facilities for distributed library maintenance, software maintenance, and user data transfer with the Series/1.

The Remote Manager exchanges data and information with the host CNM products via SNA sessions.

There are three major functions which are provided by the Remote Manager:

**ALERTS:** The Remote Manager Alert function provides the Series/1 with the ability to notify a remote S/370, 30XX, or 43XX host of conditions detected by the Series/1. When the Series/1 detects certain hardware or software conditions, the system will send an alert message to the host system.

The Remote Manager permits a Series/1 to send alert messages for permanent errors recorded in the Series/1 system error log to the host.

The Series/1 error log records that generate alert records are: Device, and user program-determined errors.

Remote Manager provides support for Series/1 user-created alert records. The user must build a Series/1 error log record and send it to the Remote Manager.

User action codes have been allocated to Series/1 user-defined alert records.

**HOST OPERATOR FACILITY:** The Host Command Facility (HCF) licensed program and the Remote Manager Host Operator Facility function permit a host terminal to function as though it were directly connected to a Series/1 system. Maintenance, service, and control functions of a Series/1 system become available at the host control site for problem determination, problem isolation, and remote system control. Functions provided include the following:

- Central control and operation of a Series/1 system selected by the authorized host network operator:
  - Access to functions available through the Series/1 system console commands.
  - Initiation and termination of tasks at Series/1 system.
  - Dynamic reconfiguration control at the remote Series/1 system, e.g., activation and deactivation of hardware and programming components to adapt the Series/1 system to different optional environments or maintenance conditions.
  - Access to all nonphysical control facilities at the Series/1 system.
- Central access to Series/1 system data sets, including error log dumps, and system operator's log.
- Central problem determination and isolation.
  - Interactive examination of system error log summary and archive information
  - Invocation of the Series/1 system debug facility, as well as other test programs
  - Initiation and examination of dumps and traces
- Central program development using the Series/1 system debug facilities.

**RELAY AND NODE DATA SERVICES:** Remote Manager allows user and system data sets and programs to flow between a host system and a Series/1 in either direction. Thus new or changed data or programs may be sent to a Series/1 in a controlled way. Data or programs may be retrieved from a development or production Series/1. Data which originates at the host, or is destined to be processed at the host, may also be transmitted.

The Remote Manager provides the following capabilities:

1. Add or replace data sets or members
2. Delete data sets or members
3. Initiate procedures sent from the host
4. Inform operator of messages from host

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM Series/1 Event Driven Executive Remote Manager licensed program requires 32K bytes of processor storage over and above the requirements to support its appropriate Event Driven Executive environment.

The minimum storage requirements for Remote Manager execution is an IBM 256K Series/1 processor.

**SOFTWARE REQUIREMENTS**

The following IBM licensed programs are prerequisites for the execution of the IBM Series/1 Event Driven Executive Remote Manager (5719-RM6):

- IBM Series/1 Event Driven Executive Basic Supervisor and Emulator licensed program Version 4 (5719-XS4).
- IBM Series/1 Event Driven Executive Utilities licensed program Version 4 (5719-UT6).
- IBM Series/1 Event Driven Executive Systems Network Architecture licensed program (5719-SX1).

The following IBM licensed programs are required for Remote Manager communication to an SNA host:



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PP 5719-RM1.2  
May 83

PROGRAM PRODUCTS

**Series/1 EDX Remote Manager (cont'd)**

- A subsequent release or version of the Distributed Systems Executive (5668-986). The support will be specified in subsequent DSX documentation.
- Host Command Facility Version 2 (5668-985).
- Network Communications Control Facility Release 2 (5735-XX6) and the next available version or release of the Network Problem Determination Application.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Remote Manager: Licensed Program Specification ... User's Guide ... General Information*

**RPOs ACCEPTED:** Yes

**TERMS and CONDITIONS:** See PP Index

## SERIES/1 REALTIME PROGRAMMING SYSTEM REMOTE MANAGER 5719-RM6

### PURPOSE

The Series/1 Remote Manager enables the Series/1 to participate in the Communications Network Management (CNM) environment. The Remote Manager will interface to existing host IBM CNM programs to provide the Series/1 with central network management functions.

### HIGHLIGHTS

The Remote Manager allows Series/1 networks to be managed and operated through the communication network management programs available on IBM host processors (S/370, 30XX, and 43XX). Effective network management is made possible with the Network Communications Control Facility (NCCF) licensed program and related communications network management (CNM) programs.

The Remote Manager is designed to communicate with the following host CNM programs:

- Network Communications Control Facility (NCCF)
- Network Problem Determination Application (NPDA)
- Host Command Facility (HCF)
- Distributed Systems Executive (DSX)

There are three components of the Remote Manager:

1. Host Operator Facility allows a host 3270 terminal operator to act as a local Series/1 operator. The host operator can issue commands, invoke system utilities, and run application programs. The host operator can communicate with any Realtime Programming System program which communicates with a local Series/1 terminal (4979) in line-by-line mode.

The host 3270 terminal operator, using the HCF licensed program and the Remote Manager is able to:

- Display system status, examine error logs, run utilities, start and stop applications in an effort to effect problem determination.
  - Act as the console operator on an unattended Series/1.
2. Relay and Node Data Services: The facility to transmit data between a Series/1 and the host using the Distributed Systems Executive (DSX) as the transmission vehicle and the resource management and tracking vehicle.
  3. Alert Processing: The facility to route Series/1 hardware and software error indications to the host to alert network operators of real or potential problems with Series/1 network operation.

### DESCRIPTION

The IBM Series/1 Remote Manager will allow Series/1 networks to be centrally managed and operated by host communication network management functions for IBM's System Network Architecture (SNA) with Advanced Communication Function.

Briefly these products are:

- Network Communications Control Facility (NCCF) is a licensed program designed to let you control, record, and automate various operator tasks. NCCF is the program base for many CNM functions. It is a VTAM or TCAM application program in OS/VS1, OS/VS2 (MVS), and VSE.
- Network Problem Determination Application (NPDA) is a licensed program that executes in conjunction with NCCF. NPDA allows an NCCF operator to display Series/1 network problem determination data.
- Host Command Facility (HCF) is a licensed program that allows an NCCF operator access to Series/1 console functions.
- Distributed Systems Executive (DSX) is a licensed program that provides Central Library Facilities for distributed library maintenance, software maintenance, and user data transfer with the Series/1.

The Remote Manager exchanges data and information with the host CNM programs via SNA sessions. The Series/1 might be a single Series/1 processor or a member of a Series/1 network.

The following definitions are used in describing Remote Manager functions in a Series/1 network.

- An independent network contains two or more Series/1 processors (nodes) linked together via the Series/1 Realtime Programming System Communications Manager licensed program. An independent Series/1 network is a non-SNA network. To participate in communication network management, the independent network must have a connection point as one of its nodes.
- A connection point is a Series/1 processor in an independent network (or a single Series/1) which is connected to an IBM host system by an SDLC link. It serves as a relay for transmissions

between the host and the downstream Series/1 processors in the independent networks.

- Downstream Series/1 processors are not connection points but nodes in the independent network.
- Communications Manager is a requirement for Remote Manager Communication with downstream nodes. Remote Manager executes as a Communications Manager application program in downstream nodes to send alerts or send and receive data for the Host Operator Facility and Relay and Node Data Service functions.

There are three major functions which are provided by the Remote Manager:

**ALERTS:** The Remote Manager Alert function provides the Series/1 with the ability to notify a remote S/370, 30XX, or 43XX host of conditions detected by the Series/1. When the Series/1 detects certain hardware or software conditions, the system will send an alert message to the host system.

The Remote Manager permits a Series/1 to send alert messages for permanent errors recorded in the Series/1 system error log to the host.

The Series/1 error log records that generate alert records are: Device, and user-program-determined errors.

Remote Manager provides support for Series/1 user-created alert records. The user must build a Series/1 error log record and send it to the Remote Manager.

User action codes have been allocated to Series/1 user-defined alert records.

**HOST OPERATOR FACILITY:** The Host Command Facility (HCF) licensed program and the Remote Manager Host Operator Facility function permit a host terminal to function as though it were directly connected to a Series/1 system. Maintenance, service, and control functions of a Series/1 system become available at the host control site for problem determination, problem isolation, and remote system control. The Series/1 can be a connection point Series/1 or a downstream node in an independent Series/1 network. Functions provided include the following:

- Central control and operation of a Series/1 system selected by the authorized host network operator:
  - Access to functions available through the Series/1 system console commands.
  - Initiation and termination of tasks at Series/1 system.
  - Dynamic reconfiguration control at the remote Series/1 system, e.g., activation and deactivation of hardware and programming components to adapt the Series/1 system to different optional environments or maintenance conditions.
  - Access to all nonphysical control facilities at the Series/1 system.
- Central access to Series/1 system data sets, including error log dumps, and system operators log.
- Central problem determination and isolation.
  - Interactive examination of system error log summary and archive information.
  - Invocation of the Series/1 system debug facility, as well as other test programs.
  - Initiation and examination of dumps and traces.
- Central program development using the Series/1 system debug facilities.

The Series/1 can be a connection point Series/1 or a downstream node in an independent Series/1 network.

**RELAY AND NODE DATA SERVICES:** Remote Manager allows user and system data sets and programs to flow between a host system and a Series/1 in either direction. Thus, new or changed data or programs may be sent to a Series/1 in a controlled way. Data or programs may be retrieved from a development or production Series/1. Data which originates at the host, or is destined to be processed at the host, may also be transmitted.

The Remote Manager provides the following capabilities:

1. Add or replace datasets or members
2. Delete datasets or members
3. Initiate procedures sent from the host
4. Inform operator of messages from host

These facilities are initiated by DSX. If the request is intended for a downstream Series/1, Remote Manager forwards the request where a

**Series/1 Remote Manager (cont'd)**

Remote Manager is automatically started at the downstream Series/1 to process the request.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment.

**HARDWARE REQUIREMENTS**

The IBM Series/1 Remote Manager may execute on a Series/1 as follows:

- An IBM Series/1 attached to a host with no downstream Series/1s.
- An IBM Series/1 attached to a host with one or more downstream Series/1s.
- A downstream IBM Series/1.

Within each Series/1, the Remote Manager components can be used separately or in combination and with or without a Series/1 in 32K bytes of processor storage over and above the requirements to support its appropriate Realtime Programming System environment. To determine specific storage requirements for a given user installation, the user should reference the *Realtime Programming System Remote Manager Design and Installation Guide* (SL23-0094).

**SOFTWARE REQUIREMENTS**

The following IBM licensed program is a prerequisite for the execution of the IBM Series/1 Realtime Program System Remote Manager (5719-RM6):

- IBM Series/1 Realtime Programming System licensed program Version 6.1 (5719-PC6).

The following IBM licensed program is required for Remote Manager Independent Networks:

- IBM Series/1 Realtime Programming System Communications Manager Version 2 (5719-CM2).

The following IBM Licensed Programs are required for Remote Manager communication to an SNA host:

- Distributed Systems Executive (DSX) Version 2 (5668-986). The support will be specified in subsequent DSX documentation.
- Host Command Facility Version 2 (5668-985).
- Network Communication Control Facility Release 2 (5735-XX6).
- Network Problem Determination Application Version 3 (5668-920 for MVS/370, 5666-295 for DOS/VSE).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System Remote Manager: Licensed Program Specification* (GL23-0096) ... *General Information* (GL23-0098) ... *User's Guide* (SL23-0097) ... *Design and Installation Guide* (SL23-0094).

**RPQs ACCEPTED: Yes**

## PROGRAM PRODUCTS

**STANDALONE DISK UTILITIES  
5719-SC2****HIGHLIGHTS**

- Prompting messages issued through the operator station to facilitate use.
- Utilities can be loaded by name.
- Recoverable errors print message identifying error and reissue prompts.
- Unrecoverable errors print message identifying error and print termination message.
- Distributed from PID on a diskette.

**DESCRIPTION****Diskette IPL Bootstrap**

The Diskette IPL Bootstrap Utility loads the contents of cylinder 1, head 0, into the high end of storage.

**DISK IPL Bootstrap/Loader**

The IPL Bootstrap/Loader Disk Utility loads programs from the disk into main storage.

**Diskette Initialization**

The Diskette Initialization Utility initializes the diskette, writing ID records and checking for bad cylinders and assigns alternate cylinders. The program initializes for Basic Exchange Format and formats sectors to 128 bytes.

**Disk Initialization**

The Disk Initialization Utility initializes the disk, writing sector IDs and checking for defective sectors, and assigns alternate sectors. The program provides for user-specified alternate sector assignment.

**Create Diskette HDR1**

The Create Diskette HDR1 creates a HDR1 record on track 0 for a diskette, using information specified. The format of HDR1 maintains Basic Exchange Format.

**Delete Diskette HDR1**

The Delete Diskette HDR1 Utility deletes the HDR1 record for a specified diskette data file.

**Diskette to Disk Copy**

The Diskette to Disk Copy Utility copies data from a specified diskette file to a specified disk file.

**Disk to Diskette Copy**

The Disk to Diskette Copy Utility copies data from a specified disk file to a specified diskette file.

**Diskette to Printer Dump**

The Diskette to Printer Dump Utility dumps the contents of a specified area on the diskette to the printer.

**Disk to Printer Dump**

The Disk to Printer Dump Utility dumps the contents of a specified data area on the disk to the printer.

**Operator Station to Diskette Patch**

The Operator Station to Diskette Patch Utility applies a patch entered at the operator station to a specified location on the diskette.

**Operator Station to Disk Patch**

The Operator Station to Disk Patch Utility applies a patch entered at the operator station to a specified location on the disk.

**Standalone Storage to Diskette Dump**

Pressing the LOAD key on the console loads this utility into main storage from a dedicated prebuilt diskette. The utility then dumps the contents of the Instruction Address Register (IAR), the general purpose registers, and the Level Status Register (LSR) for each level, and the contents of storage to that same diskette.

**Standalone Storage to Printer Dump**

Pressing the LOAD key on the console loads this utility from a dedicated prebuilt diskette. The utility then dumps the contents of storage, the contents of the Instruction Address Register (IAR), the general purpose registers and the Level Status Register (LSR) for each level on the printer.

**Automatic System Build**

The Automatic System Build program copies to disk the diskettes shipped from PID. A copy of this program resides on each diskette shipped from PID. The diskettes can be loaded in any sequence.

**System Verification**

The System Verification program ensures that the system is built properly by cross-checking each module on the system disk against a table containing expected module names. If any are missing, a message is printed indicating which specific program is not at its expected disk address.

**Error Logging Facilities**

Error logging facilities are enhancements provided to log execution time errors. The facilities offer the user the ability to format a printable error record for processor errors, device I/O request errors, and device interrupt errors. The user provides the area in which the record will be built. The user must also provide his own I/O routine to display the record on a console or printer device or may write it to a disk or diskette device for intermediate storage. When the log is on disk or diskette, the Standalone Utilities provide facilities for printing the log on the console or printer device.

**SPECIFIED OPERATING ENVIRONMENT**

Support is provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

<b>Processor</b>	IBM 4953 Processor (32K bytes minimum) or IBM 4955 Processor (32K bytes minimum)
<b>Disk/ Diskettes</b>	1 - IBM 4962 model 2 or 2F Disk Storage Unit (Combination disk/diskette unit) or 1 - IBM 4962 model 1 or 1F Disk Storage Unit and 1 - IBM 4964 Diskette Unit
<b>Printer</b>	1 - IBM 4974 Printer
<b>Operator Station</b>	1 - Teletypewriter Adapter #7850 with Teletype® Models ASR 33/35 or an ASCII equivalent device.

**SOFTWARE REQUIREMENTS**

None.

**DOCUMENTATION**

(available from Mechanicsburg)

*Series/1 Standalone Utilities User's Guide (GC34-0070) ... IBM Series/1 Standalone Utilities Program Logic Manual (GY34-0071)*

**TERMS and CONDITIONS**

Program Services: Normal SCP provisions apply



## PROGRAM PRODUCTS

**REALTIME PROGRAMMING SYSTEM  
SCREEN FORMAT DESIGN AID UTILITY (5719-SF1)  
PRESENTATION SUPPORT (5719-SF2)****PURPOSE**

Used in conjunction with Version 4 of the IBM Series/1 Realtime Programming System (5719-PC4), the Screen Format Design Aid Utility (5719-SF1) and Presentation Support (5719-SF2) provide the user with definition and execution-time facilities for the creation, maintenance, and usage of screen formats for 4978, 4979, and 5250 Display Stations attached to the Series/1.

The Screen Format Design Aid Utility (5719-SF1) executes in a 16K partition. It is menu driven and interactive. It is used to create, change, test and save screen formats in libraries on disk or diskette, and requires the Presentation Support (5719-SF2) licensed program.

Presentation Support (5719-SF2) is used on production systems [Screen Format Design Aid Utility (5719-SF1) is not required] and operates as supervisor code. A CALL Interface is provided for Assembler and high-level languages (COBOL, PL/I, or FORTRAN). Application programs may use multiple display stations. Presentation Support provides the following functions:

- RETRIEVE format (from a predefined and created screen format library)
- PUT format (write format to display)
- PUT structure (write unprotected data on display device)
- GET structure (read unprotected data from display device)

**HIGHLIGHTS****Screen Format Design Aid Utility (5719-SF1)**

- Interactive
- Option Driven
- Display device attribute characters are defined
- Hard copy of screen formats for reference and update

**Presentation Support (5719-SF2)**

- Supports multiple displays per application program
- Designed to improve user productivity
- Assembler and high-level language interface (COBOL, PL/I and FORTRAN)
- Display device independence to user application programs (except for editing attributes of the 5250)

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of these licensed programs.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system requirements are the same as for the IBM Series/1 Realtime Programming System Version 4 (5719-PC4). Additionally, an IBM 4978, 4979, or 5250 Display Station is required. The storage requirement for the Screen Format Design Aid Utility (5719-SF1) is 16K bytes. Presentation Support (5719-SF2) executes as supervisor transients, but may be specified as resident during SYSGEN (requires an additional 6K bytes of supervisor space).

**SOFTWARE REQUIREMENTS**

The Screen Format Design Aid Utility (5719-SF1) and Presentation Support (5719-SF2) require the following Series/1 licensed programs:

- Realtime Programming System Version 4 (5719-PC4)
- Program Preparation Subsystem Version 3 or 4 (5719-AS3 or 5719-AS4) - not required for execution of user applications.
- IBM 4978 Support Programming RPQ Version 3 (5799-TCE) - required if IBM 4978 is installed.
- IBM 5250 Information Display System Attachment Support (5719-TA1) - required if IBM 5250 installed.

The following Series/1 licensed programs are compatible with the Screen Format Design Aid Utility and the Presentation Support:

- FORTRAN IV Compiler and Object Support Library (5719-FO1 and 5719-FO2) and Realtime Subroutine Library (5719-FO3 and 5719-FO4)
- COBOL Compiler and Resident Library (5719-CB1) and Transient Library (5719-CB2)
- PL/I Compiler and Resident Library (5719-PL1) and Transient Library (5719-PL3)

- PL/I Compiler and Resident Library Version 2 (5719-PL2) and Transient Library Version 2 (5719-PL4)

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System Screen Formatter User's Guide (SC34-0327) ... IBM Series/1 Realtime Programming System Screen Format Design Aid Utility (5719-SF1) and Presentation Support (5719-SF2) Licensed Program Specifications (GC34-0326).*

**TERMS and CONDITIONS:** See PP Index

## REALTIME PROGRAMMING SYSTEM SORT/MERGE 5719-SM1

### PURPOSE

The IBM Series/1 Realtime Programming System Sort/Merge licensed program handles the sorting and merging of records from up to eight input data sets into one output data set in either ascending or descending order. The user specifies one or more control fields in the records to be sorted; the program then compares the control fields to determine the relative sequence of the records.

Sort/Merge executes with the Realtime Programming System Version 3 or Version 4 (5719-PC3 or 5719-PC4) or under the Program Preparation Subsystem Version 3 or Version 4 (5719-AS3 or 5719-AS4). It can execute either as a batch job under the job stream processor or in a foreground partition under the Realtime Programming System.

Sort or merge records can have any of the data set organizations that are part of the Realtime Programming System Version 3 or Version 4; this includes consecutive, random or index, and partitioned data sets whose members have random or consecutive organizations. Data sets with other organizations such as indexed can be processed through user exit routines.

### HIGHLIGHTS

- Accept multi-volume diskettes for input or output data sets in the basic exchange format.
- Accept variable or fixed length records in unblocked, blocked, or spanned blocked formats.
- Initiate program execution either as a batch job or from a user routine written in Series/1 Assembler or COBOL.
- Specify insertion of characters into the records to be sorted, either to control the sort or to appear in the sorted output as editorial characters or both.
- Permit user exit routines to handle I/O errors and process records during Sort/Merge execution.
- Specify either standard EBCDIC or ASCII collating sequence at program execution.
- Specify that the program deviate from either EBCDIC or ASCII, allowing the rearrangement of the collating sequences and addition of character not present in either code.
- Provide statistics on the number of records processed at different points in the program code and of error conditions arising during execution.
- Invoke multiple sorts from the same application.
- Route messages to the operator work station or printer.
- Select all or some of the input records to be selected from the input file by recognizing:
  - Record code
  - Relation of field to a constant
  - Relation of two fields within a record
  - Any relationship in a series (OR'ing)
  - All relationships in a series (AND'ing)
  - Multiple of the above conditions in any combination

Output from the Sort/Merge program can be one of four types:

- **Address Sort**  
Address Sort supports one input data set and produces an output data set of four-byte binary numbers that can be used as an index to the input file. These relative record displacements reflect the sequence specified for the sort job and allow processing of the input data in an ordered manner after the sort job.
- **Record Sort**  
The output from a Record Sort is a data set of sorted records in ascending or descending sequence. The format of the output records can be comprised of either the entire input record or one or more fields in the input record. This can be:
  - Control fields only
  - Data fields only
  - Control fields and data fields
- **Record Summary Sort**  
The output from a Record Summary sort is a data set of sorted records and can contain summary records. The Record Summary Sort accumulates totals from one or more user-specified fields (called summary fields) in the input records, and provides one summary record for each set of input records having control fields with the same value (for example, in an inventory file, records with the same part number).  
The summary records contain the total for each summary field specified; in addition, it can contain the same user-specified data as allowed for record sort.

- **Merge**

The Merge feature can combine up to eight previously sorted data sets into one sorted consecutive output data set.

### Productivity Aids

The following programming aids are provided to assist the user in debugging:

- User specifications for Sort/Merge are edited to minimize generation of erroneous code and errors are noted in one pass.
- All errors may be routed to the system printer via a coded message which indicates the problem area.
- User exits are provided for I/O errors to permit accepting or bypassing of specific errors.
- Statistics are logged for input and output comparisons.

### Output Listings

Under user option, Sort/Merge may produce as part of the output listing for a job, the following information:

- Specification lines
- Diagnostic messages
- Program status messages

In addition, processing statistics are always produced for the job. The statistics contain information regarding input/output files.

### Invoking Mechanisms

The user may execute Sort/Merge via the following:

- CALL macro
- STARTASK macro
- QUETS macro
- LINKTS macro
- As a batch job using the Job Stream Processor (JSP) facilities

### CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The minimum system for executing this program as a batch job under the job stream processor of the IBM Series/1 Program Preparation Subsystem Version 3 or 4 for the selected version.

Sort/Merge requires a minimum of 16K bytes to be able to perform all of its functions. This minimum is in addition to the number of bytes required for calling the task, or the size of any error exit routines. The Sort/Merge program will utilize additional available storage for improved performance. There must be sufficient disk space available for work areas. There must be sufficient diskette or disk space for user data files.

#### SOFTWARE REQUIREMENTS

The minimum system for executing this program in a foreground partition for the version of the IBM Series/1 Realtime Programming System selected. The version selected must be Version 3 or Version 4.

#### DOCUMENTATION

(available from Mechanicsburg)

The following manuals should be used for additional information on this licensed program.

*IBM Series/1 Realtime Programming System Sort/Merge: Licensed Program Specifications (GL23-0010) ... IBM Series/1 Sort/Merge: Introduction (GC34-0239) ... IBM Series/1 Programming System Summary (GA34-0285) ... IBM Series/1 Realtime Programming System Sort/Merge: Programmer's Guide (SL23-0011) ... IBM Series/1 Sort/Merge Coding Form (GX03-0009)*

**TERMS and CONDITIONS:** See PP Index

**EVENT DRIVEN EXECUTIVE SORT/MERGE  
5719-SM2****PURPOSE**

The IBM Series/1 Event Driven Executive Sort/Merge (5719-SM2) licensed program handles the sorting and merging of records from up to eight input data sets into one output data set in either ascending or descending order. The user specifies one or more control fields in the records to be sorted. The program then compares the control fields to determine the relative sequence of the records.

The Event Driven Executive Sort/Merge program executes with the Event Driven Executive Basic Supervisor and Emulator (5719-XS1). It can be invoked by the user through the \$L command, the LOAD instruction, or the \$JOBUTIL utility of the Event Driven Executive Utilities (5719-UT3).

Sort or merge records can have any of the data set organizations that are part of the Series/1 Event Driven Executive Basic Supervisor and Emulator. This includes consecutive and indexed data set organizations.

**HIGHLIGHTS**

- Accept fixed length or variable length records in unblocked or blocked formats (variable length is only supported by the Event Driven Executive COBOL Compiler and associated libraries, 5719-CB3/CB4)
- Initiate program execution either as a batch job or from a user routine written in Series/1 Assembler language, Series/1 COBOL, or Event Driven language (EDL)
- Specify the insertion of characters into the records to be sorted, either to control the sort, or to appear in the sorted output as editorial characters, or both
- Permit user-written exit routines to handle I/O errors and process records during sort/merge execution
- Specify either standard EDCDIC or ASCII to be used in collating records at program execution
- Specify that the program deviate from either EBCDIC or ASCII, allowing the rearrangement of the collating sequences and addition of characters not present in either code
- Provide statistics on the number of records processed at different points in the program code and on error conditions arising during execution
- Invoke multiple sorts from the same application
- Route messages to the operator work station or printer
- Select all or some of the input records by recognizing:
  - Record code
  - Relation of field to a constant
  - Relation of two fields within a record
  - Any relationship in a series (OR 'ing)
  - All relationships in a series (AND 'ing)
  - Multiples of the above conditions in any combination

Output from the Event Driven Executive Sort/Merge program is limited only by output data set size and can be one of four types:

**Address Sort**

Address Sort for direct data sets supports one input data set and produces an output data set of four-byte binary numbers that can be used as an index to the input data set. These relative record displacements reflect the sequence specified for the sort job, and allow processing of the input data in an ordered manner after the sort job.

**Record Sort**

The output from a Record Sort is a data set of sorted records in ascending or descending sequence.

The user determines the format and content of the sorted output record. The output record can be comprised of either the entire input record or one or more fields in the input record.

**Record Summary Sort**

The output from a Record Summary Sort is a data set of sorted records and can contain summary records. The summary record accumulates totals from one or more user-specified fields (called summary fields) in the input records, and provides one summary record for each set of input records having control fields with the same value (for example, in an inventory file, records with the same part number).

The summary record contains the total for each summary field specified; in addition, it can contain the same user-specified data as allowed for record sort.

**Merge**

The Merge feature can combine up to eight previously sorted data sets into one sorted consecutive output data set.

The merged record is comprised of the entire input record and, at the option of the user, the control field specified for the merge.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support for this licensed program will be provided when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The Series/1 Event Driven Executive Sort/Merge program requires a minimum of 16K bytes to be able to perform all of its function.

This minimum is in addition to the number of bytes required for calling the task or the size of any error or processing exit routines. The Sort/Merge program will utilize additional available storage for improved performance. There must be sufficient diskette or disk space available for work areas. There must also be sufficient diskette or disk space for user data files.

**SOFTWARE REQUIREMENTS**

The minimum system for executing this program is specified in the pages for the Series/1 Event Driven Executive Basic Supervisor and Emulator (5719-XS1).

The following licensed programs are required if the associated functions are used.

- IBM Series/1 Event Driven Executive Utilities (5719-UT3) for \$JOBUTIL and Disk Utilities.
- IBM Series/1 Event Driven Executive Indexed Access Method (5719-AM3): Required support for indexed data sets.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Event Driven Executive Sort/Merge: Licensed Program Specifications (GL23-0015) ... IBM Series/1 Event Driven Executive Sort/Merge: Programmer's Guide (SL23-0016) ... IBM Series/1 Coding Form (GX23-0009)*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**REALTIME PROGRAMMING SYSTEM VERSION 5  
SNA EXTENDED SUPPORT (5719-SN1)**

**PURPOSE**

The IBM Series/1 Realtime Programming System Version 5 SNA Extended Support licensed program enhances the overall usability of the base operating system Systems Network Architecture (SNA) support.

**Ordering Information**  
Contact IBM.

**HIGHLIGHTS**

A new user interface, the Realtime Programming System SNA Extended Support licensed program will mask the SNA protocols from the Series/1 user application program. The principal advantages of the new interface are:

- High-level macro instruction interface
- Easy to understand macro parameters
- Connection capability to CICS/VS application programs as an IBM 3790 Full Function Logical Unit
- Connection capability to IMS/VS application programs as a secondary Logical Unit Type P (SLU-P)
- Connection capability to the Network Routing Facility as a secondary Logical Unit (full-duplex pipeline)

The basic operation of the SNA Extended Support involves:

- Establishing communication with the host subsystem, including message recovery/resynchronization assistance
- Sending messages to and receiving messages from the host subsystem
- Terminating communication with the host subsystem.

The execution of these functions is shared among the elements that make up the network. The SNA Extended Support controls the communication path between the Series/1 and host, and handles the required SNA formats and protocols.

The SNA Extended Support licensed program provides an SNA presentation services level user interface to program-to-program communications with host data base/data communications subsystems in an SNA network. It is an enhancement to the data flow control (DFC) level user interface provided by the Realtime Programming System SNA base support.

This SNA Extended Support uses the SNA base support at its DFC level interface to gain access to the SNA network. The SNA base provides physical unit type 2 (cluster controller) support with multiple logical units (LU). The use of SNA Extended Support is selectable for any LU by the application programmer. Multiple LUs may be supported in the same physical unit.

The SNA Extended Support licensed program uses SNA commands to control the session with the host subsystem. The user requests services through the provided interface which allows a GET/PUT-like level of access for sending and receiving messages.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of these licensed programs.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specific operating environment:

**HARDWARE REQUIREMENTS**

The SNA Extended Support licensed program requires Synchronous Data Link Control Single-Line Control (SDLC) (#2090).

There are no additional hardware requirements to support the SNA Extended Interface Support, assuming all hardware requirements for the particular base Realtime Programming System SNA configuration have been satisfied.

**SOFTWARE REQUIREMENTS**

The minimum system for installation and program execution of this licensed program is specified in the IBM Series/1 Realtime Programming System Version 5 (5719-PC5).

**COMPATIBILITY**

This licensed program (5719-SN1) is compatible with the IBM Series/1 Realtime Programming System Version 5 (5719-PC5).

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Series/1 Realtime Programming System Version 5 System Network Architecture Extended Support: Licensed Programming Specifications (GC34-0349) ... Programmer's Guide (SC34-0370).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**EVENT DRIVEN EXECUTIVE  
SYSTEMS NETWORK ARCHITECTURE (SNA)  
5719-SX1****PURPOSE**

The IBM Series/1 Event Driven Executive (EDX) support for Systems Network Architecture (SNA) licensed program (5719-SX1) executes as a separate program within the Event Driven Executive system. A single copy of the SNA program will execute and coordinate all SNA session traffic from user application programs to a single host subsystem (IMS/VSE, CICS/VSE). The Event Driven Executive processing system will now be able to attach to existing SNA host system (System/370, 303X, 43XX) networks to permit Series/1 Event Driven Executive users to communicate with already existing host application subsystems such as the Customer Information Control System (CICS/VSE) and Information Management System (IMS/VSE). The Series/1 will attach to an SNA host system as a cluster controller node. The Series/1 node attaches to an adjacent 370X Network Control Program (NCP) Communications Controller that is either locally or remotely attached to the host system. The physical interconnection is linked by means of Synchronous Data Link Control (SDLC).

**HIGHLIGHTS**

The Event Driven Executive SNA interface will provide the Series/1 with an interface at the GET/PUT level. The principal advantages of the SNA interface are:

- Event Driven Language (EDL) interface
- Connection capability to CICS/VSE application programs as a 3790 Full Function Logical Unit
- Connection capability to IMS/VSE application programs as a secondary Logical Unit type P (SLU-P)
- Connection capability to the Network Routing Facility as a secondary Logical Unit (full-duplex pipeline).

The basic operation of the Event Driven Executive SNA support involves:

- Establishing communication with the host subsystem, including message recovery/resynchronization assistance
- Sending messages to and receiving messages from the host
- Terminating communication with the host

The execution of these functions is shared among the elements that make up the SNA network. The SNA support controls the communication path between the Series/1 and the host and handles the required SNA formats and protocols. The support provides an SNA presentation services level user interface to program-to-program communications with host data base/data communications subsystem in an SNA network.

The Event Driven Executive SNA support uses SNA commands to control the session with the host subsystem. The user requests services through the provided SNA interface which allows a GET/PUT level of access for sending and receiving messages.

This set of functional support allows the Series/1 to be defined as a Cluster Controller on an SNA/SDLC network controlled by a System/370 using OS/VSE, OS/VS1 or DOS/VSE and ACF/VTAM or ACF/TCAM through a 3705 Communications Controller using the Network Control Program (ACF/NCP/VSE). This support also allows operation in a network controlled by a System/370 with IMS/VSE Version 1 Advanced Function for Communications and System/370 CICS/VSE Version 1.5.

The Event Driven Executive SNA support is a subset of the total SNA architecture. The support provides services to establish, control, and terminate sessions between multiple Series/1 programs and an SNA host subsystem or user programs. The support also provides services to transfer data and control information between the programs.

- The Series/1 attaches to the SNA network as a cluster controller node, in SNA terminology a physical unit type 2.
- The Event Driven Executive SNA support allows multiple logical units in the Series/1.
- The Event Driven Executive SNA program supports transmission subsystem and function management profiles 3 or 4.
- The Event Driven Executive SNA program has a presentation services interface to allow Series/1 users to communicate across a network without being involved with protocols (for example, building request and transmission headers) and resources (for example, building control blocks, activating devices).
- The physical attachment to the SNA network is as a secondary SDLC station on a:
  - Nonswitched link
    - Point-to-point
    - Multipoint
  - Switched link

Manual call  
Manual answer  
Auto-answer

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

32K bytes of additional Series/1 storage is required for execution of the IBM Series/1 Event Driven Executive SNA Program. The Event Driven Executive SNA licensed program support requires Synchronous Data Link Control Single-Line Control (#2090).

**SOFTWARE REQUIREMENTS**

Event Driven Executive SNA application programs require the following licensed programs:

- Event Driven Executive Basic Supervisor and Emulator Version 3 (5719-XS3)
- Event Driven Executive Utilities Version 3 (5719-UT5)
- Event Driven Executive Program Preparation Facility Version 3 (5719-XX4)

The Utilities and Program Preparation Facility are required only for the preparation and installation of SNA application programs, and are not required for execution.

In addition to the previously listed programs, the following licensed programs are required to assemble the Event Driven Executive SNA application programs on a host system:

- Series/1 Event Driven Executive Macro Library/Host Version 3 (5740-LM4)
- System/370 Program Preparation Facilities for Series/1 FDP (5798-NNQ)
- System/370 Event Driven Executive Host Communications Facility IUP (5796-PGH) (optional)

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 Programming System Summary (GC34-0285) ... IBM Series/1 Event Driven Executive Systems Network Architecture and Remote Job Entry Guide (SC34-0402).*

**TERMS and CONDITIONS:** See PP Index

**Ordering Information**

Contact IBM.

**EVENT DRIVEN EXECUTIVE  
SYSTEMS NETWORK ARCHITECTURE RJE  
5719-SX2****PURPOSE**

The IBM Series/1 Event Driven Executive (EDX) Systems Network Architecture RJE support (SNA RJE) licensed program has the commands and capabilities of the existing EDX RJE Utilities plus additional functions which accommodate SNA host job entry subsystems. The RJE program will execute as a separate program within the Event Driven Executive system.

**HIGHLIGHTS**

The SNA RJE product will allow the SNA RJE user who has created a job stream via the EDX edit facilities to transmit that job stream to a host system for processing. Upon completion, the output from the job stream will normally be sent back to the work station for printing and/or punching. The work station also gives the user the ability to query the host system for the status of the submitted job and/or query the host for any other normally allowed information; for example, system status.

- EDX SNA RJE supports the following host job entry subsystems:
  - DOS/VSE
  - OS/VS1
  - OS/VS2
  - VSE/POWER
  - RES
  - JES 2 and JES 3
- The print output received by SNA RJE may be either printed directly on an available physical printer or, through the use of the EDX spool processor, placed in a disk spool data set (an EDX logical printer) for printing at a later time.
- Full console support.
- Punched output received by SNA RJE is always placed in an EDX data set selected by the user.
- SNA RJE will have the capability to optionally have all SNA RJE console messages directed to a data set for subsequent printing.
- The commands listed below will be available in the EDX SNA RJE licensed program.

ABORT	Stops transmission to or from the host
COMMAND	Sends a command to the host
ENDRJE	Terminates execution of the utility
PRINTON	Defines the terminal name used for output
PUNCHO	Defines a disk or diskette file for punch output of object data
PUNCHS	Defines a disk or diskette file for punch output of source data
RESET	Reset function
SUBMIT	Sends a data stream to the host
SUBMITX	Sends a transparent data stream to the host
HRJE	Displays all SNA RJE commands and functions
JOURNAL	Directs SNA RJE messages to a data set

Since the SNA RJE spool functions will be handled by the EDX spool processor, the existing BSC RJE SPOOL and ENDSPOOL commands are not implemented in the SNA RJE licensed program.

The SNA RJE support has the following SNA requirements:

- 1 Logical Unit SNA RJE Work Station
- SNA Function Management Profile 3
- SNA Transmission Subsystem Profile 3

A display or console device will be required for each SNA RJE work station to start or interact with EDX SNA RJE.

To submit a job stream or receive punched output, the SNA RJE user will require a disk or diskette.

To receive printed output, the user will require a printer or disk space as specified for the use of the EDX Spool processor.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

64K bytes of additional Series/1 storage is required for execution of the IBM Series/1 Event Driven Executive RJE program. The hardware requirement for EDX SNA RJE support is feature #2090, Synchronous Data Link Control Single-Line Control (SDLC).

**SOFTWARE REQUIREMENTS**

Basic Supervisor and Emulator Version 3 (5719-XS3) is a prerequisite, and the Supervisor must have EXIO support included at SYSGEN. The Event Driven Executive SNA program (5719-SX1) is also a prerequisite for the RJE program.

**DOCUMENTATION**

*IBM Series/1 Event Driven Executive Systems Network Architecture and Remote Job Entry (SC34-0402).*

**TERMS and CONDITIONS:** See PP Index

## 5250 INFORMATION DISPLAY SYSTEM ATTACHMENT SUPPORT 5719-TA1

### PURPOSE

The IBM Series/1 5250 Information Display System Attachment Support licensed program provides definition and execution time facilities to assist the user in the control of 5250 Information Display System work stations attached to the Series/1 5250 Information Display System Attachment.

### HIGHLIGHTS

This licensed program provides the following support:

- Attachment Initialization
- Device Support
- Verification Test Facility
- Screen Formatting Assist and Data Stream Macros
- Alternate System Console Support
- Utility Functions
- High Level Language Support
- Print Function
- Operator Commands

### DESCRIPTION

#### Attachment Initialization

The attachment initialization facility performs the following functions:

- Opens the data set referenced by the start device command or macro
- Reads the Controller Storage Image from disk or diskette
- Loads the Controller Storage Image into the attachment

Attachment initialization can be initiated from the operator station or the IPL (Initial Program Load) options data set using the Realtime Programming System Start Device operator command, or from a user application using the Realtime Programming System Start Device macro.

#### Device Support

The device support enables the user's applications to communicate with 5250 work stations attached to the Series/1. Communication is through user-generated data streams containing both data and control information. The device support provided is at a READ/WRITE macro level.

#### Verification Test Facility

The verification test facility enables the user to verify operational status during installation, normal operation, and servicing of the 5250 work stations attached to the Series/1. The following verification tests are provided:

#### Display Verification

- Display attributes
- Displayable characters
- Specified input fields
- Function keys
- Printer Verification
- Configuration Data
- Display 5250 Error Log Information

#### Screen Formatting Assist and Data Stream Macros

The screen formatting assist and Data Stream macros aid in constructing output data streams and screen formats for the 5250 work stations. Data streams are used to write data to a 5250 work station, and consist of data and control information which determine the placement and attributes of the data.

The following screen formatting assist macros are provided:

DEFERMSG	Defines error messages to be written.
FIELD	Assists in the detail definition of each field within the data stream
FTBLCLR	Defines the data stream to clear the format table
ROLL	Defines the data stream which will cause a given number of adjacent lines on the screen to be rolled upward or downward
SCREEN	Initiates the definition of the contents of a screen or any part of a screen
SCREEND	Builds a map of the fields defined within the data stream

STACLR Defines the data stream to clear the screen and the screen format table

#### Alternate System Console Support

The alternate system console support enables the user to define a 5250 work station as the alternate system console for operation after installation and initial system generation (SYSGEN). A 3101 Display Terminal, or other Teletype® ASR Models 33/35 compatible device, or 4979 Display Station must be used as the system console during initial SYSGEN, and for execution of the Realtime Programming System standalone utilities used for installation of the Realtime Programming System.

#### High Level Language Support

The high level language support allows access to 5250 work stations via the CALL interface from COBOL (5719-CB1), FORTRAN IV (5719-FO1 and 5719-FO2), or PL/I (5719-PL1 and 5719-PL2 applications).

#### Print Function

The print function allows the user to print the contents of a 5251 or 5252 Display Station or a 5256 Printer attached to the same 5250 Information Display System Attachment (#1210).

#### Utility Functions

The following functions are available to do the following:

- Build DSDs (Data Set Definitions) for 5250 work station DSDs
- Change 5250 work station DSDs

#### Operator Commands

Operator commands are provided to allow the user do the following:

- Stop a 5250 attachment and free the storage required to service that attachment
- Reset dates and counters in the 5250 error log data set

#### CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.

#### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The minimum hardware requirements for the IBM Series/1 5250 Information Display System Attachment Support (5719-TA1) licensed program are the same as for the Series/1 Realtime Programming System Version 4 and Program Preparation Subsystems Versions 3 or 4 plus the 5250 Information Display System Attachment (#1210) and 5250 System Units. The addition of a 5250 support to the Realtime Programming System Version 4 requires at least 6K additional bytes of storage within the supervisor.

#### SOFTWARE REQUIREMENTS

The Series/1 5250 Information Display System Attachment Support (5719-TA1) requires the following licensed programs:

- Realtime Programming System Version 4, Modification Level 1 (5719-PC4)
- Program Preparation Subsystem Version 3 or 4 (5719-AS3 or 5719-AS4) – not required for execution of user applications
- FORTRAN IV Compiler and Object Support Library (5719-FO1 and 5719-FO2) and Realtime Subroutine Library (5719-FO3 and 5719-FO4)
- COBOL Compiler and Resident Library (5719-CB1) and Transient Library (5719-CB2)
- PL/I Compiler and Resident Library (5719-PL1) and Transient Library (5719-PL3)
- PL/I Compiler and Resident Library Version 2 (5719-PL2) and Transient Library Version 2 (5719-PL4)
- Multiple Terminal Manager Programming RPO P82596 (5799-TCY) Version 1, Modification Level 2.

#### PERFORMANCE

System performance is dependent upon processor selection, configuration, number of work stations attached, system generation options and application program design.



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PP 5719-TA1.2

May 83

Major Revision

PROGRAM PRODUCTS

**5250 Information Display System Attachment Support  
(cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Series/1 System Summary (GA34-0035) ... IBM Series/1 Programming System Summary (GC34-0285) ... IBM Series/1 5250 Information Display System Attachment Support Licensed Program Specifications (GC34-0245) ... IBM Series/1 5250 Information Display System Attachment Support User's Guide and Reference Manual (SC34-0246) ... IBM Series/1 5250 Information Display System Attachment Support Program Logic Manual (LY34-0157).*

**TERMS and CONDITIONS:** See PP Index

**4969 MAGNETIC TAPE SUBSYSTEM SUPPORT  
5719-TA4****PURPOSE**

The IBM Series/1 4969 Magnetic Tape Subsystem Support licensed program (5719-TA4) provides support for the 4969 Magnetic Tape Subsystem when attached to the Series/1.

**HIGHLIGHTS**

The licensed program support consists of the following components: Device Management, Data Set Management and Online Utility Services.

**Device Management**

The device handler runs as part of the system task set and access is provided via Realtime Programming System access macros. The functions provided are:

- Activate and deactivate the device support
- Read a block of data from tape
- Write a block of data to tape
- Rewind tapes
- Set tape offline
- Rewind and set tape offline
- Write a tapemark
- Forward space a record or file
- Backward space a record or file
- Build a DIOCB, DDB, IOQE and DSD for tape

**Data Set Management**

The data set management routines run as part of the system task set and perform tape label, OPEN/CLOSE and GET/PUT processing and execute under the environment of the task issuing the request. These routines use the device handler functions for reading and writing tape labels and tape marks. The functions provided by the data set management routines are summarized as follows:

- Write header and trailer labels on output processing
- Verify header and trailer labels on input processing
- Write and verify the accompanying tapemarks that delineate label groups
- Allocate and deallocate a tape transport to a user program
- Receive logical records from a tape
- Send logical records to a tape
- Perform EOVS processing which includes volume switching and label processing for multi-volume tape files

**Online Utility Services**

- Copy unit w/backup (Dump Restore)
- Initialize a tape volume
- Copy tape to tape
- Build tape DSDs in a DSDT on disk
- Tape exerciser

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system requirements for the IBM Series/1 4969 Magnetic Tape Subsystem Support Program are the same for the IBM Series/1 Realtime Programming System Version 4 and IBM Program Preparation Subsystem Version 4 plus the IBM 4969 Magnetic Tape Subsystem Attachment feature (#1215) and an IBM 4969 Magnetic Tape Subsystem unit.

**SOFTWARE REQUIREMENTS**

The IBM Series/1 4969 Magnetic Tape Subsystem Support program (5719-TA4) requires the following licensed programs:

- Realtime Programming System Version 4, Modification Level 1 (5719-PC4)
- Program Preparation Subsystem Version 4, Modification Level 1 (5719-AS4) – not required for execution of user applications

The following Series/1 Realtime Programming System licensed programs are compatible with the 4969 Magnetic Tape Subsystem (5719-TA4):

- FORTRAN IV Compiler and Object Support Library (5719-FO1) and Realtime Subroutine Library (5719-FO3 or 5719-FO4)
- FORTRAN IV Compiler and Object Support Library (5719-FO2) Version 2, Modification Level 2 and Realtime Subroutine Library (5719-FO4)
- COBOL Compiler and Resident Library (5719-CB1) and Transient Library (5719-CB2) Version 1, Modification Level 1
- PL/I Compiler and Resident Library Version 2 (5719-PL2) and Transient Library Version 2 (5719-PL4)
- Sort/Merge (5719-SM1) Version 1, Modification Level 1

**DOCUMENTATION**  
(available from Mechanicburg)

*IBM Series/1 System Summary (GA34-0035) ... IBM Series/1 Programming System Summary (GC34-0285) ... IBM Series/1 Realtime Programming System 4969 Magnetic Tape Subsystem Support Program Licensed Program Specifications (GC34-0289) ... IBM Series/1 Operator's Guide (GA34-0039) ... IBM Series/1 Realtime Programming System 4969 Magnetic Tape Subsystem Support Program User's Guide (SC34-0290) ... IBM Series/1 Realtime Programming System 4969 Magnetic Tape Subsystem Support Program Program Logic Manual (LY34-0162).*

**TERMS and CONDITIONS:** See PP Index

## FACILITY CONTROL/POWER MANAGEMENT 1 FC/PM 1 (5719-U11)

### PURPOSE

IBM Series/1 Facility Control/Power Management 1 licensed program is a standalone dedicated application providing control actions for reducing both electrical demand and consumption charges. It requires no local programming and is controlled through the entry of functional commands and appropriate parameters by the user.

### HIGHLIGHTS

The Facility Control/Power Management 1 licensed program addresses electrical energy cost reduction in facilities with one demand meter, or that portion of facility on one demand meter, and up to 31 controllable device circuits. Savings are achievable providing there are sufficient controllable loads. Input points can also be monitored and, as specified by the user, can cause printing of operator messages, sounding of an alarm, and conditioning of control actions.

It may be operated in any one of six functional modes. This allows progressive installation from simple monitoring to full function energy management. The six modes are:

1. Electrical consumption monitoring.
2. Electrical consumption monitoring and alarm monitoring.
3. Electrical consumption monitoring, alarm monitoring, and time-of-day consumption limiting.
4. Electrical consumption monitoring, alarm monitoring, and time-of-day consumption limiting with cyclic start/stop.
5. Electrical consumption monitoring, alarm monitoring, and time-of-day consumption limiting with demand increment processing.
6. Electrical consumption monitoring, alarm monitoring, and time-of-day consumption limiting with cyclic start/stop and demand increment processing.

The application provides:

1. Power control functions:
  - Time-of-day strategies for up to three types of days for an entire year.
  - Device strategy specification includes up to 8 start/stop time control segments per day.
  - Devices may be selected for either demand control or cyclic on/off control by type of day.
  - Up to nine user-defined time segments per type of day.
  - 31 unique device off time strategies for each time segment.
  - Monitoring of demand meter (integrated or sliding window).
  - Demand increment processing to select and turn off demand control devices.
  - Optional inverted digital output logic for alternate control wiring.
  - Demand target for each time segment.
2. Status monitoring of up to 16 user alarm and condition points, with user defined duration times for validity checking.
3. Data logging and report generation, including the reporting of savings due to cyclic or demand control.
4. Operator interaction via keyboard of operator station:
  - Modify power, control, and device parameters.
  - Obtain reports.
  - Start or stop devices.
5. IPL and restart under user/operator control.
6. Startup/Shutdown:
  - Scheduled execution
  - Delay between device starts
7. Automatic restart after power failure with support of an optional external, battery-powered BCD clock.
8. Application personalization provides user capability of selecting options desired and entering parameters to define requirements:
  - Demand metering calculation requirements
  - Control strategies
  - Time-of-day segments for device operation and control
  - Time-of-day segments for applicable targets
  - Floating target specifications
  - Alarm and condition switch status points and message texts

9. Time-of-day update selects applicable control parameters based on time-of-day and Julian date.
10. Operator guidance provided by printed messages, status reports, and conversational prompts.
11. Condition switch function provides for external interaction with demand increment processing function.
12. Three types of targets:
  - Maximum – defined by user, and either
  - Standard – below maximum and defined by user, or
  - Floating – low maximum and dynamically adjusted to minimize demand.
13. Two basic strategies for demand control actions:
  - Priority selection of devices
  - Rotational selection of devices

### CUSTOMER RESPONSIBILITIES

The user is responsible for physical planning; planning the control strategy; installing, personalizing, checking out and operating the licensed program; securing, installing, and maintaining the operator control station; and providing the instrumentation and control devices required to interface to the user's equipment being controlled.

The user will determine the energy control plan for the facility, determining which devices may be controlled, and how these devices may be controlled to reduce electrical energy consumption and demand.

In cooperation with the customer, the marketing representative must (a) request for inclusion in the order the RPQ D26024 Operator Station, or (b), alternatively, advise the customer of his responsibility to provide an equivalent operator station. The RPQ Operator Station consists of a Teletype® Model 43 Teletype. Reference should be made to the RPQ description for complete information and limitations on warranty and serviceability/service.

If time reset after automatic restart is to be implemented with an external, battery-powered BCD clock, the user is responsible for obtaining, installing, and maintaining such a clock.

After obtaining and installing the operator station, and a subsystem usually consisting of a Manual Control Panel, individual device controls, instrumentation and interconnecting wiring, and connecting them to the Series/1 processor by means of the Customer Access Panel, the user is responsible for the installation of the licensed program. To install the licensed program, the user loads the diskette received from IBM. After the FC/PM 1 programs on the diskette have been read into the processor, the user enters the control information, determined in the development of the energy control strategy, into the processor through the operator station. FC/PM 1 is then ready for checkout and operation by the user.

In order to assist the customer in the fulfillment of the subsystem responsibilities, design and installation services are available for a charge through IBM SBIS services.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

Facility Control/Power Management 1 requires the following minimum configurations:

IBM Series/1 4952 model A Processor with 32K storage with the following features:

- Energy Conservation Application (#9023)
- Rack Mounting Fixture (#4540)
- Customer Access Panel (#1590) (recommended but optional)
- Customer Access Panel-Integrated DI/DO Cable (#1593) (recommended but optional)
- Timers (#7840)
- Teletypewriter Adapter (#7850)
- Teletypewriter-Customer Access Panel Cable (#2059) (recommended but the Teletypewriter Cable (#2055) may be substituted)
- Integrated Digital Input/Output Non-Isolated (#1560)
- 4964 Diskette Unit Attachment (#3581)
  - IBM 4964-1 Diskette Unit
  - IBM 4977-1A Rack Enclosure

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**Facility Control/Power Management 1 (cont'd)**

- An Operator Station:  
Any ASCII device usable as an operator station that meets the specification required by the Teletypewriter Adapter of the IBM Processor (see Customer Responsibilities)
- A Subsystem:  
A Subsystem is required to attach controlled circuits or devices. This subsystem usually consists of:
  - The connecting wiring
  - The individual device controls
  - A Manual Control Panel—Description, availability, price and schedule information may be requested for a Manual Control Panel through an SBIS agreement.
  - Modification to the user's electrical consumption and demand meters needed to support the operating mode selected by the user.

**SOFTWARE REQUIREMENTS**

Facility Control/Power Management 1 is a standalone licensed program and requires no additional programming support. It is distributed as executable code in machine-loadable format.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual (GH34-0094) ... Promotional Flyer (G580-0158) ... User's Guide (SC34-0062) ... Licensed Program Specifications (GC34-0065) ... Customer Site Preparation Manual (GA34-0050)*

**TERMS and CONDITIONS:** See PP Index

## FACILITY CONTROL/POWER MANAGEMENT 2 FC/PM 2 (5719-U12)

### PURPOSE

IBM Series/1 Facility Control/Power Management 2 licensed program is a standalone dedicated application providing control actions for reducing both electrical demand and consumption charges. It requires no local programming in order to execute the included application functions, but permits user programming modification of those functions or development of additional functions if desired. The FC/PM 2 functions include the functions supplied in FC/PM 1 with extended support for up to 95 device circuits, plus utilities useful for function modification or new function addition. In addition, a number of new features such as the operations monitor and the Billing Period Report have been added. A special feature, Facility Control/Power Management 3, extends the range of IBM-provided application functions to include digital device addressing for up to 256 device circuits, enthalpy control of air dampers, temperature proportional control strategies, and extended condition switch function. Application functions of both FC/PM 2 and FC/PM 3 are controlled through the entry of functional commands and appropriate parameters by the user.

### HIGHLIGHTS

The Facility Control/Power Management 2 licensed program addresses electrical energy cost reduction in facilities with one demand meter, or that portion of a facility on one demand meter, and up to 95 (94 if operations monitor is used) controllable device circuits. Savings are achievable providing there are sufficient controllable loads.

The application provides:

1. Power control functions:
  - Time-of-day strategies for up to four types of days for an entire year
  - Device strategy specification includes up to 8 start/stop time control segments per day
  - Devices may be selected for either demand control or cyclic on/off control by type of day
  - 95 unique device strategies within each of the above
  - Optional inverted digital output logic for alternate control logic
  - Demand increment processing
  - Monitoring of demand meter (integrated or sliding window)
  - Targets for up to nine user-defined time segments per type of day
  - Demand increment durations from 15 to 120 seconds and demand interval durations of 5 minutes to 2 hours for demand control
  - User-defined delay times from 2-30 seconds in increments of 2 seconds for turning on devices sequentially
2. Status monitoring of up to 95 (less if some of the FC/PM 3 functions and the automatic BCD clock is used) user alarm and condition switch points with user defined duration time for validity checking
3. Data logging and report generation including the reporting of savings due to demand and cyclic control
4. Operation interaction via keyboard of operator station:
  - Modify power, control, and device parameters
  - Obtain reports
  - Start or stop devices
5. IPL and restart under user/operator control
6. Startup/Shutdown:
  - Scheduled execution
  - Delay between device starts
7. Automatic restart after power failure with support of an optional external, battery-powered BCD clock
8. Operations monitor
9. Application personalization provides user capability of selecting options desired and entering parameters to define requirements:
  - Demand metering calculation requirements
  - Control strategies
  - Time-of-day segments for device operation and control
  - Time-of-day segments for applicable targets
  - Floating target specifications
  - Alarm and condition switch status points and message texts

10. Time-of-day update selects applicable control parameters based on time-of-day and calendar date
11. Operator guidance provided by printed message, status reports and conversational prompts
12. Condition switch function provides for external interaction with demand control, cyclic control, and time-of-day control of devices
13. Three types of targets:
  - Maximum – defined by user, and either
  - Standard – below maximum and defined by user, or
  - Floating – below maximum and dynamically adjusted to minimize demand
14. Two basic strategies for actions:
  - Priority selection of devices
  - Rotational selection of devices
15. Modifiability – The user can modify the application programs by requesting the optional source code and utilizing the Application Program Preparation Utilities which provide:
  - Source editing of records in members of the user source library
  - Source translation and execution of user-written application programs
  - User modification and replacement of Facility Control/Power Management 2 and 2M application code
  - Library service facilities for program libraries
  - Utility software error messages and diagnostics to aid the user during modification of programs

**Note:** Central and On-site Programming Services are provided by IBM on the current unaltered release of the licensed programs only.

### CUSTOMER RESPONSIBILITIES

The user is responsible for physical planning; planning the control strategy; installing, personalizing, checking out, and operating the licensed program; securing, installing, and maintaining the operator control station; and providing the instrumentation and control devices required to interface to the user's equipment being controlled.

The user will determine the energy control plan for the facility, determining which devices may be controlled and how these devices may be controlled to reduce electrical energy consumption and demand.

In cooperation with the customer, the marketing representative must (a) request for inclusion in the order RPQ D26024 Operator Station or (b) alternatively, advise the customers of their responsibility to provide an equivalent operator station. The RPQ Operator Station consists of a Teletype® Model 43 Teleprinter. Reference should be made to the RPQ description for complete information and limitation on warranty and serviceability/service.

If automatic restart is to be implemented with an external, battery-powered BCD clock, the user is responsible for obtaining, installing and maintaining such a clock.

After obtaining and installing the operator station, and a subsystem usually consisting of a Manual Control Panel, individual device controls, instrumentation and interconnecting wiring, and connecting them to the Series/1 processor, by means of the Customer Access Panel, the user is responsible for the installation of the licensed program. To install the licensed program, the user loads the diskette received from IBM. After the FC/PM 2 programs on the diskette have been read into the processor, the user enters the control information, determined in the development of the energy control strategy, into the processor through the operator station. FC/PM 2 is then ready for checkout and operation by the user.

In order to modify the included application functions, or to add more functions (including those in Facility Control/Power Management 3), the user should order the optional material and become familiar with the source code of the function he wishes to modify. The PLM included in the optional material provides logic details of the functions. The user must then use the utilities provided to include the modification or additional function on his operating diskette. Assistance in design, coding, testing, and installing of new or modified application may be obtained from IBM under the terms and conditions of an IBM Systems Engineering Service Agreement.

In order to assist the customer in the fulfillment of the subsystem responsibilities, design and installation services are available for a charge through IBM SBIS services.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

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**Facility Control/Power Management 2 (cont'd)****HARDWARE REQUIREMENTS**

Facility Control/Power Management 2 requires the following minimum configurations:

- IBM Series/1 4952 model A Processor with 32K storage (for applications with 31 or less controllable load circuits)
- IBM Series/1 4952 model B Processor with 64K storage (for applications with 63 or less controllable load circuits)
- Series/1 4952 model B Processor with 64K byte storage (for applications with 64 or more controllable load circuits)

Plus the following features:

- Energy Conservation Application (#9023)
- Rack Mounting Fixture (#4540)
- Customer Access Panel (#1590) (recommended but optional)
- Customer Access Panel—Integrated DI/DO Cable (#1593) (recommended but optional)
- Timers (#7840)
- Teletypewriter Adapter (#7850)
- Teletypewriter Cable (#2055) (recommended but the Teletypewriter Customer Access Panel Cable (#2059) may be substituted)
- Integrated Digital Input/Output Non-Isolated (#1560)
- 4964 Diskette Unit Attachment (#3581)
- Storage Addition (#6306) as required
- Additional storage (up to 64K) and Integrated Digital I/O (#1560) (up to 5) and I/O cable (#1593) (one per #1560) may be required depending on customer modifications and number of I/O devices attached. The optional Programmer Console (#5650) may be useful for customer code modification, debug and maintenance.
- IBM 4964-1 Diskette Unit
- An additional Diskette Unit and 4964 Diskette Unit Attachment (#3581) are recommended and may be required if extensive modifications are made.
- IBM 4997-1A Rack Enclosure
- An Operator Station:
  - Any ASCII device usable as an operator station that meets the specification required by the Teletypewriter Adapter of the IBM Processor (see Customer Responsibilities).
- A Subsystem:
  - A Subsystem is required to attach controlled circuits or devices. This system usually consists of:
    - The connecting wiring
    - The individual device controls
  - A Manual Control Panel - Description, availability, price and schedule information may be requested for a Manual Control panel through an SBIS agreement.
  - Modification to the user's electrical consumption and demand meters needed to support the operating modes elected by the user.

Various other configurations are acceptable. Consult the "Machines" pages.

**SOFTWARE REQUIREMENTS**

Facility Control/Power Management 2 is a standalone licensed program and requires no additional programming support. It is distributed as executable code in machine loadable format. The application functions are also available as optional material in source code format.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (GH30-0175) ... General Information Manual (GH30-0094) ... Customer Site Preparation Manual (GA34-0050) ... User's Guide (SH30-0119) ... Promotional Flyer (G580-0292) ... Executive Pocket Summary (G229-8078) ... Energy Systems Conservation Survey (G580-0159) ... Energy Systems Project Guide (ZZ60-0555).*

**TERMS and CONDITIONS:** See PP Index

**FACILITY CONTROL/POWER MANAGEMENT 3  
PC/PM 3 FEATURES #6000, #6001  
5719-U12****PURPOSE**

IBM Series/1 Facility Control/Power Management 3 is a special feature of IBM Facility Control/Power Management 2 and may be installed on Facility Control/Power Management 2M licensed programs operating on Series/1. It extends the range of functions supplied by IBM with the base product to include:

Digital Device Addressing  
Enthalpy Control of Air Dampers  
Temperature Proportional Control Strategies  
Extended Condition Switch Action

This special feature provides the user with the opportunity to further capitalize on the potential of computerized energy control through additional manpower and energy savings.

**HIGHLIGHTS**

The IBM Facility Control/Power Management 3 Special Feature provides:

- Mapping of a particular device number on existing customer-owned manual control panels to a logical 3 digit ID code. This function aids in installing the IBM Facility Control/Power Management 2 and 2M licensed programs in facilities having compatible centralized control panels. Up to 256 electrical devices may be addressed for control by digitally addressing the attached devices with the easier-to-use matrix switchboard style of manual control panel. Addressing can be sequential or non-sequential. Ease and accuracy of use is a benefit plus the potential value of using installed digital control panels, separately or simultaneously with local control.
- Controlling the outside air inlet damper by comparing outside and inside air enthalpy (heat content) using temperature and humidity measurements. The enthalpy calculation includes the effect of the additional energy required to heat or cool moist air above that required for dry air. It is thus thermodynamically more efficient than is a calculation based on temperature alone and additional energy saving opportunities are thereby provided.
- Differing sets of demand control strategies are based on changes in outside air temperature to permit optimum comfort levels and energy savings. The proportional adjustment within specified limits of the control strategies as the outside temperature varies provides the effect of continuous monitoring and readjustment of control parameters. Additional energy savings are thus possible without the manpower cost and inconvenience of defining and reinstalling multiple strategies for changes in weather.
- Extended condition switch operates by permitting the user to specify logical combinations of 1 to 3 digital inputs for signaling the condition status of one or more devices. The logical combinations thus made possible include all possible combinations of up to 3 condition inputs. The user is provided with a means to construct and adjust complex logical energy savings strategies combining such events as time, temperature, day type, other operating decisions, manual actions, etc., simply and without the cost of programming. By inter-connecting controlled outputs as condition switch inputs, extremely rich combinations of logical decisions are available to the user who has opportunities for energy cost savings too complex for systems of lesser sophistication.

**CUSTOMER RESPONSIBILITIES**

See FC/PM 2 and 2M for basic responsibilities. In addition, the user must select and install required temperature and humidity instrumentation.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Same as FC/PM 2 and 2M, except 48K of storage is required and an IBM 4955 Processor is recommended. If an IBM 4952 Processor is used, 64K of storage is required. The subsystem will include temperature and humidity instrumentation and wiring, if these functions of FC/PM 3 are active for the unmodified FC/PM 2 or 2M and 3 functions.

Installation of FC/PM 3 into the user's prerequisite FC/PM 2 or 2M system requires the use of the utilities function obtained as part of FC/PM 2 basic material.

**SOFTWARE REQUIREMENTS**

Facility Control/Power Management 3 is a feature and operates under the control of the prerequisite Facility Control/Power Management 2 and may be installed on Facility Control/Power Management 2M licensed programs. It is distributed as executable code in machine readable format and is also available as optional material in source code format.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications* (GH30-0175) ... *General Information Manual* (GH30-0094) ... *Program Reference Manual* (SH30-0559) ... *Promotional Flyer* (G580-0292) ... *User's Guide* (SH30-0119)

**TERMS and CONDITIONS:** See PP Index

## FACILITY CONTROL/POWER MANAGEMENT 4 FC/PM 4 (5719-U13)

### PURPOSE

IBM Series/1 Facility Control/Power Management 4 licensed program is a stand-alone application providing control actions to help in reducing both electrical demand and consumption charges for facilities with multiple demand and consumption meters. It requires no local programming in order to execute the included application functions, but permits user programming of modifications of certain application functions, or development of additional functions if desired, for example, a user-written program to support a hardware communications subsystem which interfaces to the Series/1 through DI/DO (#1560). The included functions are equivalent to those provided in FC/PM 2 with extended support for up to 8 meter sites, up to 128 monitoring points, and up to 158 device circuits, plus utilities useful for function modification or new function addition. Application functions of FC/PM 4 are controlled through the entry of functional commands and appropriate parameters by the user. Application Program Preparation Utilities are included with FC/PM 4.

### HIGHLIGHTS

The Facility Control/Power Management 4 licensed program addresses electrical energy cost reduction in facilities with multiple demand meters using a single Series/1 hardware configuration. It provides support for controlling up to 158 electrical devices and monitoring up to 128 status points distributed over up to eight meter sites, each having an independent demand meter. (A portion of a facility connected to a single meter is referred to as a meter site.) Savings are achievable providing there are sufficient controllable loads.

The application provides:

1. Power control functions for each meter site
  - Time-of-day strategies for up to four types of days for an entire year.
  - Device strategy specification includes up to eight start/stop time control segments per day.
  - Devices may be selected for either demand control or cyclic on/off control by type of day.
  - Unique strategies for each device within each of the above.
  - Demand increment processing for both electric and non-electric meters.
  - Monitoring of demand meter (integrated or sliding window).
  - Targets for up to nine user-defined time segments per type-of-day.
  - Demand increment durations from 15 to 120 seconds and demand interval durations of 5 minutes to 2 hours for demand control.
  - User-defined delay times from 2-30 seconds in increments of 2 seconds for turning on devices of a meter site sequentially.
- Note:** Non-electric meters, for example steam or gas, where the output can be made available to the Series/1 as a stream of electrical pulses similar to those provided from a watt hour or electrical demand meter are supported.
2. Status monitoring of up to 128 user alarm, condition switch, standby and dual action switch points, with user-defined duration times for validity checking. Each point is user specifiable for fast scan (2 second period) or slow scan (1 minute period) processing. Up to 128 scan points, of which no more than 96 can be fast scan points, distributed over 8 meter sites are supported.
3. Data logging and report generation
4. Operator interaction via keyboard of operator station:
  - Modify power, control, and device parameters
  - Obtain reports
  - Start or stop devices
5. IPL and restart under user/operator control
6. Startup/Shutdown:
  - Scheduled execution
  - Delay between device starts
7. 158 unique device strategies (control points).
8. Operations monitor support for a user-supplied alarm to signal if FC/PM or the Series/1 computer fails.
9. Automatic restart after power failure with support for an optional external battery-powered BCD clock.

10. Application personalization provides user capability of selecting options desired and entering parameters to define requirements for each meter site:
  - Demand metering calculation requirements
  - Control strategies
  - Time-of-day segments of device operation and control
  - Time-of-day segments for applicable targets
  - Floating target specifications
  - Alarm and condition switch and dual action switch, status points and message texts
11. Time-of-day update selects applicable control parameters based on time-of-day and calendar date and meter site.
12. Operator guidance provided by printed messages, status reports and conversational prompts.
13. Condition switch function provides for external interaction with demand control, cyclic control, and time-of-day control of devices.
14. Three types of targets for each meter site:
  - Maximum – defined by user, and either
  - Standard – below maximum and defined by user, or
  - Floating – automatically recalculated at the end of each demand interval as a user-specified alternative to standard target

Maximum and standard targets are user-specifiable for up to 9 time-of-day segments and 4 types of days independently for each meter site.
15. Two basic strategies for actions:
  - Priority selection of devices
  - Rotational selection of devices
16. Additional operator stations (up to 3) can be attached with an additional Teletypewriter Adapter (#7850) for user-written program functions.
17. Modifiability – The user can modify certain application programs by requesting the optional source code and using the Application Program Preparation Utilities to:
  - Edit source records in members of the user source library
  - Translate and execute user-written application programs
  - Modify and replace certain Facility Control/Power Management 4 application code
  - Allocate, delete, and rename members, and list directories and members using the library service facilities
  - Print utility software error messages and diagnostics to aid in modifying programs

The IBM Facility Control/Power Management 4M licensed program can operate each meter site in up to seven basic functional mode combinations. This allows progressive installation from a simple monitoring application for one meter site to full energy management controlling eight meter sites. The seven mode combinations are:

1. Consumption monitoring
2. Alarm monitoring
3. Consumption monitoring and alarm monitoring
4. Consumption monitoring, alarm monitoring and time-of-day consumption limiting
5. Consumption monitoring, alarm monitoring and time-of-day consumption limiting with cyclic start/stop
6. Consumption monitoring, alarm monitoring and time-of-day consumption limiting with demand increment processing
7. Consumption monitoring, alarm monitoring and time-of-day consumption limiting with cyclic start/stop and demand increment processing.

In addition, alarm monitoring is optional for mode combinations 4-7.

### CUSTOMER RESPONSIBILITIES

The user is responsible for physical planning; planning the control strategy; installing, personalizing, checking out, and operating the licensed program; securing, installing, and maintaining the operator control station; and providing the instrumentation and control devices required to interface to the user's equipment being controlled.

FC/PM 4 programs support meters and devices attached directly to the Integrated Digital Input/Output Non-Isolated feature (#1560) of the Series/1 Processor. To support remote sites, the user must do one of

## PROGRAM PRODUCTS

**Facility Control/Power Management 4 (cont'd)**

the following: a) the remote sites must be connected to the Series/1 such that it is transparent to the FC/PM 4 application programs, or b) write and install programs to interface the FC/PM 4 application program to the hardware communications subsystem which is connected to the Series/1 through Integrated DI/DO (#1560).

The user will determine the energy control plan for the facility, determining which devices may be controlled and how these devices may be controlled to help reduce electrical energy consumption and demand.

In cooperation with the customer, the marketing representative must (a) request for inclusion in the order the RPQ D26024 Operator Station, (b) alternatively, advise the customer of this responsibility to provide an equivalent operator station. The RPQ Operator Station consists of a Teletype® Model 43 Teleprinter. Reference should be made to the RPQ description for complete information and limitations on warranty and serviceability/service.

If auto restart is to be implemented with an external, battery-powered BCD clock, the user is responsible for obtaining, installing, and maintaining such a clock.

After obtaining and installing the operator station and a subsystem (usually consisting of a manual control panel, individual device controls, instrumentation, and interconnecting wiring), and connecting them to the Series/1, the user is responsible for the installation of the licensed program. To install the licensed program, the user loads the diskette received from IBM. After the FC/PM 4 programs on the diskette have been read into the processor, the user enters the control information, determined in the development of the energy control strategy, through the operator station. FC/PM 4 is then ready for checkout and operation by the user.

In order to change the modifiable application functions included or to add more functions, the user should order the optional material and become familiar with the source code of the function he wishes to modify. The PLM included in the optional material provides logic details of the functions.

The user must then use the Application Program Preparation Utilities provided to include the modification or additional function on the operating diskette. Assistance in design, coding, testing, and installing of new or modified applications may be obtained from IBM under the terms and conditions of an IBM Systems Engineering Service Agreement.

In order to assist the customer in the fulfillment of the subsystem responsibilities, design and installation services are available for a charge through IBM SBIS services.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Facility Control/Power Management 4 requires the following minimum configurations:

- IBM 4955 Processor model C with 64K storage [by Storage Addition (#6326 as required) attached] and the following features:
  - Energy Conversation Application (#9023)
  - Rack Mounting Fixture (#4540)
  - Customer Access Panel (#1590) (recommended but optional)
  - Customer Access Panel—Integrated DI/DO Cable (#1593) (recommended but optional)
  - Timers (#7840)
  - Teletypewriter Adapter (#7850)
  - Teletypewriter Cable (#2055), if TTY not attached through Customer Access Panel (#1590); (#2059), if TTY is attached through Customer Access Panel (#1590)
  - Integrated Digital Input/Output Non-Isolated (#1560)
  - 4964 Diskette Unit Attachment (#3581)
  - Communications Power Feature (#2010)
  - Additional Integrated Digital Input/Output Non-Isolated (#1560) (up to five can be attached) may be required depending on user requirements and number of input/output devices attached.
- IBM 4964 Diskette Unit model 1 (one required)
- An additional IBM 4964 Diskette Unit model 1 and Diskette Unit Attachment (#3581) are recommended and may be required if extensive user modifications are made via the Application Program Preparation Utilities.
- IBM 4997 Rack Enclosure model 1A
- An Operator Station: Any ASCII device that meets the specifications of the Teletypewriter Adapter of the IBM 4955 Processor (see "Customer Responsibilities") can be used as an operator station.

Note: Support for up to three additional Teletypewriter Adapters (#7850) is provided. They may be used by additional functions developed via the Application Program Preparation Utilities.

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Operator communication to/from the FC/PM 4 application functions will be directed only to the first Teletypewriter Adapter (#7850).

- A Subsystem: A subsystem is required to attach controlled circuits or devices. This subsystem usually consists of:
  - connecting wiring
  - individual device controls.
  - manual control panel: Description, availability, price and schedule information may be required for a Manual Control Panel through an SBIS Agreement.
  - Modification to the user's electrical consumption and demand meters needed to support the operating modes elected by the user.

**SOFTWARE REQUIREMENTS**

Facility Control/Power Management 4 is a standalone licensed program and requires no additional programming support. It is distributed as executable code in machine loadable format. The modifiable application functions are also available as optional material in source code format.

**Program Currency**

For program support purposes, a licensed program is considered current if it is the current release of the program and all PID-distributed refreshes/PTFs have been installed.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (GH30-0556) General Information Manual (GH30-0500) Promotional Flyer (G580-0292) Energy Systems Conservation Survey (G580-0159) Customer Site Preparation Manual (GA34-0050) User's Guide (SH30-0558).*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**FACILITY CONTROL/POWER MANAGEMENT 2M  
FC/FM 2M (5719-U14)**

**PURPOSE**

IBM Series/1 Facility Control/Power Management 2M licensed program operating on a Series/1 is a standalone dedicated application providing control actions to help in reducing both electrical demand and consumption charges. It requires no local programming in order to execute the included application functions, but permits user programming modification of those functions or development of additional functions if desired via the FC/PM 2 Application Program Preparation Utilities. The included functions are equivalent to those provided in FC/PM 2. Although the Application Program Preparation Utilities are not included with FC/PM 2M, optional source code will be available for function modification or new function addition. A special feature, Facility Control/Power Management 3, extends the range of IBM-provided application functions to include digital device addressing for up to 256 device circuits, enthalpy control of air dampers, temperature proportional control strategies, and extended condition switch function. Application functions of both FC/PM 2M and FC/PM 3 are controlled through the entry of functional commands and appropriate parameters by the user.

FC/PM 3, along with modifiability, opens a growth path for further savings not available to the FC/PM 1 user.

**HIGHLIGHTS**

The Facility Control/Power Management 2M licensed program addresses electrical energy cost reduction in facilities with one demand meter, or that portion of a facility on one demand meter, and up to 95 controllable device circuits. Savings are achievable providing there are sufficient controllable loads.

**1. Power control functions:**

- Time-of-day strategies for up to four types of days for an entire year.
- Device strategy specification includes up to eight start/stop time control segments per day.
- Devices may be selected for either demand control or cyclic on/off control by type of day.
- Ninety-five unique device strategies within each of the above.
- Demand increment processing.
- Monitoring of demand meter (integrated or sliding window).
- Targets for up to nine user-defined time segments per type-of-day.
- Demand increment durations from 15 to 120 seconds and demand interval durations of 5 minutes to 2 hours for demand control.
- User-defined delay times from 2-30 seconds in increments of 2 seconds for turning on devices sequentially.

**2. Status monitoring of up to 95 (less if some of the FC/PM3 functions and the automatic BCD clock are used) user alarm and condition switch points, with user-defined duration times for validity checking.**

**3. Data logging and report generation**

**4. Operator interaction via keyboard of operator station:**

- Modify power, control, and device parameters
- Obtain reports
- Start or stop devices

**5. IPL and restart under user/operator control**

**6. Startup/Shutdown:**

- Scheduled execution
- Delay between device starts

**7. Automatic restart after power failure with support for an optional external, battery-powered, BCD clock.**

**8. Operations monitor**

**9. Application personalization provides user capability of selecting options desired and entering parameters to define requirements:**

- Demand metering calculation requirements
- Control strategies
- Time-of-day segments of device operation and control
- Time-of-day segments for applicable targets
- Floating target specifications
- Alarm and condition switch status points and message tests

**10. Time-of-day update selects applicable control parameters based on time-of-day and calendar date.**

**11. Operator guidance provided by printed messages, status reports, and conversational prompts.**

**12. Condition switch function provides for external interaction with demand control, cyclic control and time-of-day control of devices.**

**13. Three types of targets:**

- Maximum – defined by user, and either
- Standard – below maximum and defined by user, or
- Floating – below maximum and dynamically adjusted to minimize demand
- Maximum and standard targets are user-specifiable for up to 9 time-of-day segments and 4 types of days.

**14. Two basic strategies for actions:**

- Priority selection of devices
- Rotational selection of devices

**15. Modifiability – The user can modify the application programs by requesting the optional source code and utilizing the Application Program Preparation Utilities from FC/PM 2 which provide:**

- Source editing of records in members of the user source library
- Source translation and execution of user-written application programs
- User modification and replacement of Facility Control/Power Management 2, 2M, and 3 application code
- Library service facilities for program libraries
- Utility software error messages and diagnostics to aid the user during modification of programs

**CUSTOMER RESPONSIBILITIES**

The user is responsible for physical planning; planning the control strategy; installing, personalizing, checking out, and operating the licensed program; securing, installing, and maintaining the operator control station; and providing the instrumentation and control devices required to interface to the user's equipment being controlled.

The user will determine the energy control plan for the facility, determining which devices may be controlled, and how these devices may be controlled to help reduce electrical energy consumption and demand.

In cooperation with the customer, the marketing representative must (a) request for inclusion in the order the RPQ D26024 Operator Station, or (b) alternatively, advise the customer of his responsibility to provide an equivalent operator station. The RPQ Operator Station consists of a Teletype® Model 43 Teleprinter. Reference should be made to the RPQ description for complete information and limitations on warranty and serviceability/service.

If auto restart is to be implemented with an external, battery-powered BCD clock, the user is responsible for obtaining, installing and maintaining such a clock.

After obtaining and installing the operator station and a subsystem, usually consisting of a Manual Control Panel, individual device controls, instrumentation, and interconnecting wiring, and connecting them to the Series/1 by means of the Customer Access Panel, the user is responsible for the installation of the licensed program. To install the licensed program, the user loads the diskette received from IBM. After the FC/PM 2M programs on the diskette have been read into the processor, the user enters the control information, determined in the development of the energy control strategy, into the processor through the operator station. FC/PM 2M is then ready for checkout and operation by the user.

In order to modify the included application functions or to add more functions (including those in Facility Control/Power Management 3), the user should order the optional material and become familiar with the source code of the function he wishes to modify. The PLM included in the optional material provides logic details of the functions. The user must also have access to FC/PM2 in order to use the Application Program Preparation Utilities provided with FC/PM 2 to include the modification or additional function on the FC/PM 2M operating diskette. Assistance in design, coding, testing, and installing of new or modified applications may be obtained from IBM under the terms and conditions of an IBM Systems Engineering Service Agreement.

In order to assist the customer in the fulfillment of the subsystem responsibilities, design and installation services are available for a charge through IBM SBIS services.

**Facility Control/Power Management 2M (cont'd)****SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Facility Control/Power Management 2M requires the following minimum configurations:

- IBM 4952 Processor model B with 32K storage (for applications with 63 or less device control circuits and 63 or less monitoring points)
  - or
- IBM 4952 model A Processor with 32K storage (for applications with 31 or less controllable load circuits)
  - or
- IBM Series/1 4952 model B Processor with 32K storage (for applications with 63 or less controllable load circuits)
  - or
- IBM 4952 model B Processor with 64K storage (for applications with 64 or more controllable load circuits)

Plus the following features:

- Energy Conversation Application (#9023)
- Rack Mounting Fixture (#4540)
- Customer Access Panel (#1590) (recommended but optional)
- Customer Access Panel—Integrated DI/DO Cable (#1593) (recommended but optional)
- Timers (#7840)
- Teletypewriter Adapter (#7850)
- Teletypewriter Customer Access Panel Cable (#2059) (recommended but the Teletypewriter Cable (#2055) may be substituted)
- Integrated Digital Input/Output Non-Isolated (#1560)
- 4964 Diskette Unit Attachment (#3581)
- Storage Addition (#6306) as required
- Additional storage (up to 64K) and Integrated Digital I/O (#1560) (up to five) and I/O cables (#1593) (one per #1560) may be required depending on customer modification, debug and maintenance.
- IBM 4964-1 Diskette Unit
  - An additional Diskette Unit and 4964 Diskette Unit Attachment (#3581) may be required if extensive modifications are made.
- IBM 4997-1A Rack Enclosure
- An Operator Station: Any ASCII device usable as an operator station that meets the specification required by the Teletypewriter Adapter of the IBM Processor (see "Customer Responsibilities").
- A Subsystem: A subsystem is required to attach controlled circuits or devices. This subsystem usually consists of:
  - The connecting wiring
  - The individual device controls.
  - A Manual Control Panel: Description, availability, price and schedule information may be requested for a Manual Control Panel through an SBIS Agreement.
  - Modification to the user's electrical consumption and demand meters needed to support the operating modes elected by the user.

Various other configurations are acceptable. Consult the "Machines" pages.

**SOFTWARE REQUIREMENTS**

Facility Control/Power Management 2M is a standalone licensed program and requires no additional programming support. It is distributed as executable code in machine loadable format. The application functions are also available as optional material in source code format.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Licensed Program Specifications (GH30-0107) ... General Information Manual (GH30-0094) ... Promotional Flyer (G580-0292) ... Energy Systems Conservation Survey (G580-0159) ... Customer Site Preparation Manual (GA34-0050).*

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**FACILITY CONTROL/POWER MANAGEMENT 3  
PC/PM 3 SPECIAL FEATURES #6000, #6001  
5719-U14**

**PURPOSE**

IBM Series/1 Facility Control/Power Management 3 is a special feature of IBM Facility Control/Power Management 2 and may be installed on Facility Control/Power Management 2M licensed programs operating on Series/1. It extends the range of functions supplied by IBM with the base product to include:

Digital Device Addressing  
Enthalpy Control of Air Dampers  
Temperature Proportional Control Strategies  
Extended Condition Switch Action

This opportunity to further capitalize on the potential of computerized energy control through additional manpower and energy savings.

**HIGHLIGHTS**

The IBM Facility Control/Power Management 3 Special Feature provides:

- Mapping of a particular device number on existing customer owned manual control panels to a logical 3-digit ID code. This function aids in installing the IBM Facility Control/Power Management 2 and 2M licensed programs in facilities having compatible centralized control panels. Up to 256 electrical devices may be addressed for control by digitally addressing the attached devices with the easier to use matrix switchboard style of manual control panel. Addressing can be sequential or non-sequential. Ease and accuracy of use is a benefit plus the potential value of using installed digital control panels, separately or simultaneously with local control.
- Controlling the outside air inlet damper by comparing outside and inside air enthalpy (heat content) using temperature and humidity measurements. The enthalpy calculation includes the effect of the additional energy required to heat or cool moist air above that required for dry air. It is thus thermodynamically more efficient than is a calculation based on temperature alone and additional energy saving opportunities are thereby provided.
- Differing sets of demand control strategies are based on changes in outside air temperature to permit optimum comfort levels and energy savings. The proportional adjustment within specified limits of the control strategies, as the outside temperature varies, provides the effect of continuous monitoring and readjustment of control parameters. Additional energy savings are thus possible without the manpower cost and inconvenience of defining and reinstalling multiple strategies for changes in weather.
- Extended condition switch operates by permitting the user to specify logical combinations of 1 to 3 digital inputs for signaling the condition status of one or more devices. The logical combinations thus made possible include all possible combinations of up to 3 condition inputs. The user is provided with a means to construct and adjust complex logical energy savings strategies combining such events as time, temperature, day type, other operating decisions, manual actions, etc., simply and without the cost of programming. By inter-connecting controlled outputs as condition switch inputs, extremely rich combinations of logical decisions are available to the user who has opportunities for energy cost savings too complex for systems of lesser sophistication.

**CUSTOMER RESPONSIBILITIES**

See FC/PM 2 and 2M for basic responsibilities. In addition, the user must select and install required temperature and humidity instrumentation.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Same as FC/PM 2 and 2M except 48K of storage is required and an IBM 4955 Processor is recommended. If an IBM 4952 Processor is used, 64K of storage is required. The subsystem will include temperature and humidity instrumentation and wiring if these functions of FC/PM 3 are active for the unmodified FC/PM 2 or 2M and 3 functions.

Installation of FC/PM 3 into his prerequisite FC/PM 2 or 2M system requires the use of the utilities function obtained as part of FC/PM 2 basic material.

**SOFTWARE REQUIREMENTS**

Facility Control/Power Management 3 is a feature and operates under the control of the prerequisite Facility Control/Power Management 2 and may be installed on Facility Control/Power Management 2M licensed programs. It is distributed as executable code in machine-readable format and is also available as optional material in source code format.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (GH30-0175) ... General Information Manual (GH30-0094) ... Program Reference Manual (SH30-0559) ... Promotional Flyer (G580-0292) ... User's Guide (SH30-0119)*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**FACILITY CONTROL/POWER MANAGEMENT 4M  
FC/PM 4M (5719-U15)**

**PURPOSE**

IBM Series/1 Facility Control/Power Management 4M licensed program is a standalone application providing control actions to help in reducing both electrical demand and consumption charges for facilities with multiple demand and consumption meters. It requires no local programming in order to execute the included application functions, but permits user programming of modifications of certain application functions, or development of additional functions if desired, via the FC/PM 4 Application Program Preparation Utilities, for example, a user-written program to support a hardware communications subsystem which interfaces to the Series/1 through DI/DO (#1560). The included functions are equivalent to those provided in FC/PM 4. Although the Application Program Preparation Utilities are not included with FC/PM 4M, optional source code will be available for function modification or new function addition. Application functions of FC/PM 4M are controlled through the entry of functional commands and appropriate parameters by the user.

**HIGHLIGHTS**

The Facility Control/Power Management 4M licensed program addresses electrical energy cost reduction in facilities with multiple demand meters using a single Series/1 hardware configuration. It provides support for controlling up to 158 electrical devices and monitoring up to 128 status points distributed over up to eight meter sites, each having an independent demand meter. (A portion of a facility connected to a single meter is referred to as a meter site.) Savings are achievable providing there are sufficient controllable loads.

The application provides:

1. Power control functions for each meter site
  - Time-of-day strategies for up to four types of days for an entire year.
  - Device strategy specification includes up to eight start/stop time control segments per day.
  - Devices may be selected for either demand control or cyclic on/off control by type of day.
  - Unique strategies for each device within each of the above.
  - Demand increment processing for both electric and non-electric meters.
  - Monitoring of demand meter (integrated or sliding window).
  - Targets for up to nine user-defined time segments per type-of-day
  - Demand increment durations from 15 to 120 seconds and demand interval durations of 5 minutes to 2 hours for demand control.
  - User-defined delay times from 2-30 seconds in increments of 2 seconds for turning on devices of a meter site sequentially.

**Note:** Non-electric meters, for example steam or gas, where the output can be made available to the Series/1 as a stream of electrical pulses similar to those provided from a watt hour or electrical demand meter, are supported.
2. Status monitoring of up to 128 user alarm, condition switch, standby and dual action switch points with user-defined duration times for validity checking. Each point is user specifiable for fast scan (2 second period) or slow scan (1 minute period) processing. Up to 128 scan points, of which no more than 96 can be fast scan points, distributed over 8 meter sites are supported.
3. Data logging and report generation
4. Operator interaction via keyboard of operator station:
  - Modify power, control, and device parameters
  - Obtain reports
  - Start or stop devices
5. IPL and restart under user/operator control
6. Startup/Shutdown:
  - Scheduled execution
  - Delay between device starts
7. 158 unique device strategies (control points).
8. Operations monitor support for a user-supplied alarm to signal if FC/PM or the Series/1 computer fails.
9. Automatic restart after power failure with support for an optional external battery-powered BCD clock.
10. Application personalization provides user capability of selecting options desired and entering parameters to define requirements for each meter site:

- Demand metering calculation requirements
  - Control strategies
  - Time-of-day segments of device operation and control
  - Time-of-day segments for applicable targets
  - Floating target specifications
  - Alarm and condition switch and dual action switch, status points and message texts
11. Time-of-day update selects applicable control parameters based on time-of-day and calendar date, and meter site.
  12. Operator guidance provided by printed messages, status reports, and conversational prompts.
  13. Condition switch or dual action switch function provides for external interaction with demand control and cyclic control.
  14. Three types of targets for each meter site:
    - Maximum – defined by user, and either
    - Standard – below maximum and defined by user, or
    - Floating – automatically recalculated at the end of each demand interval as a user-specified alternative to standard target

Maximum and standard targets are user-specifiable for up to 9 time-of-day segments and 4 types of days independently for each meter site.
  15. Two basic strategies for actions:
    - Priority selection of devices
    - Rotational selection of devices
  16. Additional operator stations (up to 3) can be attached with an additional Teletypewriter Adapter (#7850) for user-written program functions.
  17. Modifiability – The user can modify certain application programs by requesting the optional source code and using the Application Program Preparation Utilities from FC/PM 4 to:
    - Edit source records in members of the user source library
    - Translate and execute user-written application programs
    - Modify and replace certain Facility Control/Power Management 4 and 4M application code
    - Allocate, delete, rename members and list directories and members using the library service facilities
    - Print utility software error messages and diagnostics to aid in modifying programs

The IBM Facility Control/Power Management 4M licensed program can operate each meter site in up to seven basic functional mode combinations. This allows progressive installation from a simple monitoring application for one meter site to full energy management controlling eight meter sites. The seven mode combinations are:

1. Consumption monitoring
2. Alarm monitoring
3. Consumption monitoring and alarm monitoring
4. Consumption monitoring, alarm monitoring and time-of-day consumption limiting
5. Consumption monitoring, alarm monitoring and time-of-day consumption limiting with cyclic start/stop
6. Consumption monitoring, alarm monitoring and time-of-day consumption limiting with demand increment processing
7. Consumption monitoring, alarm monitoring and time-of-day consumption limiting with cyclic start/stop and demand increment processing.

In addition, alarm monitoring is optional for mode combinations 4-7.

**CUSTOMER RESPONSIBILITIES**

The user is responsible for physical planning; planning the control strategy; installing, personalizing, checking out, and operating the licensed program; securing, installing, and maintaining the operator control station; and providing the instrumentation and control devices required to interface to the user's equipment being controlled.

FC/PM 4M programs support meters and devices attached directly to the Integrated Digital Input/Output Non-Isolated feature (#1560) of the Series/1 Processor. To support remote sites, the user must do one of the following: a) the remote sites must be connected to the Series/1 such that it is transparent to the FC/PM 4M application programs, or b) write and install programs to interface the FC/PM 4M application

**Facility Control/Power Management 4M (cont'd)**

program to the hardware communications subsystem which is connected to the Series/1 through Integrated DI/DO (#1560).

The user will determine the energy control plan for the facility, determining which devices may be controlled and how these devices may be controlled to help reduce electrical energy consumption and demand.

In cooperation with the customer, the marketing representative must (a) request for inclusion in the order the RPQ D26024 Operator Station, or (b) alternatively, advise the customer of this responsibility to provide an equivalent operator station. The RPQ Operator Station consists of a Teletype® Model 43 Teleprinter. Reference should be made to the RPQ description for complete information and limitations on warranty and serviceability/service.

If auto restart is to be implemented with an external battery-powered BCD clock, the user is responsible for obtaining, installing, and maintaining such a clock.

After obtaining and installing the operator station and a subsystem (usually consisting of a manual control panel, individual device controls, instrumentation, and interconnecting wiring) and connecting them to the Series/1, by means of the Customer Access Panel, the user is responsible for the installation of the licensed program. To install the licensed program, the user loads the diskette received from IBM. After the FC/PM 4M programs on the diskette have been read into the processor, the user enters the control information, determined in the development of the energy control strategy, through the operator station. FC/PM 4M is then ready for checkout and operation by the user.

In order to change the modifiable application functions included, or to add more functions, the user should order the optional material and become familiar with the source code of the function he wishes to modify. The PLM included in the optional material provides logic details of the functions. The user must also have access to FC/PM 4 in order to use the Application Program Preparation Utilities provided with FC/PM 4 to include the modification or additional function on the FC/PM 4M operating diskette. Assistance in design, coding, testing, and installing of new or modified applications may be obtained from IBM under the terms and conditions of an IBM Systems Engineering Service Agreement.

In order to assist the customer in the fulfillment of the subsystem responsibilities, design and installation services are available for a charge through IBM SBIS services.

It is distributed as executable code in machine loadable format. The modifiable application functions are also available as optional material in source code format.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Facility Control/Power Management 4M requires the following minimum configurations:

- IBM 4955 Processor model C with 64K storage [by Storage Addition (#6326) as required] attached and the following features:
  - Energy Conservation Application (#9023)
  - Rack Mounting Fixture (#4540)
  - Customer Access Panel (#1590) (recommended but optional)
  - Customer Access Panel—Integrated DI/DO Cable (#1593) (recommended but optional)
  - Timers (#7840)
  - Teletypewriter Adapter (#7850)
  - Teletypewriter Cable (#2055), if TTY not attached through Customer Access Panel (#1590)
  - Teletypewriter Cable (#2059), if TTY is attached through Customer Access Panel (#1590)
  - Integrated Digital Input/Output Non-Isolated (#1560)
  - 4964 Diskette Unit Attachment (#3581)
  - Communications Power Feature (#2010)
  - Additional Integrated Digital Input/Output Non-Isolated (#1560) (up to five can be attached) may be required depending on user requirements and number of input/output devices attached.
- IBM 4964 Diskette Unit model 1 (one required)
  - An additional IBM 4964 Diskette Unit Model 1 and Diskette Unit Attachment (#3581) may be required if extensive user modifications are made via the Application Program Preparation Utilities from FC/PM 4.
- IBM 4997 Rack Enclosure Model 1A
- An Operator Station: Any ASCII device that meets the specifications of the Teletypewriter Adapter of the IBM 4955 Processor (see Customer Responsibilities) can be used as an operator station.

**Note:** Support for up to three additional Teletypewriter Adapters (#7850) is provided. They may be used by additional functions developed via the Application Program Preparation Utilities from FC/PM 4. Operator communication to/from the FC/PM 4 application functions will be directed only to the first Teletypewriter Adapter (#7850).

- A Subsystem: A subsystem is required to attach controlled circuits or devices. This subsystem usually consists of:
  - The connecting wiring
  - The individual device controls.
  - A Manual Control Panel: Description, availability, price and schedule information may be required for a Manual Control Panel through an SBIS Agreement

**TERMS and CONDITIONS:** See PP Index

**AUDIO DISTRIBUTION SYSTEM  
VERSION 1  
5719-U20**

**PURPOSE**

The IBM Series/1 Audio Distribution System licensed program (5719-U20), a Series/1-based voice store-and-forward message system, is intended for direct support of a network of business principals, such as managers, professionals, sales personnel, and other key operating personnel in their daily communications activities.

Users or subscribers interact with the IBM Audio Distribution System through conventional tone-generating telephones. Users access the primary functions Get (\*G), Listen (\*L), Record (\*R), Transmit (\*T) and Customize (\*C) by means of the telephone keypad. The subscribers can record their own voice messages. These messages are digitized and stored on a disk for listening by one or more other subscribers as designated by the originating subscriber. A subscriber can listen to a message sent by another subscriber, and then either reply directly to the message, or send it to one or more additional subscribers. A HELP function may also be invoked at any time to assist the subscriber.

**HIGHLIGHTS**

- The Audio Distribution System is totally integrated and consists of a licensed program (5719-U20) operating in conjunction with dedicated Series/1 processor configurations.
- The configuration interfaces to either public or private telephone networks through high performance, telephone-oriented Series/1 I/O features: The Telephone Communications Controller (#7880), and the Telephone Communications Adapter (#7881). These features provide a variety of voice digitization and logical data control functions.
- The Audio Distribution System licensed program has been designed for installation by non-computer oriented users in non-computer oriented environments. Customers are not required to perform a system generation or make program changes. The program is loaded from diskettes provided by IBM which also contain the prerequisite licensed programs, the IBM Realtime Programming System (5719-PC5) and the PL/I Transient Library (5719-PL4).
- To provide the flexibility required by a variety of users, a set of user-definable parameters is available for customization. Should the user decide not to specify parameter values, the Audio Distribution System will use default values. These values may be changed at any time by the user.

**DESCRIPTION**

The Audio Distribution System allows users to voice communicate more quickly and on their own terms by utilizing a tone-generating telephone to:

- **\*R (RECORD)**
  - Record while at home, at work or at another locations.
  - Edit what they record
  - Annotate messages received and forward to others
- **\*L (LISTEN)**
  - Review what they or other users have created
  - Slow it down or speed it up as desired
  - Increase or decrease volume
  - Skip forward or backward within a message
- **\*T (TRANSMIT)**
  - Distribute message to others on the system
  - Distribute via distribution list(s)
  - Specify time and date for delivery and classification
  - Send personal reminders to one's self for later delivery
- **\*G (GET)**
  - Hear the names of other users who have sent new messages
  - Select a message to listen to
  - Select from a category of messages (new, old, pending outbound)
- **\*C (CUSTOMIZE)**
  - Change or modify personal telephone numbers and passwords
  - Create distribution lists
  - Personalize status to let others know your location
  - Indicate version of system services and prompts desired (Prompted Basic, Basic, Complete)
- **# (HELP)**
  - Obtain instructional prompts to assist in starting or completing a function

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of the IBM Audio Distribution System licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support, as specified in the 'Program Services' section, will be provided for the Audio Distribution licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM Audio Distribution System licensed program must operate in a dedicated standalone environment. The minimum system requirements for execution of this licensed program with a single language is as follows. Please note, as the number of subscribers increase, so will the required number of ports and disks.

Unit	Mdl/FC	Description	Qty	
IBM 4955	F00	Processor 128K	1	
	3581	4964 Diskette Attach	1	
	3590	4963 Disk Attachment	2	
	3920	Floating-Point	1	
	5650	Programmer's Console	1	
IBM 4959	6328	128K Additional Storage	3	
	A00	I/O Expansion Unit	1	
	2070/2071	TCA Cable	4	
	5620	4974 Printer Attach	1	
	7840	Timer	1	
	7880	TCA Controller	2	
	7881	Telephone Comm. Adapter	4	
	RPQ D02038	4978 Display Attachment	1	
	IBM 4963	58A	58 Mb Disk Fixed Heads	2
	IBM 4964	001	Diskette Unit	1
IBM 4974	001	Matrix Printer	1	
IBM 4978	RPQ D02055	Display Station	1	
	RPQ D02056	4978 Keyboard	1	
	RPQ D02033	Attachment Cable	1	

\* Predefined IBM Audio Distribution System configurations are available in AIDS under HONE.

@SS@

**SOFTWARE REQUIREMENTS**

Customers licensed for this licensed program must also be licensed for the following:

- IBM Series/1 Realtime Programming System (5719-PC5) Version 5.1 with the Command Language Facility.
- IBM Series/1 PL/I Transient Library (5719-PL4) licensed program.

**Note 1:** Machine-readable material (executable code) for the above licensed programs is included in the distribution (process) charge and diskettes for 5719-U20.

**Note 2:** Source code and related licensed material for this licensed program (5719-U20) will not be made available to customers and these items cannot be ordered.

**DOCUMENTATION**

(available from Mechanicsburg)

The following IBM Audio Distribution System publications are available via SLSS and should be used for additional information on the licensed program and Series/1 hardware features.

*Licensed Program Specifications (GC34-0401) ... Product Flyer (G580-0359) ... Executive Brochure (G580-0363) ... Administrator's Information Kit (SBOF-4535)\*\* ... Subscriber's Information Kit (SBOF-4536)\*\*\**

\* IBM Internal Use Only

\*\* (Consists of the following manuals which are also available separately

*Administrator's Binder (SC34-0433) ... Administrator's Guide (SC34-0399) ... Telephone Template (SX34-0072) ... Wallet Card (SX34-0073) ... Subscriber's Guide (SC34-0400) ... Subscriber's Information Kit (SBOF-4536)*

\*\*\* Consists of the following manuals which are also available separately:

*Subscriber's Guide (SC34-0400) ... Telephone Template (SX34-0072) ... Wallet Card (SX34-0073).*

**Prerequisite Licenses:** The IBM Audio Distribution System licensed program (5719-U20) requires the user to be licensed for the IBM Series/1 Realtime Programming System (5719-PC5) Version 5.1 and the IBM Series/1 Transient Library (5719-PC4). (See note under "Software Requirements" above.)

**TERMS and CONDITIONS:** See PP Index

## EVENT DRIVEN EXECUTIVE QUERY 5719-XR1

### PURPOSE

The IBM Series/1 Event Driven Executive Query licensed program provides an access to user's operating data stored in an Indexed Access Method file or a sequential file. This program is for use with Event Driven Executive Multiple Terminal Manager licensed program (5719-MS2). This licensed program can also be used as in a batch processing mode by an application program.

### HIGHLIGHTS

- Query Definitions of a User's File: Query Definitions allow the user to select specific information in a file. This information may be used, for example, by a stock clerk, supervisor, accountant, or management. These query definitions refer to a file in terms of rows (representing records) and columns (representing data fields). These definitions are then used by Query to allow information retrieval from Indexed Access Method files and sequential files. File update, delete, and insert are also available using an Indexed Access Method file.
- Query Prompt Screen Interface: A user interface is provided to define file and query definitions. This interface utilizes prompt-response menu screens which guide users through creation of their definitions.
- Query Processing: The user can define different processes or tests to select specific information in a query definition.
- Query Maintenance Capabilities: Also provided are maintenance routines to perform the following functions for query definitions:
  - Copy
  - Update
  - Delete
  - Rename
- Provide global update of a field, that will update all occurrences of a field in all qualified records in an Indexed Access Method file, with a single query.
- Provide an interface to application programs written in COBOL or Series/1 Assembler language. To accomplish this, the Query object modules are linked with the user-written application programs which run as Multiple Terminal Manager applications or system application programs.
- Query Utility: Executes as a Multiple Terminal Manager application program. It operates in a prompt-response interactive mode, and its functions are not callable from any language. However, the Query Utility can be invoked by a user-written Multiple Terminal Manager application. This Query Utility program supports creation and maintenance of the following:
  - Define the fields in a file.
  - Define which field in a file to process.
  - Define how to select and process file information.
  - Define passwords.

### CONSIDERATIONS

- Maximum supported block size is 1,024 bytes for input and output.
- Maximum size of a single field in a record is 250 bytes.
- Maximum number of fields in a file that can be defined is 100 with the shipped system, but can be increased to 250 with a customized system. This requires an additional 4,500 bytes in the Multiple Terminal Manager program area.
- Maximum number of Query fields that can be defined is 40. With customized installation into a Multiple Terminal Manager system that has a program area larger than 12K, this number can be increased. Approximately 80 bytes is required for each additional field over 40.
- Maximum number of fields that can specify record selection tests is 10.
- Maximum number of fields that can be sorted in an output file is 10.
- Maximum size of a binary numeric record field is 4 bytes, and 10 digits plus edit characters in display or print field.
- Maximum size of a numeric character record field is 10 digits and it cannot contain edit characters.
- Maximum number of records that can be sequenced for printed or displayed output is:
  - 500 for non-keyed sequence field.
  - Unlimited for keyed sequence field.
- Maximum number of bytes that can be used for sequencing a printed or displayed output is 50.
- Journaling will not be supported when Query is invoked by a high-level language or Assembler.
- A maximum of 20 characters, including qualifiers, can be used when defining record selection field tests in the Utility. This is a space restriction in the Process Definition file. While running the Query Processor in interactive mode, you can specify record select tests for more than 20 bytes in the field. If you request that the record select field data be saved, only the first 20 characters will be saved.

### DESCRIPTION

This licensed program provides a facility to answer a simple query as well as a complex query with user-specified field test criteria. Specifically, the following features are supported:

- Manipulate data using a query definition.
  - Retrieve field information from a sequential file or Indexed Access Method file; the output of this retrieval can be displayed, printed or written to a sequential file.
  - Update or modify data fields within a record of an Indexed Access Method file.
  - Delete records from an Indexed Access Method file.
  - Insert or add new records to an Indexed Access Method file.
- Specify tests on data fields for selecting records to be processed, using comparison operators such as Equal to (=), Greater than (>), Less than (<), Not (\) and their logical combination. Up to ten fields may be qualified to control record selection. Three tests, logically ANDed or ORed, may be specified per field.
- Display or print sequenced output records.
- Store query definitions together with field test information in a file for later recall and processing
- Provide cancel function to stop processing the current request and allow a new request to be started.
- Produce a sorted output file.
- Edit binary and character numeric fields. Editing a numeric field is to display monetary symbols, unit of measure symbols, positioning of a decimal point and commas, and to suppress leading zeroes.
- Perform a logical connection of two Indexed Access Method files. This function supports the need to select all records from two Indexed Access Method files based on a common field within those records.
- Provide data security through Query by the use of passwords and calls to user-written security routines.
- Provide optional journaling of all updates, deletes and inserts to Indexed Access Method file when processing under the Query Multiple Terminal Manager interface. These maintenance type requests for records in a file are written to a journal file. This feature provides an audit trail.
- Provide count function to count the number of records which meets the user-defined field test criteria.
- Support generic processing for character data fields. Generic processing is performed by specifying some leading character sequence for a field and all fields which contain that leading character sequence. For example, select all names that begin with character(s) S\_, SM\_, etc.
- Calculate subtotals and totals for a particular field.

### HARDWARE PRODUCTS SUPPORTED

This Series/1 Query program executes on Series/1 with Event Driven Executive Version 3.2. This program will support the following I/O devices:

#### Disk/Diskettes and Magnetic Tape

- 4962 Disk Storage Unit
- 4963 Disk Subsystem
- 4964 Diskette
- 4965 Diskette Drive and I/O Expansion Unit
- 4966 Diskette Magazine Unit
- 4969 Magnetic Tape Subsystem (may be used for journal and output files only)

#### Printers

- 4973 Line Printer
- 4974 Printer
- 4975 Printer



PROGRAM PRODUCTS

**Event Driven Executive Query (cont'd)**

**Terminals**

- 3101 Display Terminal (models 1 and 2)
- 4978 Display Station
- 4979 Display Station

Only those hardware products supported by the Multiple Terminal Manager are supported by this Query program. Terminal devices must be 24 line full screen displays.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system for executing this licensed program is as specified for the Series/1 Event Driven Executive Version 3.2 (5719-XS3) and the Multiple Terminal Manager Version 2.1 (5719-MS2). Query requires at least 12K bytes of the transaction/program area of the Multiple Terminal Manager. A requirement for batch processing mode is an additional 20K bytes to be used with the user's application program.

**SOFTWARE REQUIREMENTS**

- Event Driven Executive Version 3.2 (5719-XS3)
- Indexed Access Method Version 2.0 (5719-AM4)
- Sort/Merge Version 1.3 (5719-SM2)
- Multiple Terminal Manager Version 2.1 (5719-MS2)

**COMPATIBILITY**

This licensed program is also compatible with the following IBM Series/1 licensed programs:

- COBOL Compiler and Resident Library Version 2 (5719-CB5)
- COBOL Transient Library Version 2 (5719-CB6)
- Macro Assembler Version 1.2 (5719-ASA)
- Macro Library Version 3.2 (5719-LM7)

**DOCUMENTATION**

(available from Mechanicsburg)

*Series/1 Query General Information Manual (GC34-0457) ... Series/1 Query User's Guide and Workbook \* ... Series/1 Query Programmer's Guide \* ... Series/1 Query Licensed Program Specifications \* ... Series/1 Query Reference Summary Card \**

\* Form numbers will be announced at availability.

**TERMS and CONDITIONS:** See PP Index

## REALTIME PROGRAMMING SYSTEM QUERY 5719-XR2

### PURPOSE

The IBM Series/1 Realtime Programming System Query licensed program provides an access to user's operating data stored in an Indexed Access Method file or a sequential file. This program is for use with Realtime Programming System Multiple Terminal Manager licensed program (5719-MT1). This licensed program can also be used in a batch processing mode by an application program.

### HIGHLIGHTS

- Query Definitions of a User's File: Query Definitions allow the user to select specific information in a file. This information may be used, for example, by a stock clerk, supervisor, accountant, or management. These query definitions refer to a file in terms of rows (representing records) and columns (representing data fields). These definitions are then used by Query to allow information retrieval from Indexed Access Method files and sequential files. File update, delete and insert are also available using an Indexed Access Method file.
- Query Prompt Screen Interface: A user interface is provided to define file and query definitions. This interface utilizes prompt-response menu screens which guide users through creation of their definitions.
- Query Processing: The user can define different processes or tests to select specific information in a query definition.
- Query Maintenance Capabilities: Also provided are maintenance routines to perform the following functions for query definitions:
  - Copy
  - Update
  - Delete
  - Rename
- Provide global update of a field that will update all occurrences of a field in all qualified records in an Indexed Access Method file, with a single query.
- Provide an interface to application programs written in COBOL or Series/1 Assembler language. To accomplish this, the Query object modules are linked with the user-written application programs, which run as Multiple Terminal Manager applications or system application programs.
- Query Utility: Executes as a Multiple Terminal Manager application program. It operates in a prompt-response interactive mode, and its functions are not callable from any language. However, the Query Utility can be invoked by a user-written Multiple Terminal Manager application. This Query Utility program supports creation and maintenance of the following:
  - Define the fields in a file.
  - Define which field in a file to process.
  - Define how to select and process file information.
  - Define passwords.

### CONSIDERATIONS

- Maximum supported block size is 1,024 bytes for input and output.
  - Maximum size of a single field in a record is 250 bytes.
  - Maximum number of fields in a file that can be defined is 100 with the shipped system, but can be increased to 250 with a customized system by the user. This requires an additional 4,500 bytes in the Multiple Terminal Manager program area.
  - Maximum number of Query fields that can be defined is 40. With customized installation into a Multiple Terminal Manager system that has a program area larger than 12K, this number can be increased. Approximately 80 bytes is required for each additional field over 40.
  - Maximum number of fields that can specify record selection tests is 10.
  - Maximum number of fields that can be sorted in an output file is 10.
  - Maximum size of a binary numeric record field is 4 bytes, and 10 digits plus edit characters in a display or print field.
  - Maximum size of a numeric character record field is 10 digits and it cannot contain edit characters.
  - Maximum number of records that can be sequenced for printed or displayed output is:
    - 500 for non-keyed sequence field.
    - Unlimited for keyed sequence field.
  - Maximum number of bytes that can be used for sequencing a printed or displayed output is 50.
  - Journaling will not be supported when Query is invoked by a high-level language or Assembler.
  - A maximum of 20 characters including qualifiers can be used when defining record selection field tests in the Utility. This is a space restriction in the Process Definition file. While running the Query Processor in interactive mode, you can specify record select tests for more than 20 bytes in the field. If you request that the record select data be saved, only the first 20 characters will be saved.
  - Up to 512 byte support on 4965 Diskette Drive and I/O Expansion Unit.
- DESCRIPTION**
- This licensed program provides a facility to answer a simple query as well as a complex query with user-specified field test criteria. Specifically the following features are supported:
- Manipulate data using a query definition.
    - Retrieve field information from a sequential or Indexed Access Method file; the output of this retrieval can be displayed, printed or written to a sequential file.
    - Update or modify data fields within a record of an Indexed Access Method file.
    - Delete records from an Indexed Access Method file.
    - Insert or add new records to an Indexed Access Method file.
  - Specify tests on data fields for selecting records to be processed using comparison operators such as Equal to (=), Greater than (>), Less than (<), Not (\) and their logical combination. Up to ten fields may be qualified to control record selection. Three tests, logically ANDed or ORed, may be specified per field.
  - Display or print sequenced output records.
  - Store query definitions, together with field test information in a file for later recall and processing.
  - Provide cancel function to stop processing the current request and allow a new request to be started.
  - Produce a sorted output file.
  - Edit binary and character numeric fields. Editing a numeric field is to display monetary symbols, unit of measure symbol, positioning of a decimal point and commas, and to suppress leading zeros.
  - Perform a logical connection of two Indexed Access Method files. This function supports the need to select all records from two Indexed Access Method files based on a common field within those records.
  - Provide data security through Query by the use of passwords and calls to user-written security routines.
  - Provide optional journaling of all updates, deletes and inserts to Indexed Access Method file when processing under the Query Multiple Terminal Manager interface. These maintenance type requests for records in a file are written to a journal file. This feature provides an audit trail.
  - Provide count function to count the number of records which meet the user-defined field test criteria.
  - Support generic processing for character data fields. Generic processing is performed by specifying some leading character sequence for a field and all fields which contain that leading character sequence. For example; select all names that begin with character(s) S\_, SM\_, etc.
  - Calculate subtotals and totals for a particular field.

### HARDWARE PRODUCTS SUPPORTED

This Series/1 Query program executes on IBM Series/1 systems with the Realtime Programming System Version 5.2. This program will support the following I/O devices:

#### Disk/Diskettes and Magnetic Tape

- 4962 Disk Storage Unit
- 4963 Disk Subsystem
- 4964 Diskette
- 4965 Diskette Drive and I/O Expansion Unit
- 4966 Diskette Magazine Unit
- 4969 Magnetic Tape Subsystem (may be used for journal and output files only)

**Note:** Licensed program 5719-TA4 is required to support magnetic tape.



PROGRAM PRODUCTS

**Realtime Programming System Query (cont'd)**

**Printers**

- 4973 Line Printer
- 4974 Printer
- 4975 Printer

**Terminals**

- 3101 Display Terminal (models 1 and 2)
- 4978 Display Station
- 4979 Display Station
- 5251 Display Station (model 11)

**Note:** Licensed program 5719-TA1 is required to support the 5251 Display Station.

Only those hardware products, supported by the Multiple Terminal Manager, are supported by this Query program. Terminal devices must be 24-line full screen displays.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the installation and use of this licensed program.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system for executing this licensed program is as specified for the IBM Series/1 Realtime Programming System Version 5.2 (5719-PC5) and the Multiple Terminal Manager Version 3 (5719-MT1). Query requires at least 12K bytes of the transaction/program area of the Multiple Terminal Manager. A requirement for batch processing mode is an additional 20K bytes to be used with the user's application program.

**SOFTWARE REQUIREMENTS**

- IBM Realtime Programming System Version 5.2 (5719-PC5)
- IBM Indexed Access Method Version 2.0 (5719-AM2)
- IBM Sort/Merge Version 1.1 (5719-SM1)
- IBM Multiple Terminal Manager Version 3.0 (5719-MT1)

**COMPATIBILITY**

This licensed program is also compatible with the following IBM Series/1 licensed programs:

- COBOL Compiler and Resident Library Version 2 (5719-CB7)
- COBOL Transient Library Version 2 (5719-CB8)
- Program Preparation Subsystem Version 5.2 (5719-AS5)
- 4969 Magnetic Tape Subsystem Version 1.2 (5719-TA4)
- IBM 5250 Information System Attachment Support Version 1.2 (5719-TA1)

**Note:** The Programming Preparation Subsystem Version 5.2 (5719-AS5) and the Realtime Programming System Version 5.2 (5719-PC5) will be available prior to or concurrent with first customer shipment of the Letter Writer program.

**DOCUMENTATION**

(available from Mechanicsburg)

*Series/1 Query General Information Manual (GC34-0457) ... Series/1 Query User's Guide and Workbook \* ... Series/1 Query Programmer's Guide \* ... Series/1 Licensed Program Specifications \* ... Series/1 Query Reference Summary Card \**

\* Form numbers will be announced at availability.

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**5110 PRINT PLOT/PROBLEM SOLVER LIBRARY  
5721-DC3 (BASIC) and 5721-DC4 (APL)****PURPOSE**

IBM 5110 Print Plot/Problem Solver Library is an interactive program. When used in conjunction with the printer control function support provided (also available via RPQ S40161), it allows the IBM 5110 to plot data generated by BASIC or APL programs, or to plot data entered from the keyboard onto an IBM 5103 Printer. (Note: All further references to the Print Plot/Problem Solver Library assume the printer control function support is that provided with the Print Plot program and not the RPQ.) In addition, the Print Plot/Problem Solver Library, through the use of the Serial I/O Adapter, can be used with these types of peripheral devices:

- Absolute Vector Plotters
- Storage Display Terminals

The present implementation will be compatible only with certain peripheral devices of the above generic device types. Peripheral device support programs are the user's responsibility. See *User's Manual* for more detail.

Print Plot/Problem Solver Library will provide the capability for generating the most used types of graphs such as line graphs, bar charts, histograms, point plotting, etc. The user may write a program to generate the data or enter the data directly from the keyboard.

**HIGHLIGHTS**

Print Plot/Problem Solver Library supports the following functions:

- Plot of horizontal and vertical lines given starting point and length.
- Automatic plotting of axes.
- Automatic plotting of grid.
- Automatic plotting of scale numbers and tick marks including logarithmic.
- Connect two points with straight line or connect more than two points with straight lines between points in the order given.
- Automatic plotting of histogram.
- Automatic plotting of bar charts.
- Plot of curve identifying characters (from standard character set).
- Built-in routine for scaling to compensate for dot density differences horizontally and vertically so that a square will be square and a circle will be round.
- Variable density of plot.
- Reversible platen so that the paper can move backward as well as forward.
- Standard 5103 character set printed horizontally for chart identification or title.
- Calculate and plot curve fits for given points.

**DESCRIPTION**

Print Plot/Problem Solver Library consists of a series of modules, that when loaded into the system, will provide a wide range of plotting capabilities. In generating a graph using Print Plot, the user would generally invoke processing as follows:

- Specify, interactively, metric or inch plotting.
- Specify the size and location of graph within the plot limits.
- Specify the location of the origin within the graph, the user X value and Y value at the origin, and the horizontal and vertical scaling factors. The scaling factors can be either linear or logarithmic.
- If axes are to be plotted, either specify automatic plotting of axes, or use Print Plot commands to plot axes to user specifications.
- If grids are to be plotted, invoke the grid plotting functions.
- Specify horizontal and vertical dot density.
- Specify a symbol to be printed at all user-defined points.
- Input user coordinates for all points to be plotted indicating whether each individual point should or should not be connected to the last point provided. In addition to keyboard entered and user program-generated points, the data for plotting points may be provided via a data file.

When generating special types of graphs (bar charts or histograms), the user may utilize the Print Plot routines which are tailored to these specific applications.

**CUSTOMER RESPONSIBILITIES**

The Print Plot/Problem Solver Library is distributed on cartridge or diskette for loading into the user's system. A *User's Guide* is also provided. The customer should use the test data supplied in the *User's*

*Guide* to test the system and 5103 Printer, and to make sure the programs work properly.

It is the customer's responsibility to provide sufficient backup cartridges or diskettes (see license agreement for limitations) to ensure continued operation in case of a failure. It is the customer's responsibility to provide sufficient security for these licensed programs.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Print Plot/APL requires a minimum of 32K of processor storage (IBM 5110 models A12 or C12 [tape], A22 or C22 [diskette]).

Print Plot/BASIC also requires a minimum of 32K of processor storage (IBM 5110 models B12, C12, B22 or C22).

The printer control function support will be automatically provided with any Print Plot/Problem Solver Library ordered. The printer control function support is separately available via RPQ S40161.

**SOFTWARE REQUIREMENTS None**

**TERMS and CONDITIONS:** See PP Index



**5110 BUSINESS ANALYSIS/PROBLEM SOLVER LIBRARY  
5721-DC5****PURPOSE**

This IBM 5110 program contains a comprehensive set of interactive routines for use on the system. It consists of 30 routines written in the BASIC language. It provides the problem solver with procedures for data generation and maintenance, spread sheet analysis, investment analysis, break-even or cost-volume profit analysis, depreciation analysis and time series analysis. The program is designed so that a detailed knowledge of programming is not required.

**HIGHLIGHTS**

- Comprehensive set of analytical routines to assist the user in examining investment alternatives and in preparing financial plans.
- Spread sheet analysis capability for report creation and update.
- Time Series Analysis for business forecasting and analysis.
- Interactive features include instructional messages, flexible control of calculations, error checking, and data editing.

**DESCRIPTION**

The Business Analysis/BASIC Problem Solver Library includes 30 routines for helping the financial analyst in exercising the following functions:

- Spread Sheet Analysis:
  - Spread sheet data file creation and update
  - Spread sheet report formatting
- Investment Analysis:
  - Return on Investment Computation
  - Discounted Cash Flow Analysis
  - Loan Analysis (multiple and single)
  - Lease vs. Purchase Analysis
  - Make vs. Buy Analysis
- Break-Even Analysis:
  - Break-even with Definite Assumptions
  - Break-even with Probabalistic Assumptions
- Depreciation Analysis:
  - Straight Line Depreciation
  - Sum-of-years Digit Depreciation
  - Declining Balance Depreciation
  - Equipment Units Depreciation
- Time Series Analysis:
  - Compound Growth Rate Projection
  - Moving Average
  - Seasonal Analysis
  - Cyclical Analysis
  - Auto-covariance and Auto-correlation
  - Cross-covariance and Cross-correlation
  - Exponential Smoothing
  - Simple Regression
- Graphic Presentation:
  - Histograms
  - Exponential Smoothing Plots
- Routine and File Indexing:
  - Business Analysis/Problem Solver Library Routine Menu
  - User-Created Data File
- Data Generation and Maintenance:
  - Create and Update Data Files
  - Select and Rearrange Records in Data Files and Spread Sheet Files
  - Resequence Records in Data Files and Spread Sheet Files
  - Print Data Files

**CUSTOMER RESPONSIBILITIES**

The Business Analysis/BASIC Problem Solver Library is distributed in machine-readable form (diskette for the 5110) and with a *User's Guide*. Customers should use the procedures outlined in the *User's Guide* with their own data to test the machine-readable code and to make sure that the programs are working properly.

It is the customer's responsibility to provide sufficient backup cartridges or diskettes (no more than 5 copies are permitted under the license agreement) to ensure continued operation in case of a failure. It is the customer's responsibility to provide sufficient security for these licensed programs.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The Business Analysis/BASIC Problem Solver Library will operate on IBM 5110 models B12, C12 (tape), B22 or C22 (diskette). The spread sheet routines require a 132-position printout or display. The IBM 5103 printer is recommended when these routines are used. Larger storage can be utilized by the Business Analysis/Problem Solver Library. This is accomplished automatically during the initialization phase of the Menu program.

**SOFTWARE REQUIREMENTS: None**

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**5110 MATH/PROBLEM SOLVER LIBRARY (Basic)  
5721-DC6****PURPOSE**

IBM 5110 MATH/Problem Solver Library is a set of interactive programs for the solution of frequently encountered mathematical problems in science and industry. The library is available in BASIC only for the IBM 5110. The conversational mode of operation of MATH/Problem Solver Library allows a non-data processing-oriented user to use the library with a minimum of effort.

**HIGHLIGHTS**

- A comprehensive set of numerical analysis routines
- Control of operation in the case of ill-conditioned problems and error messages
- Ease-of-use due to conversational mode.

**DESCRIPTION**

MATH/Problem Solver Library consists of a series of routines providing computing capabilities in the following areas:

- Solution of a Linear Equation
- Linear Equation with a Symmetric Positive Definite Matrix
- Linear Equation with a Symmetric Position Definite Band Matrix
- Linear Equation General Band Matrix
- Least Squares Solution of an Over-determined Linear System\*
- Complex Matrix Eigenproblem\*
- Real Matrix Eigenproblem Part 1 Eigenvalues\*
- Real Matrix Eigenproblem Part 2 Eigenvectors\*
- Symmetric Matrix Eigenproblem\*
- Complete Symmetric Eigenproblem
- Generalized Symmetric Eigenproblem\*
- Integration of a Tabulated Function (Trapezoidal Rule)
- Integration of a Tabulated Function (Simpson's Rule)
- Integral of a Tabulated Function (Trapezoidal Rule)
- Integral of a Tabulated Function (Simpson's Rule)
- Derivative of a Tabulated Function
- Integral of a Function (Romberg)
- Integral of a Function (Gaussian Formulas)
- Aitken-Lagrange Interpolation
- Least Squares Approximation (Chebyshev Polynomials)\*
- Evaluation of a Polynomial Expanded in Terms of Chebyshev Polynomials
- Least Squares Approximation (User-Supplied Basis)
- Min-Max Approximation Part 1: Data Preparation\*
- Min-Max Approximation Part 2: Calculation\*
- Local Least Squares Smoothing
- Real Zero of a Real Valued Function
- Local Minimum of a Function of Several Variables
- Zeros of a Polynomial with Real Coefficients
- Zeros of a Polynomial with Complex Coefficients
- First Order Differential Equations
- Inverse Discrete Fourier Transform
- Orthogonal Polynomials
- Elliptic Integrals and Functions
- Gamma Function and its Logarithm
- Fresnel Integrals
- Sine and Cosine Integrals
- Exponential Integral
- Bessel Functions of Integer Order\*
- Bessel Functions of the First Kind and Fractional Order
- Modified Bessel Functions of Integer Order\*
- Modified Bessel Functions of the First Kind and Fractional Order
- Linear Programming\*

\* These BASIC routines require a minimum of 32K for the 5110.

**CUSTOMER RESPONSIBILITIES**

The MATH/Problem Solver Library is distributed in machine-readable form for loading into the user's system. A *User's Guide* is also provided. Customers should use their own test data and the procedures in the user's guide to test machine-readable code to make sure the programs are working properly.

It is the customer's responsibility to provide sufficient backup cartridges/diskettes (no more than 5 copies are permitted under the license agreement) to ensure continued operation in case of a failure. It is the customer's responsibility to provide sufficient security for these licensed programs.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Math/Basic will operate 30 routines on an IBM 16K 5110. The remaining routines require a minimum 32K machine to operate. The library can be adjusted to reflect the amount of storage available. This is done through the initializing portion of the Menu routine.

**SOFTWARE REQUIREMENTS: None**

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**5110 STAT/PROBLEM SOLVER LIBRARY (BASIC)  
5721-DC7****PURPOSE**

The IBM 5110 STAT/Problem Solver Library is an interactive program encompassing commonly used statistical techniques for the analysis of numerical data. The library is available in BASIC only for the IBM 5110.

STAT/Problem Solver Library helps the problem solver to utilize the computer directly for statistical analysis. A statistically-oriented user should have no difficulty in quickly learning the capabilities of the programs. The interactive mode of the package allows a non-data processing-oriented professional to readily utilize the programs.

Because of the interactive nature of the STAT/Problem Solver Library the user can sit at the keyboard and see the result of the analysis as it is developed. Delays and some of the sources of error associated with batch processing and time sharing usage are eliminated.

**HIGHLIGHTS**

- A comprehensive set of statistical procedures.
- A user with a knowledge of statistics can learn the program with a minimum of effort.
- Interactive mode simplifies usage.
- Error checking with correction facilities.
- Instructional messages clarify procedures or options available.

**DESCRIPTION**

STAT/Problem Solver Library consists of a series of routines covering a wide range of capabilities under the following categories:

- **Data Generation** - Read, Print, Edit, Transform
- **Elementary Statistics** - Cross Tabulation, Histogram, Tally, Moments, T-Test, Chi-Square
- **Regression and Correlation Analysis** - Correlation, Simple Regression, Stepwise Regression, Multiple Regression, Polynomial Regression
- **Multivariate Analysis** - Discriminant Analysis, Canonical Correlation, Factor Analysis
- **Analysis of Variance** - One-way Analysis of Variance, Factorial Design
- **Non-Parametric Statistics** - Kendall Ranks Correlation, Sign Test, Wilcoxon's Matched-pairs Signed Ranks Test, Cochran Q-Test, Freedman Two-way Analysis of Variance, Mann-Whitney U-Test, Kendall Coefficient of Concordance Biserial Correlation, Point Biserial Correlation, Tetrachoric Correlation, Phi-Coefficient.
- **Time Series Analysis** - Moving Average, Seasonal Analysis, Cyclical Analysis, Auto-Covariance and Auto-correlation, Cross-Covariance and Correlation, Triple Exponential Smoothing.
- **Biostatistics** - Survival Rate, Probit Analysis

**CUSTOMER RESPONSIBILITIES**

The STAT/Problem Solver Library is distributed in machine-readable form for loading into the user's system. A *User's Guide* is also provided. Customers should use the procedures outlined in the *User's Guide* with their own data to test the machine-readable code to make sure the programs are working properly.

It is the customer's responsibility to provide sufficient backup cartridges or diskettes (no more than 5 are permitted under the license agreement) to ensure continued operation in case of a failure. It is the customer's responsibility to provide sufficient security for these licensed programs.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

STAT/BASIC will operate on an IBM 16K 5110 system. The library is able to automatically adjust the minimum-maximum entries to fit various storage sizes and input/output options.

**SOFTWARE REQUIREMENTS: None**

**TERMS and CONDITIONS:** See PP Index

**ACCOUNTING APPLICATIONS  
For The 5120 COMPUTING SYSTEM**

5120 BILLING ... (5721-XB1)  
 IBM 5120 PAYROLL ... (5721-XB2)  
 IBM 5120 ACCOUNTS PAYABLE ... (5721-XB3)  
 IBM 5120 ACCOUNTS RECEIVABLE ... (5721-XB4)  
 IBM 5120 INVENTORY REPORTING ... (5721-XB5)  
 IBM 5120 GENERAL LEDGER ... (5721-XB6)

**PURPOSE**

The IBM 5120 Computing System licensed programs for accounting applications are cross-industry programs, applicable to many different business types, which provide the user with powerful tools for running and managing a business.

The levels of support provided for these programs include: Documentation designed to increase ease-of-use and productivity; an Installation Support Center (ISC) Hotline available to all customers for assistance; Responsive Program Temporary Fix (PTF) - an enhancement to the distribution and applying of program fixes.

**HIGHLIGHTS**

- Interrelated applications through generation and passing of transaction data on diskettes for direct input, as appropriate.
- New approach to program documentation designed to significantly increase ease-of-use and customer self-sufficiency during installation and operation.
- Installation Support Center (ISC), with a direct customer hotline for questions related to the installation and operation of these applications.
- Central Service from the Application Development Center for error correction, including rapid distribution of PTFs and the capability for users to automatically apply the fixes through Responsive PTF facility.
- Enhanced ease-of-use through appropriate use of menu-driven procedure selection and/or screen prompting.
- Built-in auditability and control through such techniques as zero balancing and control totals.
- Installation-time tailoring to select key options and user specific control and report data.
- BRADS II (5798-NXT) file definitions provided with the programs for selected portions of the application files.

**DESCRIPTION****BILLING (5721-XB1)**

IBM 5120 Billing is a post-billing application providing the user the ability to create invoices for customer orders already shipped. The customer name and address, item descriptions and prices are automatically obtained from the customer and item files if the 5120 Accounts Receivable and Inventory Reporting programs are installed. If these programs are not installed, the data can be keyed in directly for each invoice. Extensions and discounts are automatically applied and transaction records created for direct input to 5120 Accounts Receivable and Inventory Reporting programs.

**Functions and Features**

- Post-billing.
- Automatic price extensions.
- Broken Case pricing.
- Discounts optionally applied based on invoice total.
- Availability of four customer class prices per item controlled by a price code in the Customer Master File.
- Up to 2 sales taxes (State, local) plus Federal Excise tax.
- Up to 3 classes of special charges (packing, freight, etc.).
- Handles cash sales.
- Billing of non-inventoried items.
- Optional handling of back order, back order shown on invoice.
- Invoice by single order, specified orders, or batch orders.
- Credit memos for returns and adjustments.
- Daily sales information from Billing is summarized in the order file and available to user as input to a user sales history file.
- Auditability and control through edit lists and control totals for Invoice Register, Accounts Receivable and Inventory transaction files.
- Interactive data entry and edit of customer orders.
- Can override any fixed data during data entry (that is, price, discounts, cost, etc.)

- Creates transaction data on diskette for direct input to the 5120 Accounts Receivable and Inventory Reporting.
- Installation-time tailoring including selection of Accounts Receivable/Inventory interface, back order, general ledger account numbers for use with accounts receivable input and automatic invoice numbering.

**PAYROLL (5721-XB2)**

5120 Payroll provides an application that performs basic payroll computations and produces payroll checks with earnings statements and deduction reports. It accommodates both hourly and salaried payrolls. Additional program flexibility and options are provided to satisfy many special customer needs.

**Functions and Features**

- Weekly, biweekly, semimonthly or monthly pay periods.
- Provides payroll register, payroll checks with Earnings Statements, Deduction Report (with exceptions) and Distribution Journal.
- Preparation of the 1979 W-2 forms with subtotals and 941-A showing excess wages for SUI.
- Vacation, holiday and sick time processing and reporting.
- Pay for regular employees on hourly basis, with additional capability for
  - Payment of special wages only (for example, piecework).
  - Two overtime rates set by user.
  - A shift differential premium handled as percent of hourly rate or flat amount per hour, set at user option. Shifts 2 and 3 may differ.
  - Pay rates based on "skill" codes.
- Pay for salaried employees, with additional capability for
  - Payment of commission only.
  - Recording overtime hours, with or without pay.
- Provides for processing special payments such as awards and bonuses.
- Allows additional Federal Income Tax withholding at employee's request.
- Provides user a specified tax table for Federal and State/Local tax computation with one state and one local tax deduction per pay period per employee. Up to four state/local changes allowed per year per employee.
- Non-statutory deductions allowed, with capability for:
  - Up to eight per employee, with a total system capacity of 40 non-statutory types.
  - Specifying deduction frequency, and continuing until stopped or predefined limit is reached.
  - Deduction amount may be percent of gross, amount per period, or amount per hour.
  - Stock/bond deduction with a certificate value and balance forward.
- Inquiry to any employee record.
- Security provisions with user pre-set passwords.
- Interactive data entry for file creation/maintenance and transactions.
- Auditability and control through payroll data batch proof and zero balancing general ledger distribution.
- Creation of summary job/department cost distribution data for input to the 5120 General Ledger program.
- Installation-time tailoring, including company name/address, security password and various processing options such as pay rates based on skill, interface to the 5120 General Ledger, job costing and distribution.

**ACCOUNTS PAYABLE (5721-XB3)**

The 5120 Accounts Payable is an interactive solution designed to assist the user in controlling cash outflow, while maintaining accurate and detailed records of vendor invoices and credits.

Information is provided to help management take advantage of vendor discounts. Accounting controls, audit trails, a menu facility and operator prompting can assist the user in maximizing productivity. Data validity is provided through zero balancing of debits and credits by voucher number at entry time.

**Functions and Features**

- Multicompany support.
- Payment options by "due date", "on demand", or "within date".

### 5120 Accounting Applications (cont'd)

- Allows for expedited payments when necessary to deviate from regular payment cycles.
- Optionally allows generated standard recurring payable items for several payment cycles.
- Handles partially prepaid vendor invoices, adjustments, transfer, reversals, and vendor debit and credit memos on an accrual basis.
- Credit memo tracking through key reports.
- Use of up to nine specified cash bank account numbers for cash disbursements.
- Allows accounting for and deduction of cash discounts.
- Supports open payables and cash disbursements.
- Auditability and control functions including zero balancing by voucher and control totals for batch input and update.
- Provides for vendor master file inquiry through file maintenance facility.
- Interactive data entry and correction capability with fast response screen for efficient data entry.
- Use of specified general ledger accounts for payables, discounts earned, cash and expense distributions.
- Creation of journal entry data to be used for input to general ledger or optionally create journal entry on diskette for input to the 5120 General Ledger.
- Installation-time tailoring includes selection and definition of report titles, payment options, interface to 5120 General Ledger and use of security feature.
- Handling of broken-case quantities
- On-demand stock status reporting with flagging of exception items (for example, out of stock, below reorder level, etc.) which may optionally be restricted to selected vendors, item classes, or inventory items
- Comprehensive inventory analysis report
- Perpetual inventory maintenance
- Item costing - both average cost and last cost
- Maintenance of month-to-date and year-to-date sales and cost of items sold for all items
- Displayed inquiry of the contents of Inventory Master File records using the File Maintenance process
- Physical inventory list - in sequence by warehouse and location
- Auditability and control functions including Master File update sequence numbering and dating, and control totals for transaction entry
- Installation-time tailoring

#### GENERAL LEDGER (5721-XB6)

The 5120 General Ledger System is an application designed to accomplish the basic bookkeeping functions of posting journal entries to general ledger and creating financial statements. The programs are based on double-entry bookkeeping principles in accordance with established professional standards. The system has been designed for easy implementation and installation, allowing a user to be productively operational in a short time.

#### Functions and Features

- Accommodate up to eleven major divisions of accounts.
- Account structure within each division can be tailored by the user to meet their specific requirements.
- Produces General Ledger, General Ledger Trial Balance, Chart of Accounts and Transaction Listings.
- Produces Balance Sheet and Income Statement on 8 1/2" x 11" format.
- Auditability and control through edit of data input formats, entry of debit and credit transactions under systems guidance, batch total control and zero balancing for input transactions.
- Use of master menu screen, with optional return after each procedure.
- Accepts transactions, direct from diskette, generated by the 5120 Payroll, Accounts Payable and Accounts Receivable programs.

**Program Documentation:** A documentation approach is provided to help customers install these IBM accounting applications. The materials offer significant improvements in the following areas:

- They are written in user-oriented language.
- The material within each book is presented in an easy-to-follow, step-by-step structure that guides the customer through the installation of the application.
- Hands-on operator training is provided. This training is self-paced and can be used with or without accompanying audio cassettes, depending upon the experience level of the user.
- The materials are designed to interface with the 5120 Operator Training providing a coordinated prerequisite for the specific operator training.
- They are designed to work in conjunction with the ISC customer hotline.
- The books are visually attractive.

The following materials are available for each application.

**Getting Ready:** This book steps the customer through the implementation process. It spells out, in simple terms, what has to be done to get the application up and running.

**Operator Training:** Complete instructional materials are provided for training the operator. This training program uses both audio and workbook to bring operators up to speed quickly. After training, the operator workbook and a *Ready Reference Guide* are used as needed.

**Reports and Information:** This book helps management take full advantage of the reports and information provided by the application. It describes, in detail, the reports produced and how they are used.

In addition, a separate program detail manual will be optionally available for each application.

#### ACCOUNTS RECEIVABLE (5721-XB4)

The 5120 Accounts Receivable is an application designed to provide the user with timely information to help improve cash flow, and reduce bad debt losses by control of the accounts receivable. The accounts receivable transactions are summarized into debits and credits to the general ledger accounts. The system provides a summarized journal report and optionally creates a general ledger transaction file on diskette, summarized by account, for entry to the user's general ledger.

#### Functions and Features

- Open-item accounting or balance forward accounting selectable by customer.
- Accounts receivable aging including three aged, one current, and one future period, with aged Trial Balance on demand.
- Customer account information may be selectively printed for credit checking and cash application.
- Automatic creation of late charge transactions which may be reviewed and edited before posting. Late charge rate and first late period can be specified.
- Deferred statement printing.
- Suppression of statements and/or late charges on an individual customer basis, as required.
- Credit limit reporting.
- Past due reporting.
- "Sundry" entries for which general ledger account numbers may be specified at transaction entry time.
- Auditability function including control totals for batch input and update.
- Interactive entry and correction capability for invoice, debit memo, credit memo, payment, adjustment data and late charge data. Fast response screen for efficient data entry.
- Creation of journal summary transactions for input to general ledger, with optional diskette output for input to the 5120 General Ledger program.
- Installation-time tailoring includes user company name and report titles, general ledger account numbers, interface to the IBM 5120 General Ledger and Billing programs, choice by customer of balance forward or open item accounting, and others.

#### INVENTORY REPORTING (5721-XB5)

The 5120 Inventory Reporting offers small enterprises the management reports to help appropriate optimization of inventory levels. The user is assisted in purchasing decisions by up-to-date reports reflecting stock movement, on-hand and on-order quantities, as well as sales and cost data.

#### Functions and Features

- Quantity on-hand and warehouse location kept separately for up to three warehouses



## PROGRAM PRODUCTS

## 5120 Accounting Applications (cont'd)

## Installation Support:

Atlanta National Market Support Center  
Customer telephone service to the Atlanta National Market Support Center, formerly the ACSC, is available only for selected 5120 licensed programs as follows:

- IBM will provide 90 days of no-charge telephone service to 5120 customers who are installing their first 5120 licensed program. These programs are:
  - Billing (5721-XB1)
  - Payroll (5721-XB2)
  - Accounts Payable (5721-XB3)
  - Accounts Receivable (5721-XB4)
  - Inventory (5721-XB5)
  - General Ledger (5721-XB6)
  - BRADS II (5796-NXT)
- Customers may purchase 12 months of continuing telephone service for all of the above licensed programs.
- Telephone service for the 5100, 5110, and 5120 BASIC programing languages is no longer available.

**Responsive Program Temporary Fix (PTF):** Responsive PTF is a diskette system designed to have customers automatically install program fixes for the 5120 Accounting Applications and BRADS II.

It consists of a single diskette containing program fixes and a program which prompts the customer to apply the required fix or fixes. The diskette will contain all known fixes to the supported applications. Central Service, at the West Coast Application Development Center, is responsible for developing fixes, maintaining the Responsive diskette, and shipping it to a customer at the request of the ISC. The customer will also receive information on how to initiate the system to the point where screen prompts are provided for further guidance.

Responsive PTF does not replace the normal methods of periodic update releases, as required, through PID. It is meant to serve as an enhanced level of support for use between releases.

**Use of Accounting Applications with BRADS II (5796-NXT):** BRADS II provides the facility for a non-programmer to define files, create and maintain the files, build file inquiries and generate reports from the file data. The 5120 Accounting Applications (except General Ledger) will further support that capability by providing selective BRADS II file definitions with the applications. Thus, the task of definition, file creation, and maintenance is accomplished as part of the application. A user who has BRADS II can then build inquiries and develop additional reports for the defined files. This facility can help meet user unique inquiry and report requirements not contained in the applications.

In addition, with BRADS II, the user can extend the usefulness and value of the 5120 by developing additional simple applications (that is, asset inventory, company phone book, price lists, mailing lists, bills of material, etc.), without requiring a knowledge of BASIC programming.

BRADS II is also a highly productive application development tool. Thus the user, who also has BASIC language programming experience, can productively develop additional applications of varying complexities.

## CUSTOMER RESPONSIBILITIES

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

The customer is responsible for error detection and analysis and submission of APARs, but can obtain hotline assistance from the ISC.

IBM Central Service is responsible for the development and distribution of program fixes, but the customer has the responsibility to apply fixes to the program and can obtain hotline assistance from the ISC and use of the Responsive PTF diskette and program.

## SPECIFIED OPERATING ENVIRONMENT

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

## HARDWARE REQUIREMENTS

The IBM 5120 Accounting Applications (General Ledger, Accounts Payable, Payroll, Billing, Inventory Reporting, Accounts Receivable) are designed to operate on an IBM 5120 Computing System or a 5110 Computer with the following minimum configurations:

5110	5120
5110 B22 Computer (32K BASIC) Feature #3200 Diskette Sort (except Payroll)	5110 B32 Computer (32K BASIC) Feature#3200 Diskette Sort (except Payroll)
5103 mdl 11 Printer	5103 mdl 11 Printer
5114 Diskette Unit Feature #3240 (Second Diskette Drive)	

Each of the applications operates individually, with its own diskettes, on a dedicated 5120 or 5110. Though there is data-passing, via diskette, between selective applications, there is no system or file co-residency.

## SOFTWARE REQUIREMENTS

The IBM 5110 Accounting FDPs [General Ledger (5798-NPH), Accounts Payable (5798-NPK), Payroll (5798-NPJ), Inventory Reporting (5798-NXK), Accounts Receivable (5798-NPN)] were used as a base for development of the 5120 Accounting Applications. Enhancements, extensive changes to the interfaces, the addition of Billing with an interface to the enhanced Accounts Receivable and Inventory, and the development of a new documentation approach have resulted in major changes. Because of these changes operational problems can occur if the 5110 and 5120 programs are used together. Therefore, IBM cannot support the intermixing of the 5110 and the 5120 applications.

## DOCUMENTATION

(available from Mechanicsburg)

## Marketing Publications

The following program documentation is provided as part of the Basic Material shipped with the programs from PID. It is also available from Mechanicsburg, and includes the following:

**IBM 5120 Billing (5721-XB1)**  
*Getting Ready Binder* (SB30-0438) contains: ... *Getting Ready Manual* (SB30-0439) ... *Getting Ready Planner Form* (SB30-0441) ... *Reports and Information Manual* (SB30-0440) ... *Operator Training Binder* (SB30-0442) contains: ... *Operator Training Manual* (SB30-0443) ... *Operator Training Cassette* (SV30-0236) ... *Ready Reference Manual* (SB30-0444) ... *Program Detail Manual* (LB30-2519) ... *Application Extension Booklet* (LB30-2527).

**IBM 5120 Payroll (5721-XB2)**  
*Getting Ready Binder* (SB30-0403) contains: ... *Getting Ready Manual* (SB30-0404) ... *Getting Ready Planner Form* (SB30-0406) ... *Reports and Information Manual* (SB30-0405) ... *Operator Training Binder* (SB30-0407) contains: ... *Operator Training Manual* (SB30-0408) ... *Operator Training Cassette* (SV30-0231) ... *Ready Reference Manual* (SB30-0409) ... *Program Detail Manual* (LB30-2516) ... *Application Extension Booklet* (LB30-2524).

**IBM 5120 Accounts Payable (5721-XB3)**  
*Getting Ready Binder* (SB30-0424) contains: ... *Getting Ready Manual* (SB30-0425) ... *Getting Ready Planner Form* (SB30-0427) ... *Reports and Information Manual* (SB30-0426) ... *Operator Training Binder* (SB30-0428) contains: ... *Operator Training Manual* (SB30-0429) ... *Operator Training Cassette* (SV30-0234) ... *Ready Reference Manual* (SB30-0430) ... *Program Detail Manual* (LB30-2518) ... *Application Extension Booklet* (LB30-2525).

**IBM 5120 Accounts Receivable (5721-XB4)**  
*Getting Ready Binder* (SB30-0431) contains: ... *Getting Ready Manual* (SB30-0432) ... *Getting Ready Planner Form* (SB30-0434) ... *Reports and Information Manual* (SB30-0433) ... *Operator Training Binder* (SB30-0435) contains: ... *Operator Training Manual* (SB30-0436) ... *Operator Training Cassette* (SV30-0235) ... *Ready Reference Manual* (SB30-0437) ... *Program Detail Manual* (LB30-2515) ... *Application Extension Booklet* (LB30-2523).

**IBM 5120 Inventory Reporting (5721-XB5)**  
*Getting Ready Binder* (SB30-0417) contains: ... *Getting Ready Manual* (SB30-0418) ... *Getting Ready Planner Form* (SB30-0420) ... *Reports and Information Manual* (SB30-0419) ... *Operator Training Binder* (SB30-0421) contains: ... *Operator Training Manual* (SB30-0422) ... *Operator Training Cassette* (SV30-0233) ... *Ready Reference Manual* (SB30-0423) ... *Program Detail Manual* (LB30-2520) ... *Application Extension Booklet* (LB30-2526).

**IBM 5120 General Ledger (5721-XB6)**  
*Getting Ready Binder* (SB30-0410) contains: ... *Getting Ready Manual* (SB30-0411) ... *Getting Ready Planner Form* (SB30-0413) ... *Reports and Information Manual* (SB30-0412) ... *Operator Training Binder* (SB30-0414) contains: ... *Operator Training Manual* (SB30-0415) ... *Operator Training Cassette* (SV30-0232) ... *Ready Reference Manual* (SB30-0416) ... *Program Detail Manual* (LB30-2517).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## PROGRAM PRODUCTS

**SYSTEM/32 BASIC ASSEMBLER LANGUAGE  
and MACRO PROCESSOR  
5725-AS1****PURPOSE**

The Basic Assembler language is a symbolic programming language used to write programs for the System/32. Source programs written in this language are processed by the Basic Assembler licensed program to produce relocatable object programs which are converted to executable format by the System/32 System Control Programming-Overlay Linkage Editor facility. The Basic Assembler can be used to create a stand-alone program. The object programs are stored in the System/32 Library. Program loading is performed through System/32 OCL.

Programs may be coded entirely by the user with no dependence on any other programming other than System/32 System Control Programming (5725-SC1).

Basic Assembler may also be used for assembly of relocatable subroutines for use with System/32 RPG II. The subroutines written in the Basic Assembler language are coded by the user and separately assembled. The process of program linking is accomplished during compilation of the RPG II source program.

**HIGHLIGHTS**

Some of the features provided by the Basic Assembler licensed program and its language are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Convenient Data Representation
- Operand Field Expressions
- Source Identification - Sequence Fields
- Assembler Instructions
- Cross-Reference Listings
- Error Checking and Diagnostic Messages

System/32 macros provide support to the Assembler user through the Macro Processor for the following System Control Program facilities: Disk functions, printer operations, keyboard and display screen access and binary synchronous communications.

The macros are supplied to provide an interface to existing SCP support. Additional macros may be written by the user using the macro definition language provided.

By referring to macro definitions, the Macro Processor expands macro instructions coded by the user. The macro definitions are coded in a macro language. The macro definitions may be supplied by either the user or IBM. See the related System/32 SCP macros. All macro instructions are expanded into assembler source language statements that in turn can be processed by the Basic Assembler.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

IBM System/32 Basic Assembler language and Macro Processor licensed program supports all models and features of the IBM 5320.

**SOFTWARE REQUIREMENTS**

A concurrent version of IBM System/32 System Control Programming (5725-SC1) is required to support IBM System/32 Basic Assembler language and Macro Processor licensed program.

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/32 CLIENT ACCOUNTING and  
FINANCIAL REPORTING SYSTEM (CAFRS)  
5725-C21**

**PURPOSE**

The System/32 Client Accounting and Financial Reporting System (CAFRS) offers the public accounting profession a comprehensive aid to solving the problems of client accounting. It assists the Certified Public Accountant, Public Accountant, or bookkeeper in operating a more profitable and productive practice.

**HIGHLIGHTS**

CAFRS can be installed without in-house programming capability:

- File sizes may be changed, within limits, as needed, by the system tailoring procedure to allow additional clients to be serviced or to offer optional processing features to more clients
- File load and maintenance procedures provided
- System-controlled master and transaction file backup procedures
- Easy-to-use runbook is available
- Step-by-step installation activity plan and detail user's information supplied by *Application Reference Manuals*

CAFRS provides ease-of-use options to the user

- Designed to fit industry requirements
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of procedures prevents execution of a program until preceding programs have been completely and successfully executed
- Compatible online/offline file maintenance and transaction data entry via the System/32 keyboard or diskettes created on the 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Selective printing options are available for many report functions

CAFRS uses recognized accounting techniques and terminology to provide a solid accounting system:

- Sample user-oriented forms for data preparation, file creation, audit and control are provided
- Clear audit trails and control techniques are provided
- Standard types of accounting reports, such as journals, ledger, trial balance, and financial statements plus special supporting analyses and lists, are provided

**DESCRIPTION**

The Client Accounting and Financial Reporting System is a ready-to-execute application for the small accounting firm.

It combines two data entry approaches - operator-oriented and batch-oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette created on a 3740 Data Entry System.

The application has certain records within a control file which contain questionnaire responses. These records allow the application to select file sizes and functions to suit each firm's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure utilizes the answers to a series of questions regarding the firm's requirements. It provides the following:

- Tailoring the application on-site at installation time.
- Allows users to activate and deactivate provided functions as their requirements change.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted, as needed, by rerunning the System Tailoring Procedure.

An *Application Reference Manual* provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, control forms with suggested procedures. Volume II of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs

on a System/32. The Operator Reference Summary Card is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly trained in the particular application.

Instructional material in the form of a self-study course is provided for the operator for training in the use of the runbook.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

**Application Description:** The Client Accounting and Financial Reporting System is a full-function ready-to-execute application. It includes application reference manuals, a runbook, source code, object code, execution procedures, and an application logic manual, if ordered as optional base material.

It is designed to allow flexibility in the options included to meet an individual client's special needs:

- Up to 13 periods per fiscal year
- Automatically calculated journal entries based upon algorithms previously defined by the accountant
- Multiple special-purpose journals with source code, related accounts, and headings specified by client
- Ability to correct prior periods
- Extensive chart of account flexibility to provide desired heading and account description information, up to 9 levels of subtotals for combining accounts, spacing and paging control
- Optional titles and formats for financial statements

Support is provided for the optional consolidation of multiple clients. Maintenance is provided for eliminating entries. Controls are included to force fiscal period alignment of clients being consolidated. The same processing capabilities are available for the consolidated client as for others.

Optional features and reports are available for any client, such as:

- Last year comparative data on financial statements
- Print-suppression of zero-balance accounts on financial statements
- Balance sheet
- Income and expense statement
- Combined department income and expense reporting
- Income and expense comparison to budget
- Income and expense account balance comparison to a specified account balance, by department
- Income and expense account balance comparison to a client-specified base, such as number of rooms, square feet, or miles driven
- Supporting schedules
- Statement of Changes in Financial Position with related worksheet and ability to process adjustments
- Reporting of financial ratios, defined by client with comparison to industrial averages
- Employee payroll register
- Printing of presently formatted 941a and W-2 forms
- Accountant's transmittal letter
- Notes to the financial statements
- Annual General Ledger

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day to day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This IBM System/32 program will execute on all models of the IBM System/32. The programs are compiled assuming a 16K minimum system. Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (128-character - #5455, and feature group A - #4004).

For presentation purposes on the reports, left and right parentheses have been included to indicate a dollar amount opposite an account's normal balance. The 64-character set feature is required for the System/32 to print the parentheses.



PROGRAM PRODUCTS

**System/32 CAFRS (cont'd)**

Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other user-written program may co-reside with this application unless stringent coding requirements for these programs are met to insure compatibility with the Client Accounting and Financial Reporting System. The *Application Logic Manual* discusses in detail the coding conventions used for the development of CAFRS.

**SOFTWARE REQUIREMENTS**

These programs are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Program (5725-SC1). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

**DOCUMENTATION**

(available from Mechanicsburg)

... *Design Objectives* (GH30-0306) ... *Education Flyer* (G580-0108) ...  
Seminar Slide Set

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/32 LUMBER DEALERS  
MANAGEMENT ACCOUNTING SYSTEM**

**BILLING ... 5725-D4F**  
**ACCOUNTS RECEIVABLE ... 5725-D4B**  
**INVENTORY CONTROL ... 5725-D4D**  
**SALES ANALYSIS ... 5725-D49**

**PURPOSE**

These modular applications are available for either a 16K or 24K System/32. The application function and data base are exactly the same. Performance improvements in the larger memory size versions for each system come from the reduction of overlays, incorporation of larger blocking factors, and use of dual I/O areas.

When all four applications are installed they constitute an interrelated application set with an integrated data base. They can help users manage their two largest business assets, accounts receivable and inventory, and give them profit performance data on their products, customers, and salesmen. They can also help the user increase operational efficiency and customer service.

The Payroll, Accounts Payable, and General Ledger licensed programs of the Distribution Financial Accounting System (DFAS) can co-reside with the Lumber Dealers Management Accounting System.

**DESCRIPTION****BILLING (5725-D4F)**

A post-billing system with data entry from the System/32 keyboard and/or diskettes keyed on a 3740 Data Entry System. Editing, invoice printing, invoice register, and sales summary. Features include:

- Ship-to address file
- Variable price selection methods
  - Operator entry of price
  - Contract price file
  - Customer code selects either the list price, or, one of six prices, discounts from list price, or markups from cost
- Price conversion, with computations for square foot, lineal foot, and board foot items
- Estimate preparation
- Price list printing - six prices in addition to list price
- State sales tax and one local sales tax
- Customer code selects 1 of 6 payment terms

**ACCOUNTS RECEIVABLE (5725-D4B)**

A combined balance forward and open item method, with data editing, monthly statements, and delinquency notices. Features include:

- Balance forward or open item selectable by account
- Lien expiration date checking
- Late charge capability for both open item and balance forward accounts
- Credit limit checked during order edit if Billing is installed
- Variable statement format - two options
- Aged trial balance monthly or on-demand
- Statement by job for contractors or by branch for multi-location wholesalers

**INVENTORY CONTROL (5725-D4D)**

A system which allows management to obtain the information needed for purchasing and profitability analysis, including reports to assist in taking inventory. Features include:

- Stock Status Review - on demand, selectable for
  - All items, item within limits, active items only
  - Sequence by vendor (optional), item class, or item
  - Exceptions only: Below minimum or cost deviation
  - Current stock position: On hand, on order, and available
  - Sales and cost information: This month and year-to-date
- Stock Status Report - monthly
  - Current stock position
  - Activity during the month
  - Year-to-date drop shipped quantities
- Inventory Analysis Report - on demand in sequence by
  - Item number
  - Date of last use or sale
  - Months supply on hand
  - Extended cost on hand
  - Vendor number
  - Item class
  - Vendor/item class

- Alternate cost on hand
- Year-to-date sales
- Basic Unit Cost - Standard cost method
- Alternate Cost - average cost
- Multiple Warehouses

**SALES ANALYSIS (5725-D49)**

Sales and profitability figures by salesman, customer, item, and item class. Availability of the information in the following reports is dependent upon the applications selected and their installation sequence.

- Daily sales recap by salesman (Data from Billing or Accounts Receivable)
- Monthly salesman sales analysis (Data from Billing or Accounts Receivable)
- Monthly customer within salesman sales analysis (Data from Billing or Accounts Receivable)
- Monthly customer sales analysis (Data from Billing or Accounts Receivable)
- Monthly item and item within item class sales analysis (Data from Billing or Inventory)
- Monthly item class within customer sales analysis (Data from Billing)
- The ability to report sales information for groups of items which do not have inventory records on file
- If Sales Analysis is the first or only Lumber Dealers application installed, the customer must provide data entry and edit programs.

**System Functions**

- Integrated data base which simplifies file maintenance and provides for more efficient disk utilization
- User-maintained constants file is used in most programs which allows operator to modify data subject to change, such as late charges rate, tax rates, terms, or aging dates, without the need to change and recompile programs
- Specific file load and maintenance programs are included for each master file
- Easy-to-use printed *Runbook* for each application
- Contains additional space in item and customer master records for customer use
- OCL procedures, sort specifications, and processing programs are cataloged into logical work units which optimize system utilization
- Automatic monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed.
- Dynamic backup and recovery system provides for periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files.
- Reprint options are possible because file updating is separated from report printing functions.
- Selective printing allows the operator to control the printing mode for reports.
- Inquiry programs
- Offline 3741 data entry diskette formats

**File Size and Application Function Tailoring Capability**

Programs and procedures for file allocation are included. The customer can allocate file space during installation and change file space allocations as business volumes change. Also, customers may control the operation of some application functions by file maintenance and by operator-controlled run-time options.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The 16K options of these IAPs will execute on all models of the IBM System/32. The 24K option will execute on all models of the IBM



PROGRAM PRODUCTS

**System/32 Lumber Dealers Management Accounting  
System (cont'd)**

System/32 except the 16K model. There may be a requirement for providing offline keying on an IBM 3740 Data Entry System.

**SOFTWARE REQUIREMENTS**

The LDMAS programs are written in IBM System/32 RPG II programming language.

The 16K and 24K IBM System/32 options are executed under control of the IBM System/32 System Control Program (5725-SC1 Version 5 and above). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the system. The RPG II Compiler (5725-RG1) is required if modifications are anticipated.

**Instructional Materials**

**Operator Introduction and Exercises**

These materials, consisting of a *Student Guide*, audio cassettes, and System/32 diskettes, will help the operator learn and practice operations without using the customer data files. One copy will be provided at no charge to the customer.

One copy of the following material is supplied via SLSS when program number and initial library are specified. Additional copies may be obtained by ordering them individually from Mechanicsburg.

Audio Cassettes (2) (SV30-0002) ... System/32 Diskettes (3) (SV30-0003) ... *Student Guide* (SR30-0171) ... *Advisor Guide* (SR30-0169) ... *Runbook* (SR30-0170) ... Binder (SV30-0024).

**DOCUMENTATION**

(available from Mechanicsburg)

*Executive Guide* (G580-0121) ... *General Information Manual* (GH30-0166) ... *IAP Specifications* (GH30-0167) ... *Application Reference Manual* (SH30-0168).

**TERMS and CONDITIONS:** See PP Index

## SYSTEM/32 FOOD DISTRIBUTORS MANAGEMENT ACCOUNTING SYSTEM

**BILLING ... 5725-D6A**  
**ACCOUNTS RECEIVABLE ... 5725-D66**  
**INVENTORY CONTROL ... 5725-D68**  
**SALES ANALYSIS ... 5725-D6C**

### PURPOSE

These modular applications are available for either a 16K or 24K System/32. The application function and data base are exactly the same. Performance improvements in the larger memory size versions for each system come from the reduction of overlays, incorporation of larger blocking factors, and use of dual I/O area.

When all four applications are installed, they constitute an interrelated application set with an integrated data base. They can help users manage their two largest business assets, accounts receivable and inventory, and give them profit performance data on their products, customers, and salesmen. They can also help the user increase operational efficiency and customer service.

The open order file, slot sequenced picking lists and automated pricing and discounting methods can help improve order processing speed and accuracy. Inventory Control provides information to the buyer that will help optimize inventory investment through identification of the obsolete, slow moving, and unprofitable items; and help increase inventory turns and service levels. Automatic credit limit checking, variable credit terms, late charges on open item and balance forward accounts, delinquency notices, and aged receivables reports provide tools for reducing bad debt losses and increasing cash flow. Daily, monthly, and on-demand sales reports help monitor the attainment of the distributor's sales objectives.

The Payroll, Accounts Payable, and General Ledger licensed programs of the Distribution Financial Accounting System (DFAS) can co-reside with Food Distributors Management Accounting System. If Billing is used in the prebilling mode, a compatible inventory control system must be installed before or with Billing.

### DESCRIPTION

#### BILLING (5725-D6A)

A prebilling system (when used with a compatible inventory control system) with postbilling capability, with data entry from the System/32 keyboard and/or from diskettes keyed on a 3740 Data Entry System, with editing, invoicing, invoice register, and a salesman's recap. Features include:

- Open orders file with listing by customer and/or item that allows either case labels or picking list in warehouse (slot) sequence
- Ship-to address file
- Variable pricing methods, including:
  - Contract pricing
  - Customer class pricing (six classes)
  - Cost plus pricing
  - Catchweight pricing
  - Broken case pricing and surcharge
  - Special charges and allowances
  - Case label charges
  - Cash and trade discounts
- Sales and tobacco tax
- Credit limit checking
- Automatic invoice numbering
- Special deals
- Automatic substitution
- Suggested retail price on invoice and case labels

#### ACCOUNTS RECEIVABLE (5725-D66)

Accounts Receivable provides for the recording, controlling, and reporting of money owed for merchandise sold or services rendered. Recognizing that a major portion of a wholesale food distributor's assets may be tied up in accounts receivable, the procedures are designed to provide timely information that helps your customer:

- Maximize profit and return on investment through tight control over all accounts due
- Minimize losses from bad debts through appropriate attention to slow-paying accounts
- Maintain customer goodwill through prompt, accurate record keeping

The major features of Accounts Receivable include:

- Balance forward or open item selectable by account
- Late charges for both open item and balance forward accounts on monthly statements
- Credit limit checked during order edit if Billing installed

- Monthly or weekly statements and delinquency notices
- Aged trial balance monthly or on demand - Summary or detail
- Aging into four aging periods

#### INVENTORY CONTROL (5725-D68)

Inventory control involves the recording of items received, sold, and on hand, the updating of item costs and the recording of activity dates.

Inventory Control can provide accurate, periodic reviews of the status of each item, while identifying any exception conditions, to assist management in deciding what to buy, how much to buy and how often to buy.

Inventory Control provides information that helps:

- Maintain records of all items physically in stock as well as on order, providing control and auditing for this major investment
- Arrange for timely, economical ordering of stock
- Minimize investment required to meet a specific service level, by highlighting overstocked or slow-moving items.

The major features of Inventory Control include:

- Two cost figures - last cost and burdened cost
- Maintenance of broken case quantities
- Warehouse location (slot)
- Physical inventory aids
- An array of reports to assist in:
  - Buyer ordering
  - Inventory Management
  - Transaction recording and control
  - Inventory Accounting

#### SALES ANALYSIS (5725-D6C)

Sales Analysis offers sales and profitability figures by salesman, customer, item, and item class. Availability of the information in the reports is dependent upon the applications selected and their installation sequence. Major Sales Analysis Reports include:

- Daily sales recap by salesman (data from Billing or Accounts Receivable).
- Monthly salesman sales analysis - current and year-to-date (Data from Billing or Accounts Receivable).
- Monthly customer sales analysis - current and year-to-date (Data from Billing or Accounts Receivable).
- Monthly salesman/customer sales analysis - current and year-to-date (Data from Billing or Accounts Receivable).
- Monthly item and item within item class sales analysis - current and year-to-date (Data from Billing or Inventory).
- Monthly item class, within customer, within salesman sales analysis - current and year-to-date (data from Billing).

If Sales Analysis is the first or only application installed, the customer must provide data entry and edit programs.

#### Functions

- Integrated data base which simplifies file maintenance and provides for more efficient disk utilization.
- User-maintained constants file is used in most programs which allows operator to modify data subject to change, such as late charge rate, tax rates, terms, or aging dates, without the need to change and recompile programs.
- Specific file load and maintenance programs are included for each master file.
- Easy-to-use printed *Runbook* for each application.
- Contains additional space in item and customer master records for customer use.
- OCL procedures, sort specifications, and processing programs are cataloged into logical work units which optimize system utilization.
- Automatic monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed.
- Dynamic backup and recovery system provides for periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to re-create up-to-date master files.
- Reprint options are possible because file updating is separated from report printing functions.

**System/32 Food Distributors  
Management Accounting System (cont'd)**

- Selective printing allows the operator to control the printing mode for reports.
- Inquiry programs, with data retrieval options selectable at program run time, provide current information from the customer and item master files.
- Offline 3741 data entry diskette formats.

**File Size and Application Function Tailoring Capability:** Programs and procedures for file allocation are included. Customers can allocate file space during installation and change file space allocations as business volumes change. They may control the operation of some application functions by file maintenance and by operator controlled run-time options.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The 16K option of these IAPs will execute on all models of the IBM System/32. The 24K option will execute on all models of the IBM System/32 except the 16K mdl. There may be a requirement for providing offline keying on an IBM 3740 Data Entry System.

**SOFTWARE REQUIREMENTS**

The FDMAS IAPs are written in IBM System/32 RPG II programming language.

The 16K and 24K IBM System/32 options are system-executed under control of the IBM System/32 Control Program (5725-SC1 Version 5 and above). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the system. The RPG II Compiler (5725-RG1) is required if modifications are anticipated.

**Instructional Materials****Operator Introduction and Exercises**

These materials, consisting of a *Student Guide*, audio cassettes, and System/32 diskettes, will help the operator learn and practice operations without using the customer data files. One copy will be provided at no charge to the customer.

One copy of the following material is supplied via SLSS when program number and initial library are specified. Additional copies may be obtained by ordering them individually from Mechanicsburg.

Audio Cassettes (2) (SV30-0002) ... System/32 Diskettes (3) (SV30-0003) ... *Student Guide* (SR30-0171) ... *Advisor Guide* (SR30-0169) ... *Runbook* (SR30-0170) ... Binder (SV30-0024)

**DOCUMENTATION**

(available from Mechanicsburg)

*Executive Guide* (G580-0120) ... *General Information Manual* (GH30-0156) ... *IAP Specifications* (GH30-0157) ... *Application Reference Manual* (SH30-0158).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## SYSTEM/32 DISTRIBUTORS MANAGEMENT ACCOUNTING SYSTEM (DMAS)

**BILLING ... 5725-D41**  
**ACCOUNTS RECEIVABLE ... 5725-D43**  
**INVENTORY CONTROL ... 5725-D45**  
**SALES ANALYSIS ... 5725-D47**

### PURPOSE

These modular applications are available for either a 16K or 24K System/32. The application function and data base are exactly the same. Performance improvements in the larger memory size versions for each system come from the reduction of overlays, incorporation of larger blocking factors, and use of dual I/O areas.

When all four applications are installed they constitute an interrelated application set with an integrated data base. They can help users manage their two largest business assets, accounts receivable and inventory, and give them profit performance data on their products, customers, and salesmen. They can also help the user increase operational efficiency and customer service.

The open order file, warehouse sequenced picking lists and automated pricing and discounting methods can help improve order processing speed and accuracy. The inventory control system provides information to the buyer that will help optimize inventory investment through identification of the obsolete, slow moving, and unprofitable items; and help increase inventory turns and service levels. Automatic credit limit checking, variable credit terms, late charges on open item and balance forward accounts, delinquency notices, and aged receivables reports provide tools for reducing bad debt losses and increasing cash flow. Daily, monthly, and on-demand sales reports help monitor the attainment of the distributor's sales objectives.

The Payroll, Accounts Payable, and General Ledger licensed programs of the Distribution Financial Accounting System (DFAS) can co-reside with the DMAS licensed programs.

### DESCRIPTION

#### BILLING (5725-D41)

A postbilling system with data entry from the System/32 keyboard and/or from diskettes keyed on a 3740 Data Entry System, with editing, invoicing, invoice register, and salesman's recap. Features include:

- Open orders file allows printing of either order acknowledgements or packing lists
- Ship-to address file
- Variable price selection methods
- Variable item discount or markup flexibility
- Variable payment terms and cash discounts
- Broken case pricing with surcharge
- Pricing unit conversion - when inventory unit differs from selling unit
- Container charges automatically applied
- Price list
- Daily backorder slips
- Federal Excise tax calculated
- State sales tax (standard) plus two local sales taxes
- Monthly tax totals report

#### ACCOUNTS RECEIVABLE (5725-D43)

A combined balance forward and open item method, with data editing, monthly statements, and delinquency notices. Features include:

- Balance forward or open item selectable by account
- Late charges for both open item and balance forward accounts
- Future dating
- Credit limit checked during order edit if Billing is installed
- Monthly statements and delinquency notices
- Aged trial balance monthly or on demand - summary or detail
- Statements by job or branch location
- Aging of customer invoices with three past due periods

#### INVENTORY CONTROL (5725-D45)

A system which allows management to obtain the information needed for purchasing and profitability analysis, including a perpetual inventory system and a physical inventory system. Features include:

- Stock Status Review - on demand
- Stock Status Report - monthly

- Inventory Analysis Report - on demand
- Basic Unit Cost - average cost method
- Alternate Cost - last cost method
- Multiple Warehouses

#### SALES ANALYSIS (5725-D47)

Sales profitability figures by salesman, customer, item, and item class. Availability of the information in the following reports is dependent upon the applications selected and their installation sequence.

- Daily sales recap by salesman (data from Billing or Accounts Receivable)
- Monthly salesman sales analysis - current and year-to-date (data from Billing or Accounts Receivable)
- Monthly customer sales analysis - current and year-to-date (data from Billing or Accounts Receivable)
- Monthly salesman/customer sales analysis - current and year-to-date (data from Billing or Accounts Receivable)
- Monthly salesman/customer/item class sales analysis - current and year-to-date (data from Billing)
- Monthly item and item within item class sales analysis - current and year-to-date (data from Billing or Inventory)

If Sales Analysis is the first or only DMAS application installed, the customer must provide Data Entry and Edit Programs.

#### System functions

- Integrated data base which simplifies file maintenance and provides for more efficient disk utilization.
- User-maintained constants file is used in most programs which allows operator to modify data subject to change, such as late charge rate, tax rates, terms, or aging dates, without the need to change and recompile programs.
- Specific file load and maintenance programs are included for each master file.
- Easy-to-use printed RUNBOOK for each application
- Contains additional space in item and customer master records for customer use.
- OCL procedures, sort specifications, and processing programs are cataloged into logical work units which optimize system utilization.
- Automatic monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed.
- Offline 3741 data entry diskette formats.
- Dynamic backup and recovery system provides for periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to re-create up-to-date master files.
- Reprint options are possible because file updating is separated from report printing functions.
- Selective printing allows the operator to control the printing mode for reports.
- Inquiry programs provide current information from the customer and item master files.

**File Size and Application Function Tailoring Capability:** All necessary programs and procedures for file allocation are included with the DMAS programs. The customer can allocate file space during installation and change file space allocations as business volumes change. Also, the customer may control the operation of some application functions by file maintenance and by operator-controlled run-time options.

#### CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

#### SPECIFIED OPERATING ENVIRONMENT

##### HARDWARE REQUIREMENTS

The 16K option will execute on all models of the IBM System/32. The 24K option will execute on all models of the IBM System/32 except the 16K model. There may be a requirement for providing offline keying on an IBM 3740 Data Entry System.

##### SOFTWARE REQUIREMENTS



### System/32 DMAS (cont'd)

The DMAS licensed programs are written in IBM System/32 RPG II programming language.

The 16K and 24K System/32 options are executed under control of the IBM System/32 System Control Program (5725-SC1 Version 5 and above). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the system. The RPG II Compiler (5725-RG1) is required if modifications to the IAPs are anticipated.

#### Instructional Materials

##### Operator Introduction and Exercises

These materials, consisting of a *Student Guide*, audio cassettes, and System/32 diskettes, will help the operator learn and practice operations without using the customer data files. One copy will be provided at no charge to the customer.

One copy of the following material is supplied via SLSS when program number and initial library are specified. Additional copies may be obtained by ordering them individually from Mechanicsburg.

Audio Cassettes (2) (SV30-0002) ... System/32 Diskettes (3) (SV30-0003) ... *Student Guide* (SR30-0171) ... *Advisor Guide* (SR30-0169) ... *Runbook* (SR30-0170) ... Binder (SV30-0024)

A prerequisite to these exercises is the System/32 Operator Training Self-study Course (SR30-0004).

#### DOCUMENTATION (available from Mechanicsburg)

*Executive Guide* (G580-0112) ... *General Information Manual* (GH30-0093) ... *Specifications* (GH30-0095) ... *Application Reference Manual* (SH30-0141)

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## SYSTEM/32 DISTRIBUTION FINANCIAL ACCOUNTING SYSTEM (DFAS)

GENERAL LEDGER ... 5725-D61  
ACCOUNTS PAYABLE ... 5725-D62  
PAYROLL ... 5725-D63

### PURPOSE

These three applications provide distributors with a powerful aid in managing their business.

### HIGHLIGHTS

- Independent or Interrelated application approach:
  - Modular design facilitates sequential application installation
  - Single data entry results in multiple application updates
  - Modular design allows users to choose the applications that address their problem areas
- Wide variety of reports and report options included:
  - Management reporting is a byproduct of normal data entry
  - The 941-As and W-2s are saved on diskette and may be printed later
  - Detail or summary listings within a range of keys is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided
  - Security code deters unauthorized execution of key programs in each application
  - A journal reference numbering system supplies an audit trail for any application that generates transactions into the General Ledger
- The System/32 product may co-reside, but not interact, with the System/32 Distribution IAPs written up elsewhere in this section.
- Can be installed without customer programming capability:
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures provided
  - Easy-to-use runbook
  - Operator self-study course is available
  - Step-by-step installation activity plan provided by the *Application Reference Manuals*
  - User's information supplied to the supervisor by the *Application Reference Manuals*

### SPECIAL SALES INFORMATION

Each application offers opportunities for growing installed System/32s. Each is primarily intended for the distributor with 20-250 employees.

Key accounting and management reports are provided to allow selling and installing without a requirement for Systems Engineering Services or customer programming capabilities.

Each application is a customer requirements-oriented system, and caution should be used in changing the system design, function, or data base layout. Exercise care in proposing these applications to large distributors. Make an extensive study of the large distributor's needs to determine the applicability, throughput, and the extent of any needed modification to the programs, procedures, or file sizes.

### DESCRIPTION

These three applications are independent yet interrelated, ready-to-execute applications for the small distributor:

- General Ledger
- Accounts Payable
- Payroll

The system combines two data entry approaches - Operator-Oriented and Batch-Oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette keyed offline on a 3740 Data Entry System. The three easy-to-operate applications can be installed in separate stages at different times and still be an interrelated system.

Each application has certain requirements for records within a cross-application Constants File which contains questionnaire responses. These records allow the application to select certain fields for editing, file sizes, and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a distributor's requirements. It provides the following:

- Tailoring the application on site at installation time.
- Allows users to change the selection of provided functions as their business changes.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted as needed by rerunning the System Tailoring Procedure.

An *Application Reference Manual* Volume 1 provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. Volume 2 of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs on a System/32. The Operator Reference Summary Card is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly trained in the particular application.

Instructional material, with exercises, is provided for operator training in the use of the *Runbook*. The course is not application-dependent. Therefore, only one copy of the course is needed per customer no matter how many DFAS applications are installed.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

**Applications Description:** The three applications are ready-to-execute applications. Each includes samples of all input forms and control forms. Also included are the *Application Reference Manuals*, a *Runbook*, Source Code, Object Code, execution procedures, and the *Application Logic Manual*, if it is ordered as optional basic material.

These are some general features which all three applications have:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline file maintenance and transaction data entry via the System/32 keyboard or diskettes created on the 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions, and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Some report printing can be deferred to a more convenient time
- Selective printing options are available for many report functions

### GENERAL LEDGER (5725-D61)

This application combines all the transactions affecting the financial status of the company during the period. They may be entered directly as a General Journal Entry or may have been previously entered through interface with Accounts Payable or Payroll. Support is provided for either a 13-period or 12-month fiscal year. At period-end closing time, audit listings and the Financial Statement Worksheet are provided to help verify that the user is still in balance before proceeding into the actual closing. The reports will also aid in generation of any necessary closing entries.

An Income Statement and Balance Sheet are standard report outputs. The user can design the format of these reports with an easy-to-use format description procedure. The financial reports can illustrate current financial data as compared to historical information, also to budget information on the Income Statement. The capability is provided to format Income Statements by subdivisions of a company, such as department. Several companies' financial information may be combined into one Balance Sheet and Income Statement. A Statement of Changes in Financial Position Worksheet is provided.

Users may define their own Chart of Accounts or use a suggested account structure provided with the application. The fiscal year start period or month is user-defined. Multiple company support for up to ten companies is included. Any transactions passed from Payroll are applied to company number one only.

**System/23 DFAS (cont'd)****ACCOUNTS PAYABLE (5725-D62)**

The Accounts Payable application provides an Open Payables and Cash Disbursements function on either an accrual or cash basis. Invoices and credit memos entered may be multi-lined and distributed by General Ledger account number. Entries may be for standard or one-time vendors and may be open or pre-paid. Credit memos may be entered manually or initiated automatically by referencing a prior entered invoice. Invoice payments may be assigned to a vendor other than the original vendor. Invoices may be controlled through the application based upon a voucher number entered with the invoice.

A Purchase Journal provides the audit trail for cost transactions entering into the General Ledger system and into the Open Payables File. An Open Payables Report is provided in due date or vendor sequence. This turnaround document provides a way to select for payment by date, vendor, or invoice, including partial payments, for Cash Disbursements. Invoices may be entered or placed in hold status to prevent inadvertent payment. A Cash Requirements Report is used to assist in insuring sufficient funds are available and proper invoice selection was made before the checkwriting procedure begins. The Cash Disbursements Journal provides an audit trail for its transactions entering the General Ledger application and acts as the Check Register. Checkwriting and reconciliation are also provided.

A Vendor Analysis Report indicates key business volumes and discounts lost and taken by previous year and current year. An additional analysis report by business volume per vendor is also provided. Multiple company support for up to 10 companies is provided.

**PAYROLL (5725-D63)**

This hourly/salary/executive payroll provides for regular, overtime, premium, vacation, and sick pay. It may be run weekly, biweekly, semimonthly, monthly. Hours may be entered daily or by pay period. Exception hours provide time and one-half, double-time, double-time and one-half, and triple time capabilities. Rates may be selected from the Employee Master Record or keyed in as an override. Shift differential capabilities are provided for second and third shift. The differential may be defined as a percentage of the rate or cents to be added to the rate.

Vacation/Holiday pay may be part of a regular pay check or on a separate check. A bonus payment is paid on a separate check with a flat percentage of income tax deducted. Sick pay may be fully non-taxable or only liable for income tax. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined.

The ability to handle taxable or non-taxable adjustments, pay advances, and employer-paid union benefits (taxable and non-taxable) is also provided. Once the gross earnings is calculated, deductions will be taken to reach net pay. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Miscellaneous deductions may be taken by percent, fixed amount, hourly rate, upper limit, or cyclic within a user-specified frequency. Union deductions may be taken by percent, hourly rate, or fixed amount within a user-specified frequency.

Handwritten paychecks and paychecks never cashed (reversals) are also supported by the application. Once the payroll register and checks are printed, many analysis reports are produced: Labor Distribution, Miscellaneous Deductions, Union Deductions, YTD/QTQ Earnings, Workmen's Compensation Worksheet, and Payroll Journal. The presently formatted W-2 and 941A reports are also provided.

The capability is provided to pass transactions to the General Ledger application, if installed. These transactions will be applied towards company one only. Payroll may be on either a cash or accrual basis. If the cash basis is selected, no transactions are passed to the General Ledger.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

The three applications are intended to be independent yet interrelated. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries.

Each application may co-reside, but will not interact, with the Distribution IAPs but may also operate as stand-alone applications.

The Distribution IAP must have a Constants File with a record length of 64 characters. The original shipments of the Food and Paper IAPs for 24K machines had 59-character records. The customers that received

these original shipments will have to update their IAPs to the larger record size before they will co-reside with DFAS.

**HARDWARE REQUIREMENTS**

Each of these IBM System/32 Industry Application Programs will execute on all models of the IBM System/32. The programs are compiled assuming a 16K system. Because of volumes and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (128-character - #5455 and feature group A - #4004).

**SOFTWARE REQUIREMENTS**

The application programs for the IBM System/32 are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Programming (5725-SC1 Version 3). The IBM System/32 Utilities licensed program (5725-U11), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

**Instructional Materials**

*DFAS Operator Instructions* (SBOF-3584).

One copy is supplied via SLSS when program number and initial library are specified. Additional copies can be obtained by specifying SBOF-3584 which includes the following:

Binder (SR30-0120) ... *Study Guide* (SR30-0117) ... *Sample Run Book* (SR30-0118) ... *Advisor Guide* (SR30-0119) ... *Cassette* (SV30-0073) ... *Diskette* (SV30-0074) ... *Plastic Insert* (SR30-0166)

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/ 32 STUDENT RECORDS (5725-E31),  
STUDENT ACCOUNTING (5725-E32),  
STUDENT SCHEDULING (5725-E33)**

**PURPOSE**

Each program offers opportunities for new name and first systems account sales in small school districts. These applications are primarily intended for small school districts, or large secondary schools.

The Student Records IAP, which provides the data base and file maintenance functions, is a prerequisite for either or both of the other packages.

These three applications provide the school with a powerful aid in managing its student record keeping functions.

The system design of these packages incorporates many significant features:

- General - System tailoring to the schools' unique requirements for number of periods in a school day, number of terms (or semesters) in a year, state reporting cycles, etc. All input specifications are described in terms familiar to school administrators and require no detailed knowledge of data processing techniques. Data files are shared among applications.
- Student Records - provides common data base and file maintenance functions for the other applications. Basic record keeping and reporting functions essential for secondary schools are also included.
- Student Accounting - consists of an Attendance Accounting Application and a Mark Reporting Application.
- Student Scheduling - supports both machine scheduling and "arena" scheduling of students to classes. Provides many reports to assist the principal and counselor in the scheduling process.

**HIGHLIGHTS**

- Interrelated applications approach:
  - Modular design allows users to choose applications that address their problem areas
  - Modular design facilitates sequential application installation
  - Single data entry results in multiple application updates
- Wide variety of reports and report options included:
  - Management reporting is a byproduct of normal data entry
  - Optional sequences and selection within a range is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid student accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided
  - Security codes deter unauthorized execution of key programs in each application
- Can be installed without customer programming capability:
  - Designed to fit industry requirements
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and auditability provided
  - Easy-to-use runbook
  - Operator self-study course
  - Step-by-step installation activity plan and detailed user information provided by the *Application Reference Manual*

**DESCRIPTION**

These three applications are an interrelated and ready-to-execute set of applications for the small school district or large secondary school:

- Student Records
  - Data Base and Maintenance
- Student Accounting
  - Attendance Accounting and Mark Reporting
- Student Scheduling
  - Assignment of Students to Classes

The system combines two data entry approaches - operator-oriented and batch-oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette keyed offline on a 3740 Data Entry System. Student Records is a prerequisite to the other applications which can be installed at different times.

Each application has certain requirements records within a cross-application Constants File which contain questionnaire responses. These records allow the application to select certain fields for editing, file sizes, and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed

as needed. The System Tailoring Procedure allows these responses to be entered and maintained.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a school's requirements. It provides the following:

- Tailoring of the application at installation time.
- Allows users to change the selection of provided functions as the environment changes.
- All provided functions are included in the programs but only required functions are executed.
- Files may be resized as needed by rerunning the System Tailoring Procedure.

*Application Reference Manual* Volume 1 provides a step-by-step installation activity plan including sample input and maintenance data forms and file loading sequences. *Application Reference Manual* Volume 1 is delivered with the Student Records application. It contains information pertinent to all three applications. Each Volume 2 of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs on a System/32. The *Procedure Reference Summary* is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used as a quick reference once the operator is thoroughly trained in the particular application.

Instructional material with exercises is provided for System/32 operator training in the use of the *Runbook*. The course is not application dependent. Therefore, only one copy of the course is needed per customer no matter which of the student applications is installed.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

**Applications Description:** The three applications are ready-to-execute. Each includes source code, object code, execution procedures, and the *Application Logic Manual*, if it is ordered as optional basic material.

These are some general features which all three applications have:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline file maintenance and transaction data entry via the System/32 keyboard or diskettes created on a 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing
- Selective printing options are available for many reports

**STUDENT RECORDS (5725-E31)**

The Student Records area represents a systems solution to the problems of recording, retrieving, manipulating, and reporting student data. The student record is the key to the school's student accounting system. It is a vital source of information necessary to the implementation of the other applications. In addition to providing data to and collecting data from the scheduling, mark reporting, and attendance accounting applications, it contains student personal data for counseling. This data includes the student's name, school code, year of graduation, current grade level, sex, birth date, address, and a number of other data elements. It also contains student attendance information, the student's current schedule and mark reporting information, and the school's curriculum for the current school year. From these files, many reports can be provided for the school administration, teacher, counselors and parents.

As the Student Records system is designed to be an ongoing system, it is not necessary to recreate all of the basic files at the beginning of each school year. Programs are provided to accomplish a year-to-year

**Student Records, Accounting, Scheduling (cont'd)**

transition by indicating the promotion of qualified students to the next grade level, and their new school, if that is indicated at promotion time. An important aspect of the student records application is the file maintenance functions. Programs are provided to update information in each of the files in the student records application as well as performing the year-end transition functions (student transfers between schools, promotions of students from one grade level to the next, etc.).

The integrity of the data in the files is maintained through the use of extensive editing of the data when it is entered into the system and through complete backup and recovery procedures which are an integral part of the package.

Output reports include:

- Student Listings
- Name and Address Labels
- Ethnic Distribution Report
- Student Profiles
- Student Schedules
- Room Schedules
- Instructor Schedules
- Class Rosters

**STUDENT ACCOUNTING (5725-E32)**

The Student Accounting package consists of two applications, Attendance Accounting and Mark Reporting. The Student Records package, which provides the data base and file maintenance functions, is a prerequisite to this package.

**A. Attendance Application**

The maintenance of attendance records is an important aspect of Student Accounting. In many states the amount of state aid for public education is based on average student attendance. Under manual methods, a considerable amount of time is expended by teachers and staff personnel in keeping records and accumulating data for state reports. The Attendance Accounting application simplifies such tasks by collecting original data at the source through the use of attendance data gathering documents, enabling reports to be prepared accurately and rapidly, and reducing clerical transcriptions.

Output reports include:

- Daily Absence Phone List
- Daily Absence Report
- Unresolved Absence Report
- Student Attendance Register
- Student Category Register
- School Category Register

**B. Mark Reporting Application**

The Mark Reporting application provides a means of recording student progress data for reports to parents and to school personnel. The prime data processed by this application are the student marks, which may be either numeric marks or alphabetic marks with optional plus or minus signs. In addition, up to two comments may be selected from a list of 99 user-defined comments and associated with each student's graded course. The Mark Reporting application is designed to fit the needs of many schools by providing a selection of reports and processing methods from which to choose. Output reports include:

- Report Card
- Labels for Permanent Records
- GPA Listings
- Mark Analysis
- Exception Reports

**STUDENT SCHEDULING (5725-E33)**

The Student Scheduling package (Student Records (5725-E31) is a prerequisite) processes student course requests against a manually prepared master schedule of classes to produce a schedule of classes for each student. To assist the school administrator in preparing this master schedule of classes, the following reports are produced from the student course requests: Student Verification Report, Course Verification Report, Course Request Tally Report, and Potential Conflict Matrix.

Once the master schedule of classes has been prepared, student requests are processed by the Main Scheduler programs, or schools may wish to use the arena scheduling option. Whether the class assignments are accomplished through machine scheduling or arena scheduling, the results are the same: A data base reflecting each

student's class assignments. For those students who could not be completely scheduled because of a conflict in their course requests, a Student Conflict report can be printed to assist the school administrator in resolving that student's conflict. Once a final scheduling run has been processed, the school may optionally run the study hall scheduler which will assign the student to study halls during any unassigned time in the school day.

Output reports include:

- Student Request Verification
- Course Request Verification
- Course Request Tally Report
- Potential Conflict Matrix
- Student Conflict Report
- Student Schedules

Programs are provided to pass basic student identifying information from the Student Records package to the Scheduling package and then, once scheduling is completed and the scheduled term is about to begin, the student data records will be updated to reflect the student's current schedule of classes. One of the primary objectives of the Student Scheduling package is to provide for the variety of scheduling philosophies present in today's secondary school environment. This flexibility is accomplished by offering a number of basic scheduling features and options which include:

- Scheduling of up to 4 terms, or semesters
- Up to 24 periods in a school day
- Up to 20 requests per student
- Flexibility in course requests - section requests, instructor requests, term requests, free time requests, and alternates
- Add-on scheduling
- Study hall scheduling option
- Arena scheduling option

Student scheduling is far more than a clerical chore. The basic educational philosophy of an institution is reflected in the manner in which students are assigned to a class section. For example, many school systems permit varying degrees of student-elected alternates and teacher preferences. This example illustrates the need for flexibility in a student scheduling system to accommodate a wide spectrum of educational policies. The student scheduling package provides the administrator with a large variety of optional system features which can be used to tailor the scheduling system to coincide with the policies of the school.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

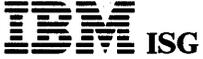
The minimum system configuration requirements are an IBM System/32 with:

- 24K bytes of main storage
- 5.0 MB of disk storage
- Character or line print capability with 132 print positions and the 48-character set.

The IAPs are designed to process data recorded on the IBM System/32 keyboard, or data from a diskette recorded by the IBM 3740 Data Entry System. Because of volumes and time constraints, there may be a requirement for providing offline key entry on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (#5455) and Feature Group A (#4004).

The three applications are interrelated. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other IAP or user-written programs may co-reside unless stringent coding requirements for these programs are met to insure compatibility with the Student Administration System. The *Application Logic Manual* discusses in detail the coding conventions used for the development of the Student Administration System.

Because of the printing volumes and timing constraints involved in the Mark Reporting applications, an 80 cps printer is recommended as a practical minimum.



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Major Revision

PROGRAM PRODUCTS

**Student Records, Accounting, Scheduling (cont'd)**

**SOFTWARE REQUIREMENTS**

The application programs are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Programming (5725-SC1) Version 5. The IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

**DOCUMENTATION**

(available from Mechanicsburg)

*Student Records Runbook (SB30-0127) ... Student Records Reference Manual Volume 1 (SB30-0128) ... Student Records Reference Manual Volume 2 (SB30-0129) ... Student Accounting Runbook (SB30-0131) ... Student Accounting Reference Manual (SB30-0132) ... Student Scheduling Runbook (SB30-0134) ... Student Scheduling Reference Manual (SB30-0135) ... Student Records Logic Manual (LB30-0130) ... Student Accounting Logic Manual (LB30-0133) ... Student Scheduling Logic Manual (LB30-0136)*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/32 FORTRAN IV  
5725-FO1****PURPOSE**

System/32 FORTRAN IV processes programs written in the System/32 FORTRAN IV language, producing output suitable for execution with the System/32 System Control Programming (5725-SC1).

**DESCRIPTION**

The System/32 FORTRAN IV language contains those features defined in American National Standard Basic FORTRAN, X3.10.1966; language extensions supported by IBM 1130 Basic FORTRAN; and additional features and capabilities previously available only with certain IBM Full FORTRAN compilers. These features include:

- Logical data, logical expressions, and logical IF are supported.
    - Logical elements (that is, constants, variables, and arrays) contain true or false values.
    - Operation symbols are used in logical and relational expressions
- |                     |                            |
|---------------------|----------------------------|
| .NOT. (negative)    | .LT. (less than)           |
| .AND. (conjunction) | .LE. (less or equal to)    |
| .OR. (union)        | .EQ. (equal)               |
|                     | .GT. (greater than)        |
|                     | .NE. (notequal)            |
|                     | .GE. (greater or equal to) |
- Logical expressions evaluate elements to obtain true or false values.
  - Logical assignment statements define a relationship - placing the value of a logical expression in a variable or array element.
  - The logical IF statement evaluates an expression and executes or skips an associated statement, depending upon whether the value of the expression is true or false, respectively.
  - Logical variables and arrays can be initialized to true or false using the DATA statements.
  - Logical elements can be used as arguments of a CALL statement.
- Integer 2-byte constants are provided to facilitate IBM 1130 to System/32 FORTRAN IV conversion.
  - Source Entry Utility [Utilities licensed program (5725-UT1)], although not a part of the FORTRAN licensed program, may be used to enter and maintain FORTRAN source programs.
  - IBM FORTRAN IV language extensions INVOKE, PROGRAM and GLOBAL allow FORTRAN main programs to be loaded successfully into main storage and executed, while permitting these programs to share a common data area. These language extensions provide function equivalent to 1130 FORTRAN CALL LINK.
  - The Overlay Linkage Editor will automatically create overlays which reduces the amount of storage required to run System/32 FORTRAN IV programs but may increase the execution time.
  - The DEBUG facility enables the user to locate errors in a FORTRAN source program. By use of four basic statements, the DEBUG facility provides for tracing flow within a program and between programs and for checking the validity of subscripts.
  - List directed input/output permits reading and writing of formatted data without a FORMAT statement.
  - The GENERIC statement enables the user to specify a single name for a FORTRAN built-in or library function having several names. Depending on argument type, the correct function is selected by the compiler with each appearance of the name.

The System/32 FORTRAN IV library contains mathematical and service subprograms required during execution to perform arithmetic operations, input and output constant conversions and input/output control.

System/32 FORTRAN IV is supplemented by a commercial subroutine package which is equivalent in function to the 1130 Commercial Subroutine Package insofar as is meaningful in terms of System/32 devices and data management.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

FORTRAN IV compiler and its generated programs will execute on any model of IBM System/32. Object programs will support Additional Support (#1005) and Data Recorder Attachment (#3200). Control Storage Increment (#1500) is required on the IBM 5320 for execution of object programs. It is not required for compilation. On IBM 5320 B and C models, FORTRAN graphics are provided by a 64-character EBCDIC print belt or a 48-character FORTRAN print belt.

**SOFTWARE REQUIREMENTS**

A current version of IBM System/32 System Control Programming (5725-SC1) is required to execute the FORTRAN IV compiler and its generated programs.

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/32 FINANCIAL INSTITUTIONS  
CUSTOMER ACCOUNTING SYSTEM**

**CUSTOMER INFORMATION FILE ... 5725-F11  
DEMAND DEPOSIT ACCOUNTING ... 5725-F12  
SAVINGS ACCOUNTING ... 5725-F13  
INSTALLMENT LOAN ACCOUNTING ... 5725-F14**

**PURPOSE**

The Customer Information File IAP (CIF) includes the data base, the application conversion procedures, and the file maintenance procedures for the system. It is a prerequisite for the Demand Deposit Accounting, Savings Accounting and Installment Loan Accounting IAPs, which may be installed independently of each other.

The applications provide broad application support for the small commercial bank. The Customer Information File IAP enables the bank to associate all of a customer's checking, savings, and installment loan accounts with a single record that contains common information about the customer and the customer's relationship to the bank. This enables the bank to make decisions based on a broader knowledge of the status of the customer's accounts. Account and customer information is accessed by account number for daily transaction processing, and by customer name for management reports, inquiries, etc. The Demand Deposit Accounting, Savings Accounting and Installment Loan Accounting IAPs support the three most important data processing applications in a commercial bank. Each of these IAPs contains a variety of functional options, enabling the bank to tailor the application to its own requirements.

These applications offer an opportunity for new name and first system account sales to small commercial banks. While the applications are primarily intended for commercial banks with deposits of \$5 to 25 million, the size of the bank deposits is not by itself an accurate indicator of proper IAP fit at any given bank.

**HIGHLIGHTS**

- Can be Installed without Customer Programming Capability:
  - Step-by-step installation activity plan and detailed user guidance is provided in the *Application Reference Manual*
  - System Tailoring Procedure accommodates account growth by allowing on-site changes to file sizes and functions used.
  - Application conversion procedures are provided.
  - Conversion aids are provided to assist in consolidating the master data from a customer's account records into a single CIF record.
  - Strict DP controls are enforced during conversion.
  - File maintenance is provided.
  - Operator self-study course is provided.
- Accounting and Control Techniques
  - Two levels of security codes help deter unauthorized access to programs and data.
  - Sample audit trail and control techniques are documented.
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided.
- Interrelated Application Design
  - Data base design reduces file space requirements.
  - Common procedures add new accounts and provide file maintenance for all installed applications.
  - Access to all application accounts through the CIF Master Record.

**DESCRIPTION**

These four applications are an interrelated and ready-to-execute set of applications for the small commercial bank:

- Customer Information File
  - Data Base, File Maintenance, Application Conversion and Customer-oriented reports.
- Demand Deposit Accounting
  - Processing of checking accounts with optional functions of Overdraft Banking, Automatic Funds Transfer, and Combined Statements.
- Savings Accounting
  - Processing of savings accounts, both regular savings accounts and time deposit open accounts.
- Installment Loan Accounting
  - Processing of installment loan accounts, including simple interest, add-on, and discount loans.

The system provides transaction and file maintenance data entry through the System/32 keyboard or through a diskette keyed offline on a 3740 Data Entry System. The bank may optionally elect to use the 1255 Magnetic Character Reader (MICR) to capture transactions for Demand Deposit Accounting, Savings Accounting, and Installment Loan Accounting. An installation questionnaire and data capture programs are provided to support the 1255 MICR.

At installation time the options provided in the systems are selected through a System Tailoring Procedure which allows the user to:

- Tailor the application to use only the functions wanted.
- Change selection of functions to be executed as the environment changes.
- Resize files as the bank's business expands, or if the bank wishes to revise its original estimates.

There is only one *Application Reference Manual, Volume 1*, provided with the System/32 Financial Institutions Customer Accounting System. It is shipped with CIF and provides instructions for installing and converting all of the Financial Institutions Customer Accounting System IAPs. It contains guidance on installation planning, data gathering, and the use of the installation and conversion procedures. Samples of all required input data and control forms are included. A separate Volume 2 of the *Application Reference Manual* is provided for each of the four IAPs. These manuals contain information on the daily operations of the application. Included is information on procedure scheduling, the operating of each procedure and the implementation of sound operational controls.

A runbook and a procedure reference summary is provided for each application. The *Runbook* provides the operator with an easy-to-use set of instructions showing all the activities necessary to run the procedures on a System/32. The *Procedure Reference Summary* is provided for the operator as a reminder of the functions and use of each procedure. It is intended to be used as a quick reference once the operator is thoroughly trained in the particular application.

An *Operator Instruction Manual* with exercises is provided for operator training in the use of the runbook. The course is not oriented specifically to financial applications. Therefore, only one copy of the course is needed per customer regardless of which of the IAPs are installed.

An *Application Logic Manual* is provided for each application as licensed material. It is mainly useful for the self-sufficient customer and for systems engineering support. The manual describes the architecture of the Financial Institutions Customer Accounting System, and the logic of the programs and procedures. Data base cross references and a data dictionary are also included.

The four applications are ready-to-execute. Each includes the source code, object code, execution procedures and the *Application Logic Manual*. Some general features common to all four applications are:

- Two levels of security codes help deter unauthorized access to programs and data.
- Customer tailors application processing by including or excluding functions to be executed.
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation.
- Monitoring of execution sequence prevents execution of a program until the required preceding programs have been successfully executed.
- File maintenance and monetary transactions may be entered via the System/32 keyboard or diskettes created on a 3740 Data Entry System.
- Monetary transactions may be entered via the 1255 Magnetic Character Reader.
- A single set of CIF procedures enters and edits application conversion data for all IAPs and creates the master files.
- A single set of CIF procedures establishes new accounts and performs master file maintenance for all IAPs.
- The Backup and Recovery design forces periodic backup of master files and transactions. This provides for tracking of what procedures need to be rerun in recovery to re-create the master files. Three generations of backup diskettes can be maintained, each containing a complete set of master files and transactions.
- Reprint options permit printing multiple copies of reports.

**CUSTOMER INFORMATION FILE (5725-F11)**

The Customer Information File IAP supports three general functions of the System/32 Financial Institutions Customer Accounting System:

- Application Conversion
- Master File Maintenance
- Cross-Application Reports

Customer Information File is a prerequisite for Demand Deposit Accounting, Savings Accounting, and Installment Loan Accounting, and is installed in conjunction with the installation and conversion of each of those IAPs. The conversion process creates a CIF Master File, (which contains customer-related data for each of the bank's customers) and separate Account Master Files for DDA, Savings, and Installment

**System/32 Financial Institutions  
Customer Accounting System (cont'd)**

Loans. The Account Master Files contain account-related data for each account in the three applications. The system maintains linkage from each customer's Customer Information File record to the account master record for each account - checking, savings, and installment loan accounts. In addition a cross-reference file provides an access path from each account master record to all of the customers associated with the account, based on the account number.

**HIGHLIGHTS**

**Application Conversion:** Separate programs are provided to enter and edit the customer and account data and to build the data base during application conversion. A two-phase conversion procedure is established for each application. During the first phase the data that is less subject to change (such as customer name and address, account type, etc.) is entered. The master data from each customer's account records is consolidated into a single Customer Information File record. A unique access key is developed for each customer and all master records are created. At this stage the records can be maintained, but monetary transactions cannot be processed. This phase may take place over several weeks or months.

During the second phase the remaining data, such as account balances are entered, edited and loaded into the master records created in the first phase. The records are placed in active status and the application is ready for daily processing.

Strict batch controls are implemented for both phases of conversion. The controls will not permit either phase to proceed if edit errors exist in any records or if the monetary controls do not balance.

**File Maintenance:** All maintenance of inter-application master files is performed by Customer Information File programs. A single operator procedure is provided to add new customers or new accounts to any converted application. Another procedure is used to change the data in these master files - including status, etc. Monetary data can only be changed through application transaction processing. A separate procedure is provided to change the operator and supervisor security codes.

**Cross-Application Reports:** A basic set of cross-application reports is provided. The advanced customer may wish to extend the use of the Customer Information File data base through additional user-written report programs. (If these programs are to co-reside with the Financial Institutions Customer Accounting System IAPs, they must, however, meet stringent coding requirements to insure complete compatibility.)

The following items are provided:

- A Customer Services Report, summarizing the number of customers using installed applications or combinations of applications.
- Mailing labels, to assist the bank in selective marketing of its services, may be printed according to customer selection criteria established by the execution of the Customer Services Report.
- A Customer Profile showing information for an individual customer, and the account status.
- A customer inquiry, display on the console CRT, and containing a subset of the information printed for a Customer Profile. Inquiry may be by full or partial customer name, customer key, or an account number.
- A Spread Report showing the distribution of accounts and the total deposits for up to five user-supplied ranges of DDA and Savings account balances.
- A Master File List, in customer key sequence, to assist in the maintenance of customer and account data.

**DEMAND DEPOSIT ACCOUNTING (5725-F12)**

The Demand Deposit Accounting (DDA) IAP provides daily transaction processing and reporting for checking accounts for a commercial bank. The IAP includes broad support for the standard processing functions and for two major optional functions - Overdraft Banking and Automatic Funds Transfer (AFT).

The Customer Information File (5725-F11), which provides the data base and file maintenance functions, is a prerequisite for this IAP.

**Standard DDA Functions:** Transactions can be entered from the operator console, a diskette created on a 3740 Data Entry System, or a 1255 Magnetic Character Reader.

Transactions can be posted against the current, available or collected balance in the account. The bank must select one of these options at installation time to apply to all DDA accounts.

Either one or two classes of float may be used for deposits to calculate the collected balance for accounts. The bank specifies the number of days it requires to collect each class.

The bank must assign one of the supported service charge options to each DDA account. In addition, if the Savings Accounting Application (5725-F13) is installed, the service charge may be waived based on

either a minimum or average balance maintained in the customer's savings account. The supported service charge options are:

- Free Checking
  - No service charge.
- Single Plan
  - A fixed monthly service charge.
- Special or Thrift
  - A fixed monthly charge plus an extra charge for each item designated by the bank as "service chargeable".
- Minimum Balance and Charge Per Item
  - The same as the Special or Thrift Option except that provision is made for a charge for each item in a deposit; and the service charge is zero if a bank-specified minimum or average current balance is maintained in the account during the statement period.
- Three-Two-One
  - The service charge for the account will be one of three fixed monthly charges, or will be zero, depending on the relationship of the minimum current balance for the period to three ascending balance levels designated by the bank. The account will be charged amount 1 if the minimum current balance is below level 1, amount 2 if it is between level 1 and level 2, amount 3 if it is between level 2 and level 3, and no charge if it is above level 3.
- Volume Earnings
  - The service charge is determined by calculating the cost of servicing the account, subtracting from this amount a credit for the amount the bank earned on the average collected balance, and charging the account the difference. The bank may include a fixed monthly cost, a cost per service-chargeable item, and a cost per item deposited in the cost computation. The earnings credit is a specified percentage of the average collected balance for the statement period. If the earnings credit exceeds the cost, the service charge is zero

Stop payment actions may be ordered against a check, based on check amount or serial number. In addition a "stop all" action may be initiated to prevent the posting of any checks to the account.

A hold for a specific amount may be specified against an account, or the account may be frozen - in which case all transactions against it are rejected.

The bank may specify a short list factor which applies to all accounts. When the daily number of checks for an account reaches the specified level, the checks are added together to form a single item for account posting and statement printing. A list of the checks that were combined to produce this single item is printed for filing in the customer's account folder. The short list factor may be overridden to always short list or never short list an account regardless of the number of checks.

The bank must select one of two procedures for determining how to handle an account when there are not sufficient funds to post all checks that are presented. They may choose to, (1) post each item individually until the balance is insufficient and then reject those items that cannot be posted; or, (2) add all checks together and either post them or reject them.

**Overdraft Banking:** The overdraft banking function may be invoked for any specific account. If a check would normally cause the posting balance to fall below zero, a loan sufficient to cover the check is automatically advanced. Loans are always advanced in user-defined increments, with a credit limit specified for each account. The loan balance is maintained separate from the checking account balance, and deposits do not reduce the loan balance. Finance charges are accrued daily and added to the loan balance when the monthly statement is printed. A user-defined minimum payment is also calculated at statement time and automatically deducted from the DDA account balance. The overdraft banking format of the standard statement shows the running balance of the overdraft loan, its associated transactions, and the loan status.

**Automatic Funds Transfer (AFT):** The AFT function provides periodic transfers of funds from a checking account to another account - such as a savings or installment loan account. If the Savings Accounting IAP (5725-F13), or the Installment Loan Accounting IAP (5725-F14) is installed, the deposit or payment is automatically credited. If the credit is to some other account, it is listed on a report and must be credited offline. The account holder may designate a frequency of weekly, biweekly, monthly or quarterly for the transfer. A number of transfers may be established against a single account.

**Customer-Oriented Reports:** These reports are all produced on pre-printed forms. The sample forms shown in the documentation may be ordered from the Systems Supplies Division.

**System/32 Financial Institutions  
Customer Accounting System (cont'd)**

Account statements are printed monthly. One of the five service charge options, or free checking, must be assigned to each account. The bank may offer each customer either the standard statement or a "combined" statement. The combined statement includes the balances of selected customer savings and installment loan accounts, if they exist on an installed Savings Accounting IAP, (5725-F13) or Installment Loan Accounting IAP (5725-F14).

The NSF Notice is a combination form which is used to notify the customer either of checks drawn on insufficient funds, or of an overdraft loan advance.

Auditor Confirmation Notices are generated on request, based on a multiple start point systematic sample technique. The random start points are selected by the auditor.

**Internal Reports:** The reports produced for use within the bank include:

- Transaction entry and edit reports
- Trial balance and Activity Journal
- Unposted Items Report
- Service Charge Journal
- Overdrawn and Drawing Against Uncollected Funds Report
- Significant Balance Change Report
- Inactive and Dormant Accounts List
- Inactive and Dormant Accounts Activity Report
- Account Status Change Report
- Stopped Items List
- Closed and Zero Balance Accounts List
- Short Lists
- Overdraft Banking Trial Balance Report
- AFT Debits List and AFT Credits List
- AFT Journal
- Stop/Hold Journal

**SAVINGS ACCOUNTING (5725-F13)**

The Savings Accounting IAP provides daily transaction processing and reporting for regular savings accounts and time deposit open accounts.

The Customer Information File (5725-F11), which provides the data base and file maintenance functions, is a prerequisite for this IAP.

**Standard Functions:** Transactions may be entered from the operator console, a diskette created on a 3740 Data Entry System, or a 1255 Magnetic Character Reader. If the Demand Deposit Accounting IAP (5725-F12) is installed, Automatic Funds Transfer (AFT) to savings accounts will be merged by the system into the daily transactions and automatically credited to the designated accounts.

A hold for any amount may be specified against an account, all withdrawals may be stopped, or the account may be frozen - in which case all transactions against it will be rejected.

Up to eight different account plans, based on combinations of the interest calculation techniques, and the compounding and crediting options discussed below, may be offered at one time.

**Interest Calculation Techniques:** The IAP supports both regular saving deposits and time deposit open accounts. The Low Reference Balance and Day of Deposit to Day of Withdrawal (DOD-DOW) interest calculation techniques may be selected for savings deposit account plans. Time deposit open account plans may be based on either, (1) a requirement that the funds be on deposit for at least one complete calendar quarter, or, (2) a requirement that they be on deposit for at least ninety consecutive calendar days.

For Low Reference Balance accounts, interest is calculated and compounded either quarterly or semi-annually. Grace periods at the beginning of each month and end of the period may be defined, and either the LIFO or FIFO posting option must be selected for each plan.

For all except Low Reference Balance accounts, interest is accrued daily, and the bank may elect to compound interest continuously, daily, quarterly or semi-annually.

The bank may elect to credit interest to the account (add it to the account balance) either quarterly or semiannually.

**Customer-Oriented Reports:** For both regular savings deposit and time deposit open accounts, the bank may choose to provide pass-books, periodic statements, or may do both. The system records and reports "no-book" transactions against a passbook account.

Interest earned during the preceding year may be reported to the customer each January on 1099 forms.

Auditor Confirmation Notices are generated on request, based on a multiple start point systematic sample technique. The random start points are selected by the auditor.

**Internal Reports:** The reports produced for internal use within the bank include:

- Transaction entry and edit reports.
- Trial Balance
- Activity Journal
- Unposted Items Report
- Special Activity Report
- Earnings Journal
- Inactive and Dormant Accounts
- Closed Accounts
- No-Book Transactions List
- Transaction History Report
- Accrual Report
- Account Status Change Report
- Stop/Hold Journal

**INSTALLMENT LOAN ACCOUNTING (5725-F14)**

The Installment Loan Accounting IAP provides daily transaction processing for installment loan accounts for a commercial bank. The IAP includes broad support for the handling of the common interest calculation types, accrual and refund methods, and provides a variety of other features.

The Customer Information File (5725-F11), which provides the data base and file maintenance functions, is a prerequisite for this IAP.

**Standard Functions:** Transactions may be entered from the operator console, a diskette created on a 3740 Data Entry System, or a 1255 Magnetic Character Reader. If the Demand Deposit Accounting IAP (5725-F12) is installed, AFT payments to installment loan accounts will be merged by the system into the daily transactions and automatically applied to the designated accounts.

For simple interest loans, interest is accrued daily. For precomputed (add-on and discount) loans, interest is accrued monthly on the loan's anniversary day (the day of the month on which payment is scheduled) by either the rule of 78s or straight-line accrual methods or on a cash basis.

Early payoff calculations for precomputed loans use either the rule of 78s or straight-line method. They are performed monthly on, or up to 15 days after, the anniversary day. These calculations are performed monthly for all loans including those on a quarterly payment schedule. A loan paid off prior to the first regular monthly accrual will earn either one full month's interest or interest computed at a daily rate for the number of days outstanding.

Credit life and accident and health insurance are supported. Earnings and collections on each type of insurance are maintained and reported separately. Early payoff calculations include insurance earnings.

Dealers can be associated with a loan and earn a portion of the interest. Dealers will earn by the same schedule and method that the bank earns. Banks earnings and dealers earnings are reported separately on a daily and monthly basis. The bank's recourse to dealer is identified.

The bank may choose to print reminder notices and late notices and to assess late charges for accounts missing a payment. A percentage of the payment may be allowed to fulfill the payment obligation and prevent late charges from being assessed.

Payments may be applied first to either past due amounts or to the current payment, based on a bank-selected option. Late charges are assessed only if the current payment has not been paid. The bank has the option to permit automatic deduction of late charges from a payment. The late charges will only be deducted after the current month's payment obligation is fulfilled, past due amount is satisfied, and full payments are applied to the loan balance. A separate late charge payment is also accepted.

Loan extensions may be granted, thereby deferring payments for some number of months. The bank may require a fee for extensions.

Notices of Interest can be produced on request for all or selected accounts. These notices are also produced automatically at the end of each month for accounts closed during the month.

Payment notices can be printed for simple interest loans, advising customers of payments due.

Auditor confirmation notices are generated on request based on a multiple start point systematic sample technique. The random start points are selected by the auditor.

**System/32 Financial Institutions  
Customer Accounting System (cont'd)**

**Internal Reports:** The reports produced for use within the bank include:

- Transaction entry and Edit reports
- Trial Balance
- Update Totals
- Earnings Update Summary
- Transaction Journal
- Unposted Items Report
- Suspected Closed Report
- Special Activity Report
- Exception Report
- New Loans Report
- Late Charge Assessments Report
- Collection Report
- History Merge
- Monthly Earnings Report
- Dealers Monthly Earnings Report
- Monthly Insurance Company Report
- Closed Loans Report
- Transaction History Report
- Aged Delinquency Report
- Dealers Trial Balance
- Loan Class Report
- Loan Plan Report
- Collateral Insurance Expiration Report

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Each of these IBM System/32 Industry Application Programs is compiled assuming a 24K (#9041) or 32K (#9141) system and will execute on all models of the IBM System/32 equipped with a minimum of 24K or 32K of memory. Because of volumes and time constraints, there may be a requirement for offline keying on an IBM 3740 Data Entry System and/or transaction entry IBM 1255 Magnetic Character Reader. If an IBM 3741 is to be used, it must have Feature Group A - #4002. If an IBM 3742 is to be used, it must have 128-Character feature - #5455 and Feature Group A - #4004. In addition, the Proof Keyboard feature (#5901 or #5902) is desirable but is not required.

All models of the IBM 1255 Magnetic Character Reader (MCR) that can be attached to the IBM System/32 are supported by these IAPs. The Dash Symbol Transmission feature (#3215) cannot, however, be installed if the customer wishes to use the MICR data capture programs supplied with the IAPs. Consult the appropriate pages for ordering instructions and any restrictions that pertain to attachment of the IBM 1255 MCR to the IBM System/32.

The four applications are closely interrelated. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other IAP or user-written programs may co-reside unless stringent coding requirements for these programs are met to insure compatibility with the Financial Institutions Customer Accounting System. The *Application Logic Manual* discusses in detail the coding conventions used.

**SOFTWARE REQUIREMENTS**

- IBM System/32 System Control Program (5725-SC1) (Version 6 or above)
- IBM System/32 Utilities Licensed Program (5725-UT1)
- RPG II Compiler (5725-RG1) is required if modifications to the RPG programs are required.
- Customer Information File (5725-F11) is a prerequisite for Demand Deposit Accounting (5725-F12), Savings Accounting (5725-F13), and Installment Loan Accounting (5725-F14).

**DOCUMENTATION**  
(available from Mechanicsburg)

*Customer Information File Runbook (SB30-0137) ... Customer Information File Reference Manual Volume 1 (SB30-0138) ... Customer Information File Reference Manual Volume 2 (SB30-0139) ... Demand Deposit Accounting Runbook (SB30-0141) ... Demand Deposit Accounting Reference Manual (SB30-0142) ... Savings Accounting Runbook (SB30-0144) ... Savings Accounting Reference Manual (SB30-0145) ... Installment Loan Accounting Runbook (SB30-0147) ... Installment Loan Accounting Reference Manual (SB30-0148) ... Customer Information File Logic Manual (LB30-0140) ... Demand Deposit Accounting Logic Manual (LB30-0143) ... Savings Accounting Logic Manual (LB30-0146) ... Installment Loan Accounting Logic Manual (LB30-0149).*

**Additional Support Materials**

*... Licensed Program Design Objectives: ... Installment Loan Accounting (GH30-0362) ... Licensed Program Specifications: ... Customer Information File (GH30-0358) ... Demand Deposit Accounting (GH30-0359) ... Savings Accounting (GH30-0360) .*

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**SYSTEM/32 HOSPITAL FINANCIAL  
MANAGEMENT SYSTEM (HFMS)**

**PATIENT BILLING ... 5725-H11**  
**ACCOUNTS RECEIVABLE ... 5725-H12**  
**PAYROLL ... 5725-H13**

**GENERAL LEDGER/ACCOUNTS PAYABLE ... 5725-H14**

**PURPOSE**

The Hospital Financial Management System offers the small hospital a disk data-based system comprised of a series of programs and procedures that perform the accounting, management reporting and statistical functions for patient billing, accounts receivable, payroll and general ledger/accounts payable.

Presentation of timely information enables management to observe trends and deviations from the hospital's planned financial position. This enables Hospital Management to quickly spot problems and initiate corrective action. More important, it provides a basis upon which to institute plans to improve the financial position. The accuracy of the accounting information is mandatory because of reporting requirements placed upon the hospital by regulatory agencies.

Completeness of hospital operating information provides the basis for review, analysis, and cause-and-effect relation studies of such things as rate setting, reimbursement analysis, patient mix, and services performed. A comprehensive information base provides the justification for decisions regarding future operations and services.

Four applications are supported in HFMS. They are Patient Billing, Accounts Receivable, Payroll, and General Ledger/Accounts Payable. General Ledger and Accounts Payable are marketed together as one offering. Each of the other applications is a separate offering. Each application may be installed and operated independently or as an integrated system.

A description of the four offerings follows the general highlights of the system.

HMS is designed for the small hospital, in general 50 to 150 beds.

**HIGHLIGHTS**

- An integrated series of offerings that can be installed in any sequence for stand-alone or integrated operation.
- The HFMS offering consists of:
  - Source Code and Object Code
  - Ready-To-Execute Procedures
  - Predefined File Sizes
  - Installation Guides
  - Operator Runbooks
  - Installation Supervision Self-Study Instructions
  - Operator Self-Study Courses With Machine Exercises
  - Hospital Application-Oriented Specifications for Data Entry and Control Forms
  - Technical Documentation for problem determination
- Simplicity of operation characterized by application-oriented commands, prompting, responses, and messages
- Complete hospital disk data base
- Complete file load and maintenance programs
- Backup/recovery procedures imbedded in the application flow
- Comprehensive data entry editing with errors explained to facilitate correction
- Inquiry facility for Patient Billing and Accounts Receivable
- Optional entry of batch transaction input through diskettes prepared on the 3740 Data Entry System
- Comprehensive accounting controls through a defined audit trail
- User-defined system control file entries for adapting HFMS to customer requirements

**DESCRIPTION****PATIENT BILLING (5725-H11)**

The system provides for accurate and timely posting of inpatient and outpatient charges to produce patient bills and provides the basis for the revenue statistics needed for third-party reporting, cost reimbursement, internal rate setting and revenue analysis. The offering has five logical subsystems: Census, posting, billing, and revenue usage, and statistics.

The census subsystem tracks the location of inpatients and processes all outpatient activity. Census reports are produced in various sequences which serve the needs of different users in the hospital. The census reports and the daily recap are used to verify the accuracy of the reported day's activity. The generation of the final census triggers the automatic generation of room charges to the posting subsystem.

The posting subsystem enters all routine and ancillary charges (including room charges from the census subsystem) into the inpatient and outpatient billing files. Charges can be automatically priced by the

system or overridden by keyboard entry. It produces reports necessary to verify the accuracy of the information, automatically prepares the daily revenue entries for General Ledger (5725-H14), and updates the detail revenue file records.

All detail posted charges are saved by the system on an accumulated charges file, which is used by the billing subsystem to prepare detail patient bills. Accounts Receivable (5725-H12) will post payments against accounts not yet final billed into the accumulated charges file.

The billing subsystem uses the information in the inpatient and outpatient billing files and the accumulated charges file to print patient bills. The detail bills for both inpatients and outpatients include a complete chronological detail of charges and a summary of charges at the end of the bill. Inpatients' final detail bills are automatically produced after discharge. Outpatient emergency (one-time visit) detail final bills are automatically produced after the patient visit, while recurring outpatient final detail bills are produced when requested by the hospital. After the detail final bill is produced, the billing file record is deleted. Prior to this deletion, it is transferred to the accounts receivable file if HFMS Accounts Receivable (5725-H12) is installed.

Detail cycle bills can also be requested for any current inpatient account. This bill shows the balance as of the last cycle bill and a detailed summary of current charges. Requesting cycle bills does not alter the processing or format of the detail final bill which will eventually be produced.

Summary bills can be printed on demand (inquiry) for any inpatient or outpatient account not yet final billed. The bill is in summary format containing all charges as of the last posting period.

The revenue usage subsystem is driven by the inpatient and outpatient charges from the posting subsystem. Daily and monthly revenue reports are produced in detail or in summary by departments showing usage of individual services within the current period and year-to-date.

The statistics subsystem maintains and reports patient statistics by medical service and patient category for both inpatients and outpatients, ancillary utilization statistics by department for all inpatients and for five outpatient categories, and departmental revenue by six financial classes.

**ACCOUNTS RECEIVABLE (5725-H12)**

Managing the Hospital's Accounts Receivable has become an increasingly complex task. Required interaction with patients and many third parties (including private and public insurance companies and various governmental agencies) has created an explosion in clerical tasks. This has resulted in a difficult control problem in the hospital business office. The offering has three logical subsystems to aid in the collection of accounts receivable and in controlling the large volume of data involved. They are daily posting, statement writing, and reporting.

The posting subsystem creates receivable accounts either through keyboard entry or by accepting transferred inpatient and outpatient accounts which have been final billed from the HFMS - Patient Billing offering (5725-H11). The subsystem accepts a full range of transactions such as payments, adjustments, late charges, and bad debt recoveries. If HFMS - Patient Billing (5725-H11) is installed, payments can be accepted against active billing accounts and posted as credit charges. Controls, procedures, edit and audit reports assist the accounts receivable department in making sure transactions are posted to the correct accounts. This automated posting procedure eliminates many clerical tasks and frees business office personnel to concentrate the majority of their time analyzing and pursuing collection of open accounts.

The posting subsystem maintains a separate account for each patient for each hospital visit. However, the ability to assign a guarantor number (family number) is provided. The facility enables the system to group all accounts for one family together for statement writing and accounts receivable reporting. The system has further facilities to handle both active and bad debt accounts with separate controls, to transfer from patient to insurance and from insurance to patient, and to generate entries for the General Ledger (5725-H14).

The Statement Writing Subsystem generates balance-forward statements and includes a number of options that allow the user to operate the system to meet unique requirements. Statements can be written on a weekly, biweekly, or monthly cycle to smooth the business office workload. Statements can be written for all financial classes or only selected financial classes (financial class denotes primary method of payment, such as self-pay, Medicare, Blue Cross, Welfare, etc.). Finance charges can be assessed at the option of the user. Statements can be either family statements or individual account statements.

The Reporting Subsystem provides the user with a flexible information system to be used in handling the unique patient and third-party collection problems encountered in a hospital receivables system. Aged receivables reports can be produced in varying sequences or as various exception reports to help hospital personnel zero-in on specific collection problems or to satisfy specific information needs. The age of accounts can be calculated based on discharge date, date of last

**System/32 HFMS (cont'd)**

payment, or date insurance was filed. Reports can be produced for all open accounts or selected accounts based on financial class, range of dollar balances, and age since discharge date, last payment date, or date insurance was filed. If patient number is assigned to all accounts, the aging reports can be printed for all accounts for a patient alphabetically by patient name.

A selective Detail Status Report facility is provided in the system for the user to retrieve reports showing all detail transactions for any specific account or group of accounts, based on financial class or patient number.

The system handles the processing for both Active and Bad Debt Accounts. A report showing all accounts that have been transferred to bad debt can be run at any time.

Account Balance Inquiry can be requested at any time to be displayed on the System/32 Display Unit or printed or both. This allows the business office to retrieve the most current information regarding any account when it is required.

The Patient Account record and all Detail Transactions for an account are maintained in the system until a user-specified number of days after the account zero balances or until the account is deleted from the system as an uncollectable bad debt. At the time an account is deleted from the system, a one page report is printed showing all the detailed information for the account. This report is then filed for reference purposes.

**PAYROLL (5725-H13)**

Within the hospital, personnel represents the most valuable and most expensive resource. While an efficient mechanism for prompt employee payment and bookkeeping is essential, the emphasis today is necessarily on astute management - planning, scheduling, and monitoring - to ensure the most productive use of this valuable and costly resource. This application addresses these needs through four logical subsystems: Payroll Processing, Labor Distribution, Benefits Analysis, and Personnel Reporting.

The biweekly Payroll Processing subsystem calculates hourly and salaried employee earnings, calculates statutory and voluntary deductions, accrues vacation and sick leave, accumulates quarter and year-to-date totals needed for 941-A and W-2 reports, and prints the employee's check. It also provides necessary reports to show a complete audit trail of each payroll run and to perform check reconciliation. The system calculates and deducts tax sheltered annuities, federal withholding taxes, and Federal Insurance Compensation Act (FICA) withholding. Rates are supplied to the programs from a system control file to avoid program recompilation as rates change. The data fields needed to calculate existing state, county, or city withholding taxes are included in the data base and an exit point is provided in the program for the inclusion of a user-written subroutine to calculate these taxes. However, the earnings statement and reports have provisions to print only one non-federal withholding tax.

Vacation and sick-leave hours are accrued based on actual hours worked and a hospital-defined accrual rate that can vary by employee.

The system will handle up to 10 types of voluntary deductions that can vary among employees regarding the frequency and method of calculation. These hospital-defined voluntary deductions are calculated, deducted, and reported each pay period on both a current period and year-to-date basis.

The labor distribution subsystem produces current and year-to-date reports each pay period by using the extended employee time records and budgeted and year-to-date balances from the position control file. These reports show hours and dollars (actual, budget, and variance) categorized by productive and non-productive time. This subsystem produces the departmental expense entries for General Ledger (5725-H14).

The benefits analysis subsystem produces reports for both included and contributory benefits each pay period. Included benefits are generally those that are completely paid by the hospital, such as vacation, sick leave and holidays. Contributory benefits are generally those that are partly paid by the hospital and partly by the employee, such as life insurance and health insurance.

The Included Benefits Report shows vacation and sick leave hours carried over, accrued, taken and remaining for each employee and department. Holidays taken are also noted on this report. The Contributory Benefits Report provides an analysis of the amount paid by the hospital for life and health insurance on a total cost basis and cost per hours basis for each employee, position classification, and department.

The personnel reporting subsystem provides reports to assist the personnel department in effectively using the people resource of the hospital.

An up-to-date Employee Status Report for each employee in the hospital is produced by the system whenever a change is made on an employee's record. All additions, changes, or deletions of employee information are thoroughly edited by the system and printed on Maintenance Reports. An Employee Personnel Profile is produced for

employee verification of pertinent data. It serves as a turnaround document for entering changes into the system.

Employee listings by name and number are printed for reference purposes. An Annual Employee Benefits Report is produced for each employee showing total earnings, included benefits, and contributory benefits. The Turnover Report provides an analysis of employee terminations by department showing the reason for each termination. Union Listings by employee within union can be produced when required.

**GENERAL LEDGER/ACCOUNTS PAYABLE (5725-H14)**

In order to provide increased patient care, hospitals must work from a sound financial base. In order to develop that base, the hospital executive must have detailed hospital operating information that is accurate, timely, and complete. The hospital must establish a plan, and since they are controlled to cost-dependent prices, they must work within that plan. The general ledger application provides the information that is key to more effective management through three logical subsystems: Daily processing, accounting period-end updating, and accounting period-end financial reporting.

The daily processing subsystem produces a journal of the day's valid transactions and adds them to the accumulated transaction file. Transaction validity is established through the use of the batch proof report. All transactions can be entered as miscellaneous journal entries. However, other offerings of the Hospital Financial Management System automatically provide journal entries from Patient Billing (5725-H11), Accounts Receivable (5725-H12), Payroll (5725-H13), and General Ledger/Accounts Payable (5725-H14) which will substantially reduce keying time. All transactions from whatever source are thoroughly edited by the system.

The accounting period-end updating subsystem provides the detail and summary trial balances. They are produced at the close of each accounting period. The system is designed to handle either 12 or 13 accounting periods per fiscal year. The trial balances can be run as many times as necessary to insure that all closing and correcting entries for that accounting period have been processed and the ledger is in balance. The system then updates the General Ledger Accounts file by extracting all entries for the accounting period (from the Accumulated Transaction File and summing these entries with the balance as the end of the last accounting period) to obtain the new year-to-date balance of each account in the General Ledger Accounts File. The updated General Ledger Accounts File is then used to produce the Financial and Management reports by the accounting period-end reporting subsystem.

Comparative schedules of Patient Revenue, Miscellaneous Revenue, Deductions from Revenue, and Expenses are produced showing variances on a current month and year-to-date basis for either this year versus last year or this year versus budget or both.

The format of the Balance Sheet, Income Statement, Pre-Cost Allocation Schedule, Per Diem Revenue Report, and Per Diem Expense Report can be tailored to the user's requirements through the use of the Report Description Master file. This file contains a record for each physical line that appears on each of the reports. By adding, changing or deleting records in this file, characteristics of the reports such as the number of lines, levels of total, and line and total descriptions, can be changed to meet the needs of the user. This feature, along with the ability to define the chart of accounts desired, provides a flexible financial information system that can be defined by the user to produce financial reports for assistance in creating and maintaining financial stability for the hospital.

**Accounts Payable:** Inflation has caused a rapid increase in the cost of supplies in all departments of the hospital. An accurate, efficient Accounts Payable system has become a requirement. It is one of the basic tools needed by hospital management to assist in reducing and controlling the cost of providing health care because most of the hospital's supplies expense originates through Accounts Payable. Approved vendor invoices must be accurately recorded, efficiently analyzed, and accurately distributed to affected cost centers.

The key element of expense control can only be obtained if the proper departments are given the information they need. For example, the purchasing agent requires information regarding standard vendor terms and volume of the business. The financial officer needs timely information regarding open Accounts Payable to analyze cash requirements. Available cash must be used effectively to take advantage of all discounts through prompt payment. The business office needs an efficient method of recording items, reporting to management, and accurately distributing supplies expense to appropriate cost centers.

The Accounts Payable application meets these objectives and satisfies these needs through four logical subsystems: Transaction entry, check writing, expense distribution, and reporting.

The transaction entry subsystem performs an extensive edit on all approved invoices and credit memos. The required information is keyed into the system and a Proof Report is printed to balance to controls. Any errors are corrected prior to further processing. These transactions



## PROGRAM PRODUCTS

**System/32 HFMS (cont'd)**

are accumulated with any prior unpaid items and a Cash Requirements Report is printed to provide a current listing of all unpaid items listed by invoice within vendor. The items to be paid are noted on the Cash Requirements report and control totals are developed. Items to be paid can be selected in either of two ways: All invoices for a vendor or only certain invoices within a vendor can be selected. The computer operator uses this report to enter a notification of items to be paid into the system. A Payment Journal is printed by the system showing all transactions selected to be paid. This report is used to balance to the control totals and any keying errors are corrected prior to the writing of checks.

*Accounts Payable Reference Manual (LB30-0007) ... General Ledger Reference Manual (LB30-0019).*

**RPGs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

Further flexibility is provided by the system because a check for any items may be typed at any time and entered into the system with a different code to designate a demand check. The transactions for these demand checks flow through to the expense distribution, but no computer checks are prepared. This facility provides the hospital maximum flexibility for taking advantage of discounts and creating of special checks such as travel advances.

The check writing subsystem produces the Check Registers, Checks, and Remittance Advices for those items checked on the cash requirements report. The system allows for multiple check-writing runs during the month which, in conjunction with the ability to handle demand checks, provides the flexibility needed to control the payment of outstanding accounts payable items. Check reconciliation reports are included to allow the user to control the reconciling of checks and produce an Aged Outstanding Check Register.

Once each accounting period, the Accumulated Transaction file is sorted by General Ledger number and the expense distribution subsystem is run. An Accounts Payable Distribution Report is produced and summary expense entries are created for entry into the General Ledger System.

The reporting subsystem provides analysis of year-to-date purchases and discounts taken based on information in the Vendor Master file. This file contains one record for each permanent or temporary vendor used by the system to obtain vendor name, address, and discount terms information. The amount of purchases, credit memos and discounts for each vendor are also maintained in this file and Vendor Analysis Reports can be printed whenever desired.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

These IBM System/32 Industry Application Programs will execute on all models of the IBM System/32.

Information regarding disk allocation and usage (master and transaction files) and recommended backup levels and diskette requirements are available in the *HFMS Installation Guide*.

The OCL and file sizes, as distributed, will be fixed at the maximum capacity, assuming all five applications are to be installed on a 5 megabyte file.

Any changes to file sizes other than those shown above should be carefully reviewed by the customer and IBM System Engineering to determine the necessity for more storage, estimate time required to convert OCL procedures, and estimate throughput performance.

**SOFTWARE REQUIREMENTS**

The IBM HFMS System/32 program is written in IBM System/32 RPG II and operates under control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data (SORT), entering transactions with the Data File Utilities (DFU) and for making source program corrections with Source Entry Utility (SEU). If compilation of the RPG HFMS source programs is required, the IBM System/32 RPG II Compiler (5725-RG1) and Source Entry Utility (SEU), for making RPG II program corrections, must be available.

**DOCUMENTATION**

(available from Mechanicsburg)

*Patient Billing Installation Guide (SB30-0008) ... Patient Billing Runbook (SB30-0014) ... Accounts Receivable Installation Guide (SB30-0009) ... Accounts Receivable Runbook (SB30-0015) ... Payroll Installation Guide (SB30-0010) ... Payroll Runbook (SB30-0016) ... Accounts Payable Installation Guide (SB30-0011) ... Accounts Payable Runbook (SB30-0017) ... General Ledger Installation Guide (SB30-0012) ... General Ledger Runbook (SB30-0013) ... Patient Billing Reference Manual (LB30-0004) ... Accounts Receivable Reference Manual (LB30-0005) ... Payroll Reference Manual (LB30-0006) ...*

**SYSTEM/32 MEDICAL GROUP MANAGEMENT SYSTEM  
5725-H15**

**PURPOSE**

The application provides the medical group with a powerful aid in managing its business.

The Medical Group Management system is primarily intended for a group of up to 20 doctors using a single accounting system.

Key accounting and management reports are provided to allow selling and installing without a requirement for services or customer programming capabilities.

**HIGHLIGHTS**

- Wide variety of reports and report options included:
  - Management reporting is a byproduct of normal data entry
  - Detail or summary listings within a range of options is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided
  - Security code deters unauthorized execution of all programs in the application
  - A Reference Number may be used to supply an audit trail for any transaction entered into the system
- Designed to be installed without customer programming capability:
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures
  - Easy-to-use runbook
  - Operator self-study course is available
  - Step-by-step installation activity plan provided by the *Application Reference Manual*
  - User's installation and daily operating information supplied to the supervisor by the *Application Reference Manual*

**DESCRIPTION**

The system combines two data entry approaches: Operator-oriented and batch-oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette created on a 3740 Data Entry System.

The application has requirements records which contain Questionnaire responses stored in a Constants File. These records allow the system to select certain fields for editing, report formats, file sizes, and functions to suit each customer's needs. The Questionnaire responses are typed in during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure uses the answers to a series of questions regarding a medical group's requirements to build the system. It provides the following:

- Tailoring the application and Operational Control Language (OCL) on site at installation time.
- All provided functions are included in the programs but only required functions are executed.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- File sizes may be increased or decreased as needed by rerunning the System Tailoring Procedure.

*Application Reference Manual* Volume I provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. Volume II of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions stating all the activities necessary to run the programs on a System/32. The *Procedure Reference Summary* is provided for the operator as a reminder of the major operational instructions for each procedure. It is intended to be used once the operator is thoroughly trained in the application.

Instructional material in the form of a self-study guide is provided to train the System/32 operator in the use of the *Runbook*.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

**DESCRIPTION**

The application is ready-to-execute. It includes source code, object code, and execution procedures as basic material. The *Application Logic Manual* is included if it is ordered as optional licensed material.

There are some general features included in the application:

- Designed to fit business requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline data entry through the System/32 keyboard or by means of diskettes created on a 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files.
- Reprint options are possible because file updating is separated from report writing functions
- Some report printing can be deferred to a more convenient time
- Selective printing options are available for many report functions

The Medical Group Management System IAP is intended to provide a balance forward accounts receivable system for a group of up to 20 doctors using a single accounting system.

The IAP provides the ability to bill patients on a monthly basis. Third parties (insurance companies) can be billed as required. It provides accounts receivable information including status reports and aged trial balances in order to control accounts receivable.

An optional Daily Charge Slip system is provided to print an appointment list showing patient appointment information and patient charge slips for recording patient charges, diagnoses and procedures. The charge slips can then be used as turnaround documents for input into A/R.

A practice analysis system is also optional and provides statistical reports for each doctor on a calendar year basis.

Inquiry is provided allowing the user to locate a guarantor record by keying either the guarantor's last name and first initial or the guarantor's account number.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Each of these IBM System/32 Industry Application Programs will execute on all models of the IBM System/32. The programs are compiled assuming a 16K system. Because of volume and time constraints, there may be a requirement for providing offline key entry on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record feature (#5455) and Feature Group A (#4004).

Many functions have been included to protect the integrity of the master files, programs, procedures and libraries. Because of this, no other IAP or user-written programs may co-reside unless stringent coding requirements for these programs are met to insure compatibility with the Medical Group Management System. The *Application Logic Manual* discusses in detail the coding conventions used for the development of the Medical Group Management System.

**SOFTWARE REQUIREMENTS**

The application programs for the IBM System/32 are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Program (5725-SC1 Version 3. IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

RPGs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## SYSTEM/32 MEMBERSHIP and MAILING LIST SYSTEM 5725-K11

### PURPOSE

Associations are constituted to serve their memberships. Their prime functions are information retrieval and dissemination, establishment of standards and ethics, research, and representing their members to external agencies. Items of general interest are disseminated through association publications sent through the postal service. However, the need often exists to make specialized mailings to selected members with specific characteristics. Information exchange also takes place at events sponsored by associations. Associations, then, have data processing needs characterized by large data bases which must be processed in total but with the ability to process individual records or groups of records on a selective or exception basis.

The Membership and Mailing List System is designed for associations of up to approximately 15,000 members if optional files are not used.

### HIGHLIGHTS

The Membership and Mailing List System provides an economical approach for the needs of business and professional associations. It addresses the following areas:

#### Data Base Management

- Interrelates up to 10 master files into a single data base
- Non-redundant data base (duplicate records eliminated)
- Can be installed as:
  - Single-file system (members are individuals)
  - Dual-file system (members are companies with mailing sent to and events attended by individuals). Usage of other master files is optional as needed.
- Full maintenance procedures

#### Cash Accounting

- Invoices generated for dues and publications
- Balance forward accounts maintained for dues
- Cash application through file maintenance runs

#### Mailing Labels

- One-up or four-up
- Names and addresses vertically and horizontally aligned
- Produced from the data base on user-defined selection criteria
- Zip code changes noted and count shown
- Includes zip codes and circulation reporting

#### Membership and Association Services

- Membership cards
- 3 x 5 information cards
- Membership rosters, dynamic listings, and profiles
- Data file inquiry

#### Analyze Procedure

- Provides a means to select and sequence subsets from the data base
- Used for statistical profiles; input to all of the above runs; input to a preformatted dynamic listing program - for management review and analysis.

The Membership and Mailing List System also includes the following features:

- Installation through a System Control File which allows implementation of user options and printed descriptions without recompilation
- Inquiry capability to display or print individual member's records

### DESCRIPTION

The Membership and Mailing List System organizes the vital records of an association into a comprehensive data base. The data base is modular in design so that only those portions which are required for user-desired functions need to be implemented. For example, if the association does not maintain its membership in a chapter structure, the chapter file is not used. Similarly, if it has no interest in knowing who sponsored a member for membership, the sponsor file is not used. The basic decision to be reached regarding the optionality of files, however, concerns the manner in which the association structures its membership and what dues functions are required. A typical difference between business associations and professional organizations is that business associations tend to have companies as members while professional organizations tend to have individuals as members. The Membership and Mailing List System accounts for this difference by separating the dues function from the mail function. Data required to

implement these two functions is separated into two discrete files: the dues file and the mail file.

If your customer has company members with individuals within the company receiving mail, both files would be used (dual-file system). If, however, the members of the association are individuals, either the dues file or the mail file, or both, may be used. If partial payments are to be accepted and the association has only one publication that it distributes, the dues file should be implemented. If the association has multiple publications with different payment rates and accepts full payment only, the mail file should be implemented. However, whichever file is implemented, the basic cash accounting and mailing function are provided. The optional nature of the data base files is implemented through a Systems Control File without need for recompilation. Consult the Membership and Mailing List System *Installation Guide* for further information.

The following sections describe system highlights in three important functional areas: Accounting, mailing, and service.

#### Accounting Functions

**Invoicing:** Invoices are generated for both dues and publications. The dues invoice shows the balance brought forward, the current dues amount, and a new total owed. An optional special charge amount (such as an initiation fee) can also be included. First dues billing for new members can be pro-rated. Publication invoices can handle amounts for two separate publications (mail file). Both types of invoices as well as follow-up notices are prepared on user-defined billing cycles and frequencies.

**Cash Application:** Cash can be applied to dues on a partial payment basis (dues file only) or on a full-payment required basis. Payments for publication subscription can be applied in even increments of the base subscription rate with automatic calculation of the "paid to" date. Cash receipts can also be applied for registration fees for association-sponsored events.

#### Mailing Functions

**Mailing Labels:** Mailing labels are prepared for user-defined subsets of the data base. The selection is dynamic. User-defined parameters for inclusion/exclusion and sequencing are keyed prior to the label run. The labels can be printed one-up or four-up with names and addresses horizontally and vertically aligned. Changes in zip code (if the labels are sequenced by zip code) can be highlighted to facilitate mailing bundling. Mailing type is noted, that is, sample publications.

**Circulation Reports:** This report recaps totals by state, zip code, or type of mailing for each mailing. It can be used for advertising rate setting by showing circulation demographics.

#### Membership/Association Service Functions

**Membership Cards:** Membership identification cards can be prepared showing member's name and current membership period.

**3 x 5 Information Cards:** These cards can be prepared with user-defined inclusion/exclusion and sequencing criteria. They are useful for such functions as convention registration, direct sales follow-up, etc.

**Rosters:** Periodic alphabetic listings of the membership, mailing lists, or event participation can be prepared for reference.

**Membership Profile:** A profile of all information regarding a member can be printed that can be sent for review and correction. Therefore, it can serve as a turnaround document to maintain the accuracy of the data base.

**Additional Features:** The Membership and Mailing List System is designed to meet the needs of associations by producing standard printouts of selected input. Input inclusion/exclusion and sequencing criteria are entered through a simple ANALYZE command. This feature provides great flexibility to your customer. For example, the system does not arbitrarily send follow-up notices for dues or publication invoices after a fixed period. Your customer can implement a 30- or 60-day follow-up policy by simply entering the appropriate 30- or 60-day parameter into the ANALYZE command prior to running the follow-up procedure. Analysis report formats have been established for each major file. The user of the ANALYZE command in conjunction with these report programs gives the user a dynamic listing capability to answer needs as they occur. The ANALYZE command can also be used without a subsequent report to develop statistical profiles (demographic analysis) of the membership.

The optional files are implemented and descriptions are supplied to the programs by answering a questionnaire. The responses are then entered into a Systems Control File. Other options addressed on the questionnaire include such policy matters as invoicing frequency and dues proration for new members.

An inquiry capability is provided through the Data File Utilities (DFU) to indicate individual records on the System/32 display screen or to print the records.



PROGRAM PRODUCTS

**System/32 Membership & Mailing List System (cont'd)**

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This System/32 Industry Application Program will execute on all models of the IBM System/32.

Information regarding disk allocation and usage (master and transaction files) and recommended backup levels and diskette requirements are available in the *Installation Guide*.

The OCL and file sizes, as distributed, will be fixed at the maximum capacity and normal distribution for the 5-megabyte file.

Any changes to file sizes should be carefully reviewed by the customer and IBM Systems Engineering to determine the necessity for more storage, estimate the time required to convert OCL procedures, and estimate throughput performance.

**SOFTWARE REQUIREMENTS**

The Membership and Mailing List System programs for IBM System/32 are written in IBM System/32 RPG II and operate under control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities program product (5725-UT1) must be available for sorting of data (SORT), entering transactions with the Data File Utilities (DFU) and for making source program corrections with Source Entry Utility (SEU). If compilation of the RPG II source programs is required, the IBM System/32 RPG II Compiler (5725-RG1) and Source Entry Utility (SEU), for making RPG II program corrections, must be available.

**CONVERSION**

The Membership and Mailing List System requires loading of a large volume of data. This may make use of the System/32 keyboard inadvisable for conversion input. Programs are supplied to load the files from diskettes produced by the 3740 Data Entry System. Discussing conversion approaches and schedules with your customer or prospect will be a key element in your installation planning process.

**DOCUMENTATION**

(available from Mechanicsburg)

*Installation Guide* (SB30-0078) ... *Runbook* (SB30-0079) ... *Reference Manual* (LB30-0076).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**5230 DATA COLLECTION SYSTEM  
SUPPORT for SYSTEM/32  
5725-M3A**

**PURPOSE**

The 5230 Data Collection System Support for System/32 program provides the manufacturer with a convenient, practical means of preparing shop floor data for processing by the System/32 Manufacturing Management Accounting System (MMAS) application programs. Data collected by the 5230 Data Collection System is edited, consolidated, and formatted for processing by the MMAS Payroll, Inventory Management, and Production Status and Costing IAPs or for user-written manufacturing management systems (with appropriate changes to the output modules).

This IAP offers current System/32 MMAS account upgrading in the manufacturing industry. It is primarily intended for the manufacturer with 50 to 250 employees.

**HIGHLIGHTS**

- Interrelated to MMAS applications:
  - Elapsed time calculation for Payroll
  - Material receipt and issue data for Inventory Management
  - Job time for Production Status and Costing
- Management reports generated as a byproduct of data entry
  - Option to print or not print all reports except error reports and audit summaries
  - Labor report by supervisor for checking
  - Attendance and absentee reports
- Provides internal cross-checking and editing
  - Jobs started checked against jobs stopped
  - Employee time on jobs checked against time and attendance record
  - Transaction records checked for complete and accurate entry
- Provides automatic generation of machine-readable data
  - Reduces transcription errors
  - Eliminates time keeper calculation of elapsed time
  - Supports up to 40 different shifts to provide added flexibility for special starting times, lunch and other break times, and unique weekend schedules.
- Can be installed without customer
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures
  - Easy-to-use runbook
  - Step-by-step installation activity plan provided by the *Application Reference Manual*
  - User's information supplied to the supervisor by the *Application Reference Manual*

**DESCRIPTION**

The 5230 Data Collections System Support for System/32 provides two phases of operations: 5230 personalization phase and a data conversion phase.

The 5230 personalization provides a menu of actions from which the users select those that best fit their operation. Using the menu selections and loop definitions for up to three 5231 Controllers with up to four loops each, this phase creates the personalization records required to personalize the 5230 Data Collection System.

The data conversion phase prepares the data received from the 5230 Data Collections System for processing by the MMAS applications. The data can be accepted through the data communications facilities, the cards, or the diskette offered as output options by the 5230 Data Collection System.

Both material transactions and labor transactions are prepared. The material transactions are edited, listed, formatted, and stored for later use by the Inventory Management and Production Status and Costing applications. Labor transactions are expanded, edited, checked for accuracy, and adjusted for break and lunch times. They are also adjusted for lunch and shift start-stop time variances. The elapsed time for time and attendance and job time is calculated, and job time applied to overlapping jobs is apportioned to the jobs. Time and attendance totals are checked against job time totals with warning messages printed for differences that exceed user-prescribed limits. A correction procedure is included to allow for changing incorrect labor transactions. The results of the labor transaction processing are stored for later use by the Payroll and Production Status and Costing applications.

Reports are printed, at the user's option, for material transactions and for labor transactions. The material transactions report is a single listing. Labor transaction reports provide labor-related information suitable for management review and checking by supervisors for correctness. Attendance and absentee reports are also printed.

This program augments the MMAS cross-application Constants File with its own questionnaire responses. These records allow the

application to select certain options for the procedures to be used. The questionnaire responses are keyed during initial installation and may be changed as needed.

An *Application Reference Manual* provides a step-by-step installation activity plan including sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. This manual also provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of the program.

The 5230 Data Collection System Support for System/32 is a ready-to-execute program. It includes source code, object code, execution procedures, and the *Application Logic Manual*, if ordered as optional basic material.

**CUSTOMER RESPONSIBILITIES**

IBM will provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 5230 Data Collection System Support for IBM System/32 will execute on all models of the IBM System/32. The programs are compiled assuming a 16K system. If data communications features are to be used, the Binary Synchronous Communications Adapter (#2074) must be installed in the IBM 5230 System Unit. If card output from the IBM 5230 System is to be used, the Data Recorder Attachment (#3200) may be installed on the System/32 only.

**SOFTWARE REQUIREMENTS**

The IBM 5230 Data Collection System Support program for the IBM System/32 is written in IBM System/32 RPG II Programming language and executes under control of the IBM System/32 System Control Program (5725-SC1 Version 3). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the program. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary. In addition, one of the following MMAS applications should be installed.

- Payroll (5725-M32)
- Inventory Management (5725-M35)
- Production Status and Costing (5725-M31)

**Additional Materials:**

*Data Collection Application Workbook* (GH20-0203) ... *IBM 5230 Data Collection User's Guide* (GA34-0040)

**DOCUMENTATION**

(available from Mechanicsburg)

*Runbook* (SB30-0092) ... *Application Reference Manual* (SB30-0093) ... *Logic Manual* (LB30-0094).

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/32 MANUFACTURING MANAGEMENT ACCOUNTING SYSTEM (MMAS)**

- PRODUCTION STATUS AND COSTING ... 5725-M31
- PAYROLL ... 5725-M32
- ACCOUNTS PAYABLE ... 5725-M33
- ACCOUNTS RECEIVABLE ... 5725-M34
- INVENTORY MANAGEMENT ... 5725-M35
- PRODUCT DEFINITION AND COSTING ... 5725-M36
- GENERAL LEDGER ... 5725-M37
- SALES ANALYSIS ... 5725-M38
- ORDER ENTRY AND INVOICING ... 5725-M39

**PURPOSE**

The System/32 Manufacturing Management Accounting System (MMAS) provides manufacturers with a powerful aid in managing the business.

MMAS offers flexible applications specifically designed for the manufacturing industry. MMAS provides key reports to help management direct and control their business effectively.

MMAS offers opportunities for new name and first systems account sales in the manufacturing industry. It is primarily intended for the manufacturer with 20 to 250 employees.

**HIGHLIGHTS**

- Independent or interrelated applications approach:
  - Modular design facilitates sequential application installation
  - Single data entry results in multiple application updates
  - Modular design allows users to choose the applications that address problem areas
- Wide variety of reports and report options included:
  - Management reporting is a byproduct of normal data entry
  - Certain reports (statements, 941-As, and W-2s) can be saved on diskette for later printing
  - Detail or summary listings within a range of keys is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided
  - Security code deters unauthorized inquiry or execution of key programs in each application
  - A Journal Reference Numbering System supplies audit trail for any application that automatically generates transactions into the General Ledger
- Provides manufacturers with an easy-to-use method for organizing and using manufacturing information such as bills-of-material, product cost, and shop order or job cost.
- MMAS can be installed without customer programming capability:
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures
  - Easy-to-use runbook
  - Supervisor and operator self-study courses are available
  - Step-by-step installation activity plan provided by the *Application Reference Manual*
  - User's information supplied to the supervisor by the *Application Reference Manual*

**DESCRIPTION**

The Manufacturing Management Accounting System is a set of nine independent yet interrelated, ready-to-execute applications for the small manufacturer:

- Order Entry and Invoicing
- Sales Analysis
- Accounts Receivable
- Inventory Management
- Product Definition and Costing
- Payroll
- Accounts Payable
- General Ledger
- Production Status and Costing: The system combines two data entry approaches - operator-oriented and batch-oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette created on a 3740 Data Entry System. The nine easy-to-operate applications can be installed in separate stages at different times and still be an interrelated system.

The only requirement is that Order Entry and Invoicing (5725-M39), and/or Inventory Management (5725-M35), and/or Accounts

Receivable (5725-M34) must be installed before Sales Analysis (5725-M38).

Each application has certain requirements records within a cross-application Constants File which contain questionnaire responses. These records allow the application to select certain fields for editing, report formats, file sizes, and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a manufacturer's requirements. It provides the following:

- Tailoring the application and Operator Control Language (OCL) on-site at installation time.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted as needed by rerunning the System Tailoring Procedure.

An *Application Reference Manual* provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, control forms with suggested procedures. Volume II of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the MMAS programs on a System/32. The Operator Reference Card is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly trained in the particular application.

Instructional material in the form of self-study courses is provided for the System/32 supervisor and operator to train them in the use of the *Application Reference Manual* and *Runbook*. The two courses are not application dependent. Therefore, only one copy of each course is needed per customer no matter how many applications are installed.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

**Features:** The Manufacturing Management Accounting System consists of nine full-function, ready-to-execute applications. MMAS includes source code, object code, execution procedures, and the *Application Logic Manual*, if ordered as optional basic material.

These are some general features which all applications have:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding programs have been completely and successfully executed
- Compatible online/offline data entry through the system console or by means of diskettes created on a 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions, and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Some report printing can be deferred to a more convenient time
- Selective printing options are available for many report functions

**PRODUCTION STATUS AND COSTING (5725-M31)**

This program provides management information on jobs or shop orders from the point of release to the shop floor through the closing process. Also, it provides a means to build and maintain a job select file for retaining and releasing repetitive or standard jobs. This file contains information at an operation and material level.

Jobs or shop orders may be released from the job select file and/or manually, based on individual requirements. During the release function the shop data base is created to provide for editing of feedback from the shop floor and for management reports. In addition to the creation

**System/32 MMAS (cont'd)**

of a shop data base, the release function creates a job worksheet to move with the work and a group of labor tickets for labor reporting.

The report function provides a variety of production and accounting reports such as Job Status, Work List, and exception reporting for quantity variance or cost variance. These reports reflect variance from projection on both production and accounting information and may be obtained in summary or detailed format.

The updating function records information from the shop floor to the shop data base at the operation and material detail level. Updates to the shop data base occur via labor, move, material issue, miscellaneous, outside operations and material receipts transactions. These transactions reflect the activity (hours and cost) and movement (quantity) of jobs or shop orders as they progress through the manufacturing facility. Transactions may be entered either manually or from other applications (Payroll, Inventory Management, and Accounts Payable) via the application interface.

Upon completion of a job, the closeout function produces closeout reports in both production and accounting formats to allow the analysis of labor and cost projections against actual. After producing these reports the closed jobs or shop orders are removed from the shop data base.

**PAYROLL (5725-M32)**

This hourly/salary/executive payroll provides for regular, overtime, premium, vacation, and sick pay. It may be run weekly, biweekly, semimonthly, monthly. Hours may be entered daily or by pay period; if selected, balancing time worked to attendance may be accomplished daily or weekly. Exception hours provide time and one-half, double time, double time and one-half, and triple time capabilities. Rates may be selected from the Employee Master Record or keyed in as an override. Shift differential capabilities are provided for second and third shift. The differential may be defined as a percentage of the rate or cents to be added to the rate.

Vacation/Holiday pay may be part of a regular pay check or on a separate check. A bonus payment is paid on a separate check with a flat percentage of income tax deducted. Sick pay may be fully non-taxable or only liable for income tax. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined.

The ability to handle taxable or non-taxable adjustments, pay advances and employer-paid union benefits (taxable and non-taxable) is also provided. Once the gross earnings is calculated, deductions will be taken to reach net pay. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Miscellaneous deductions may be taken by percent, fixed amount, hourly rate, upper limit, or cyclic within a user-specified frequency. Union deductions may be taken by percent, hourly rate, or fixed amount within a user-specified frequency.

Handwritten paychecks and paychecks never cashed (reversals) are also supported by the application. Once the payroll register and checks are printed, many analysis reports are produced: Labor Distribution, Job Distribution, Miscellaneous Deductions, Union Deductions, YTD/OTD Earnings, Workmen's Compensation Worksheet, and Payroll Journal. The presently formatted W-2 and 941-A reports are also provided.

The capability is provided to pass transactions to the General Ledger application, if installed. These transactions will be applied toward company use only. Payroll may be on either a cash or accrual basis. If the cash basis is selected, no transactions are passed to the General Ledger.

**ACCOUNTS PAYABLE (5725-M33)**

Accounts Payable provides an Open Payables and Cash Disbursements function on either an accrual or cash basis. Invoices and credit memos entered may be multilined and distributed by job, item number, cost type and General Ledger account number. Entries may be for standard or one-time vendors and may be open or prepaid. Credit memos may be entered manually or initiated automatically based upon a prior entered invoice.

A Purchase Journal provides the audit trail for cost transactions entering into the General Ledger system and into the open payables file. An Open Payables Report is provided in due date or vendor sequence. This turnaround document provides a mechanism to indicate payment by data, vendor or invoice, including partial payments, for Cash Disbursements. Invoices may be entered or placed in hold status to prevent inadvertent payment of invoices in question.

A Cash Requirements Report is used to assist the controller in insuring sufficient funds are available and proper invoice selection was made before the checkwriting procedure begins. The Cash Disbursements Journal provides an audit trail for its transactions entering the General Ledger application and acts as the Check Register. Checkwriting and reconciliation are also provided.

A Vendor Analysis Report indicates key business volumes and discounts lost and taken for previous year and current year.

**ACCOUNTS RECEIVABLE (5725-M34)**

Accounts Receivable supports a combination of both open-item and balance-forward customers. Billing transactions are directly keyed or accepted from Order Entry and Invoicing if that application is installed.

All transactions (that is, invoices, cash receipts, adjustments, and credit memos) are retained in an Open-Item File. This file may be purged daily or monthly at the user's request. An Aged Trial Balance with current plus four past periods is provided. It has multiple printing options (summary, detail, selected line, within limits). Delinquency Notices may also be printed. Late charges can be calculated for balance forward customers.

Two optional formats are provided for the customer statements which are printed at month-end. The capability is provided to delay the printing of the statements until a more convenient time without affecting the closing of the books. An account status inquiry feature is also provided.

**INVENTORY MANAGEMENT (5725-M35)**

Inventory Management maintains a perpetual inventory and on-order status for each item. It calculates and prints on demand numerous management figures including: Economic order quantity, dollar profit and percent of profit, average monthly usage, turnover rate, and reorder point. Management reports are also provided: ABC Analysis Report, two types of Stock Status, Inventory Analysis Report, Physical Inventory Checklist, On-Order Status Reports, Inventory Valuation and Variance Report, and Inventory Reorder Report. It can also interface with Order Entry and Invoicing, Sales Analysis, Product Definition and Costing, and Production Status and Costing.

**PRODUCT DEFINITION AND COSTING (5725-M36)**

Product Definition and Costing provides manufacturers with an easy-to-use method of organizing bills-of-material and item information and calculating product costs using bills-of-material. Costs are built from raw material up to the finished end-item. Assembly costs may be recalculated when there is a change in the bill-of-material or in the assembly labor or material costs or burden. The user can simulate the effect of proposed cost changes in end-item costs due to changes in labor, material or burden cost.

For all product costs the total cost of purchased parts is maintained separately as material cost. These costs are calculated and maintained level by level and make it possible for the user to identify the added value (labor, burden) for products and assemblies for tax purposes.

Management reports can be produced when required since the cost information is stored in the Product Definition and Costing data base. These reports include costed bills of material, cost reports reflecting either real or potential cost changes and variances (simulations), and special vendor where-used and final assembly where-used lists. The basic formats used for parts lists and where-used lists are single level, indented and summarized.

**GENERAL LEDGER (5725-M37)**

General Ledger combines all the transactions affecting the financial status of the company during the month. They may be entered directly as a General Journal Entry or may have been previously entered through interface with Accounts Payable or Payroll. At month-end closing time, Audit Registers and the Financial Statement Worksheet are provided to help verify that the user is still in balance before proceeding into the actual closing. The reports will also aid in generation of any necessary closing entries.

An Income Statement and Balance Sheet are standard report outputs. The user can define these reports with an easy-to-use format description procedure. The financial reports can illustrate current financial data as compared to budget or historical information.

Users may define their own chart of accounts or use a suggested account structure provided with the application. The fiscal year start month is user-defined. Multiple company support for up to ten companies is included. Any transactions passed from Payroll or Accounts Payable are applied to the first company only.

**SALES ANALYSIS (5725-M38)**

Sales Analysis reports summarize the activity and highlight the performance of items, customers, and/or salespersons. Selected reports may be printed in detail or summary, depending on the option selected at printing time. Since all data used in Sales Analysis can be entered through Order Entry and Invoicing, it should be installed to obtain full benefit of the Sales Analysis application. If Sales Analysis is installed with Accounts Receivable alone, only Salesperson and Customer Sales Analysis can be obtained; or with Inventory Management alone, only Item Sales Analysis can be obtained.

**ORDER ENTRY AND INVOICING (5725-M39)**

This postbilling program includes order entry and edit, invoicing, and preparation of an invoice register and price lists. The Order Acknowl-

**System/32 MMAS (cont'd)**

edgement will show warehouse location, while the picking list is printed in warehouse sequence. Pricing options include selection of the actual selling price, a discount percent from a list price, operator-entered price, or a contract price by customer. Up to six user-assigned discount percentages by item and up to three tax percentages are provided. Quantity break prices can be established optionally by item.

Order status and backorder status is provided by item, customer, or due date. Support is also provided for partial shipments and backordering or cancellation of the balance of the order. This application provides data for input into Inventory Management, Accounts Receivable, and Sales Analysis.

Two invoice formats are available. Picking list is optional and can be run either at order entry time or just prior to billing. Order acknowledgements are optional and may optionally be printed with prices.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day to day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Each of these IBM System/32 Industry Application Programs will execute on 16K or 24K models of the IBM System/32. The programs are compiled assuming either a 16K or 24K system. It is not intended that any one customer install all nine applications on one IBM System/32. Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (#5455 and #4004).

The Manufacturing Management Accounting System is intended to be an independent yet interrelated set of applications. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other user-written program may co-reside with any MMAS application unless stringent coding requirements for these programs are met to insure compatibility with the MMAS applications.

**SOFTWARE REQUIREMENTS**

The application programs are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Program (5725-SC1 Version 2). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

**DOCUMENTATION**

(available from Mechanicsburg)

**MMAS Application Guides:**

*Production Status and Costing* (G580-0029) ... *Payroll* (G580-0031) ... *Accounts Payable* (G580-0035) ... *Accounts Receivable* (G580-0033) ... *Inventory Management* (G580-0030) ... *Product Definition and Costing* (G580-0028) ... *General Ledger* (G580-0036) ... *Sales Analysis* (G580-0034) ... *Order Entry and Invoicing* (G580-0032).

**MMAS IAP Specifications:**

*Production Status and Costing* (GH30-0037) ... *Payroll* (GH30-0035) ... *Accounts Payable* (GH30-0036) ... *Accounts Receivable* (GH30-0031) ... *Inventory Management* (GH30-0032) ... *Product Definition and Costing* (GH30-0033) ... *General Ledger* (GH30-0034) ... *Sales Analysis* (GH30-0039) ... *Order Entry and Invoicing* (GH30-0038).

**Customer Self-Study Education:****MMAS Users Guide, Modules 1 - 4**

Set of 4 Audio Tapes (SV30-0072) ... *Workbook 1, Introduction to MMAS* (SR30-0104) ... *Workbook 2, Product Definition and Costing* (SR30-0105) ... *Workbook 3, Inventory Management* (SR30-0106) ... *Workbook 4, Production Status and Costing* (SR30-0107).

**MMAS Users Guide, Modules 5 - 8**

Set of 4 Audio Tapes (SV30-0091) ... *Workbook 5, Accounts Payable and General Ledger* (SR30-0180) ... *Workbook 6, Payroll* (SR30-0181) ... *Workbook 7, Accounts Receivable, Order Entry and Invoicing, Sales Analysis* (SR30-0182) ... *Workbook 8, 5230 Data Collection System Support* (SR30-0183).

**Unlicensed Publications**

... *Production Status and Costing Runbook* (SB30-0038) ... *Reference Manual Volume 1* (SB30-0039) ... *Reference Manual Volume 2* (SB30-0059) ... *Payroll Runbook* (SB30-0032) ... *Reference Manual Volume 1* (SB30-0033) ... *Reference Manual Volume 2* (SB30-0056) ... *Accounts Payable Runbook* (SB30-0035) ... *Reference Manual Volume 1* (SB30-0036) ... *Reference Manual Volume 2* (SB30-0057) ... *Accounts Receivable ... Runbook* (SB30-0020) ... *Reference Manual*

*Volume 1* (SB30-0021) ... *Reference Manual Volume 2* (SB30-0051) ... *Inventory Management Runbook* (SB30-0023) ... *Reference Manual Volume 1* (SB30-0024) ... *Reference Manual Volume 2* (SB30-0053) ... *Product Definition and Costing Runbook* (SB30-0026) ... *Reference Manual Volume 1* (SB30-0027) ... *Reference Manual Volume 2* (SB30-0054) ... *General Ledger Runbook* (SB30-0029) ... *Reference Manual Volume 1* (SB30-0030) ... *Reference Manual Volume 2* (SB30-0055) ... *Sales Analysis Runbook* (SB30-0044) ... *Reference Manual Volume 1* (SB30-0045) ... *Reference Manual Volume 2* (SB30-0061) ... *Order Entry and Invoicing Runbook* (SB30-0041) ... *Reference Manual Volume 1* (SB30-0042) ... *Reference Manual Volume 2* (SB30-0060).

**Licensed Publications**

*Production Status and Costing Logic Manual* (LB30-0040) ... *Payroll Logic Manual* (LB30-0034) ... *Accounts Payable Logic Manual* (LB30-0037) ... *Accounts Receivable Logic Manual* (LB30-0022) ... *Inventory Management Logic Manual* (LB30-0025) ... *Product Definition and Costing Logic Manual* (LB30-0028) ... *General Ledger Logic Manual* (LB30-0031) ... *Sales Analysis Logic Manual* (LB30-0046) ... *Order Entry and Invoicing Logic Manual* (LB30-0043).

**TERMS and CONDITIONS:** See PP Index

## SYSTEM/32 SHIPPING CONTROL for SUPPLIERS TO THE AUTOMOTIVE INDUSTRY 5725-M44

### PURPOSE

System/32 Shipping Control for Suppliers to the Automotive Industry provides solutions for many problems associated with planning, controlling and reporting shipping dock transactions for the automotive supplier. Shipping Control for Suppliers to the Automotive Industry addresses the requirements for both release orders and discrete quantity orders by generating a wide variety of planning reports, shipping documentation and reporting of completed shipping transactions, which assists suppliers in effectively managing and controlling their shipping operations.

Shipping Control for Suppliers to the Automotive Industry offers opportunities for new name and first system account sales as well as established data processing accounts in the automotive industry. It is intended for automotive suppliers starting with enterprise locations with at least 50 employees or 2 million dollars in sales, and ranging up to the size of manufacturing plants of the automotive companies.

### DESCRIPTION

Shipping Control is an operator-oriented system for suppliers to the automotive industry. The system is designed to operate in conjunction with Release Control for Suppliers to the Automotive Industry (5725-M45), or as a stand-alone application interfaced to the customer's release order processing and/or discrete order processing systems through customer-supplied programs. The application is designed for the needs of the automotive supplier by incorporating both batch and interactive modes of operation. All reports and shipping documents generated in the application are designed to meet the needs for both the automotive original equipment manufacturers and the replacement market.

An installation guide provides a step-by-step installation activity plan including sample reports and maintenance user data forms, control forms with suggested procedures, and other information necessary for a successful installation.

The runbook provides the operator with the detailed instructions necessary to effectively operate Shipping Control and provide accurate and timely management reports for planning, controlling, reporting and documenting shipping activity.

### HIGHLIGHTS

Provides key planning reports:

- Schedule and Status Report showing the daily shipping schedule for current week, behind schedule position, current release position and last shipment date and quantity.
- Load and Routing Report showing projected daily shipments in terms of net, tare and gross weight with the associated carrier and routing instructions.
- Container requirements reports showing detailed container requirement by customer and/or container part number.  
Allows selection and printing of shipping documents in a batch mode or through interaction between the system and the operator.
- Picking slips may be printed in customer, part number, or location sequence.
- Load sheets selected in interactive mode allow the operator to view the customer's requirements and the total weight buildup as parts are assigned to the load.
- Shipper documents designed to meet the requirements of the original equipment manufacturer and the replacement market.
- Bills of Lading may be printed in the formats required for direct shipments or shipments through consolidation points.

Provides a wide variety of reports of completed shipping transactions. Data files of shipping transactions are available for interfacing to other applications areas through user-supplied programs.

Creates advanced shipping notification data files for most of the major automotive manufacturers. Audit reports of all generated files are provided.

Interfaces with Release Control for Suppliers to the Automotive Industry (5725-M45) without programming modification.

### CUSTOMER RESPONSIBILITIES

The customer is responsible for the following:

- Making all decisions regarding the application processing options (refer to *Installation Guide* for a discussion of system options).
- Acquiring all forms and supplies.
- Gathering all master file data and generating all master files.
- Preparing schedules.
- Providing for installation assistance if required.

- Providing any programs which might be required to interface with existing user systems. Specifically, if discrete quantity orders are to be processed in the shipping application, the order file must be prepared in the proper format.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

Shipping Control has been designed for a minimum configuration of IBM System/32 mdl A12. The IBM System/32 mdl B12 can be used if the printing of cut form bills-of-lading is not required. It is recommended that users of Shipping Control review with their marketing representatives their direct access storage requirements which are a function of the size of the master data files and transaction volumes. The size of the user's files will dictate the size of the disk storage capacity required. Listed below is a guideline which will be helpful in determining the user disk requirements.

Shipping Control for Suppliers to the Automotive Industry was designed to fit on the IBM System/32 with 5-megabyte disk capacity and the 80 cps Printer (mdl A22) assuming the following volumes:

1,700	Customer Master Records
800	Destination Master Records
1,000	Item Master Records
200	Routing Master Records
4,000	Order Records
800	Open Shipping Activity Records
450	Advanced Shipping Notification Records

These volumes are not restrictive but can be used as a guide to determine if the customer's shipping control system and files can be contained within the minimum system. The minimum IBM System/32 (mdl A12) is supported if the customer daily transactions can be handled by a 40-cps printer.

The file sizes set in the distributed OCL reflect these volumes for a 5-megabyte file.

Any changes to the file sizes should be carefully reviewed by the customer and IBM Systems Engineer to determine the necessity for more direct access storage, estimate of time required to convert OCL Procedures, and estimate of throughput performance.

#### SOFTWARE REQUIREMENTS

The programs in Shipping Control for Suppliers to the Automotive Industry are written in IBM System/32 RPG II and operate under the control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data (SORT) and Source Entry Utility (SEU) for making procedure or RPG II source program modifications.

If compilation of the RPG II source programs is required, the IBM System/32 RPG II Compiler (5725-RG1) must be available.

#### DOCUMENTATION (available from Mechanicsburg)

*Profit Building Resources from IBM for the Automotive Supplier* (G580-0066) ... *Shipping Control Licensed Program Design Objectives* (GH30-0013) ... *Release Control Licensed Program Design Objectives* (GH30-0014) ... *Runbook* (SB30-0098) ... *Installation Guide* (SB30-0099).

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 RELEASE CONTROL for  
SUPPLIERS to the AUTOMOTIVE INDUSTRY  
5725-M45****PURPOSE**

System/32 Release Control for Suppliers to the Automotive Industry provides the automotive parts suppliers with solutions to many problems associated with processing and maintaining release orders from the major automotive manufacturers.

Release Control offers a means of easily maintaining accurate release information which may be used to better manage the planning of shipments, fabrication activities and material acquisitions.

Release Control offers opportunities for new name and first system account sales as well as established data processing accounts in the automotive industry. It is intended for automotive suppliers starting with enterprise locations with at least 50 employees or 2 million dollars in sales, and ranging up to the size of manufacturing plants of the automotive companies.

**DESCRIPTION**

Release Control is an operator-oriented system for suppliers to the automotive industry. The system is designed to operate in conjunction with Shipping Control for Suppliers to The Automotive Industry (5725-M44), or as a stand-alone application.

An installation guide provides a step-by-step installation activity plan including sample input and user data forms for file maintenance, control forms with suggested procedures, and other information necessary for a successful installation.

The runbook provides the operator with information necessary to effectively operate Release Control to provide accurate and timely management reports.

**HIGHLIGHTS**

- Provides for key entry of release data with the ability to tailor the operator prompting to the specific release document.
- Provides for the processing of machine-readable release data as if it were key entered.
- Audit reports are printed showing release status before and after update.
- Processes shipping activity and adjustments to update release status and to maintain shipping history.
- Provides management reports in detail and summarized formats.
- Allows inquiry into the release and shipping history files for quick resolution of customer or supplier questions.
- Comes complete with source code, ready-to-execute procedures and object code.
- Is documented with an installation guide, application logic manual and an operator runbook.
- Provides for file maintenance to generate, list, update or delete master file records.
- Designed to interface with the Shipping Control for Suppliers to the Automotive Industry licensed program (5725-M44) without program modification.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the following:

- Acquiring all forms and supplies
- Gathering all master file data and creating all master files
- Preparing run schedule
- Providing for installation assistance if required

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Release Control has been designed for a minimum configuration of IBM System/32 mdl A12 (Matrix Printer) or B12 (Line Printer).

It is recommended that users of the IBM Release Control for Suppliers to the Automotive Industry review with their marketing representatives their direct access storage requirements which are a function of the size of the master data files and transaction volumes. The size of the user's file will dictate the storage capacity required.

The minimum system was designed to handle the following approximate volumes:

- 800 releases (customer/part number) with an average of three destinations each.
- 6,000 shipping history records, before a purge is necessary.

The file sizes set in the distributed OCL reflect these volumes for a 5-megabyte file.

Any changes to the file sizes should be carefully reviewed by the customer and IBM Systems Engineer to determine the necessity for more storage, estimate of time required to convert OCL procedures, and estimate of throughput performance.

**SOFTWARE REQUIREMENTS**

The programs in Release Control for Suppliers to the Automotive Industry are written in IBM System/32 RPG II and operate under the control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data (SORT) and Source Entry Utility (SEU) for making procedure or RPG II source program modifications. If compilation of the RPG II source programs is required, the IBM System/32 Compiler (5725-RG1) must be available.

**DOCUMENTATION**

(available from Mechanicsburg)

*Profit Building Resources from IBM for the Automotive Supplier (G580-0066) ... Shipping Control Licensed Program Design Objectives (GH30-0013) ... Release Control Licensed Program Design Objectives (GH30-0014) ... Runbook (SB30-0095) ... Installation Guide (SB30-0096).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/32 CONSTRUCTION MANAGEMENT  
ACCOUNTING SYSTEM (CMAS)**

**JOB COSTING ... 5725-M61**  
**ACCOUNTS PAYABLE ... 5725-M62**  
**PAYROLL ... 5725-M63**  
**GENERAL LEDGER ... 5725-M64**

**PURPOSE**

The System/32 Construction Management Accounting System (CMAS) provides the construction industry with a complete, yet flexible method for managing their Payroll, Accounts Payable, Job Costing, and General Ledger.

CMAS offers opportunities for new name and first systems account sales in the construction industry. It is primarily intended for the general contractor with 1 to 7 million dollars in contracts per year, 25 to 250 employees; or the subcontractor with \$65,000,000 in contracts per year, 35 to 250 employees.

CMAS offers flexible applications specifically designed for the construction industry. CMAS key reports help construction management effectively direct and control their business.

The Construction Management Accounting System consists of four full function ready-to-execute applications. CMAS includes source code, object code and execution procedures.

**HIGHLIGHTS**

- Independent or interrelated applications approach
  - Modular design facilitates sequential application installation.
  - A journal reference numbering system ties the four applications together when multiple CMAS Applications are installed.
  - Single data entry results in multiple application update
- Wide variety of reports and report options included
  - Management Reporting is a byproduct of normal data entry
  - All applications provide for multicompany entries and reports
  - Field reporting allows for projecting profit and loss by job
- Uses recognized accounting techniques and terminology to provide a solid accounting system.
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation and audit and control are provided
  - Security code deters unauthorized inquiry or execution of key programs in each application
- CMAS can be installed without customer programming capability
  - System tailoring procedure on-site to facilitate account growth changes
  - Display Screen input prompting and output report formats are tailored to meet specific customer requirements
  - Complete, system-controlled, operator oriented input prompting
  - Complete file maintenance and audit programs and procedures
  - Installation and operator self-study training exercises are provided to each customer

**DESCRIPTION**

The Construction Management Accounting System is a set of four independent, interrelated, ready-to-execute applications for the small to medium size contractor/subcontractor. The system combines two approaches - operator-oriented and batch reporting. This approach and programming system provides a sound accounting base by doing Payroll with Labor Distribution, Accounts Payable with Subcontract Accounting, Job Costing with Management Reporting and General Ledger with Financial Statements.

The four easy-to-operate programs may be installed in separate stages at different times and still be a totally interrelated system, that is, payroll data may be passed by the system directly to general ledger and job costing, etc.

Each application contains a requirements file with user questionnaire responses which allows the application to select input formats, report formats, and functions to suit each customer's needs. These responses are keyed in during initial installation and may be changed as customer needs change.

The systems tailoring procedure controls the prompting of input records and fields to be entered, the types of reports and fields on reports, and data files used for output.

Systems tailoring procedure is a procedure requesting the answers to a series of questions regarding a contractor's company requirements. Systems tailoring provides the following:

- Tailoring the system on-site at installation time

- Application reprogramming is not required as business changes because system tailoring parameters can be changed by the customer
- The programs contain all the announced functions, but only required functions are performed by the system
- Applications may be installed in any sequence
- System tailoring options include the following:
  - Multiple companies or single
  - Multiple states or single
  - Multiple unions or no unions
  - Custom formatting of Balance Sheets and Income Statements

An installation guide provides a step-by-step installation activity plan including suggested numbering systems, sample input and maintenance user data forms, control forms with suggested procedures, and other activities necessary for a successful installation.

The runbook provides the operator with activities necessary to effectively operate CMAS as an accounting system to provide accurate and timely management reports.

Two self-study guides lead the user through the installation guide, runbook, and associated materials to assist the self-sufficient customer.

**JOB COSTING (5725-M61)**

General Journal entries with cost distribution may be entered with distribution by company, job, pay item, cost code, and cost type.

Job Costing automatically updates the General Ledger component, if available. General Ledger is then updated on a monthly basis.

Job Costing is automatically updated by the Accounts Payable application, if installed. Payroll reports, when used with the Job Cost reports provide a total perspective of job status.

Job Cost management reports are provided with unit costs, budget comparison, and projected profit or loss based on field reporting of percent complete or quantity 'put-in-place'. Income reporting with distribution provides the basis for cash flow reports by company and by job.

**ACCOUNTS PAYABLE (5725-M62)**

Invoices and credit memos entered may be multiline and distributed by company, job, pay item, cost code, and cost type. The entries may consist of vendor, miscellaneous, estimated or subcontract invoices. Prepaid invoices are permitted on all of the invoice types. Credit memos may be entered manually or initiated automatically based on a prior enter invoice.

Subcontract accounting provides for automatic movement and accountability of retainage and change orders. Subcontracts are maintained on either a balance forward or open items basis. Subcontract status reports by job and by vendor denote the contract amount, change orders, billed amount and date, payment amount and date, retention, and taxes.

An accrued accounting system provides for timely job cost information, while a cash flow handling capability indicates job cash position through the general ledger.

The Accounts Payable application provides an Open Payable and Cash Disbursements function. An Open Payable report is provided in due date or vendor sequence. This turnaround document provides a mechanism to indicate payment by date, job, vendor, or invoice, including partial payments for Cash Disbursements.

Invoices may be entered or placed on hold status to prevent inadvertent payment of invoices in question.

A Cash Requirements report is used to assist the controller in insuring funds are available and proper invoice selection was made before the check writing procedure begins.

Check writing and reconciliation are provided. The check format provided includes a user-indicated check stub length to adapt the size of the remittance advice. Stub overflow initiates a separate supplementary stub.

An Accounts Payable trial balance is available in job or vendor sequence.

A Vendor Analysis Report indicates key business volumes by quarter and year.

**PAYROLL (5725-M63)**

This hourly/salary distributed payroll provides for regular, overtime, premium, vacation, sick and travel pay. It may be run weekly, biweekly, semimonthly, or monthly. Exception hours provide time and one-half, double time, double time and one-half, and triple time capabilities. Rate selection may be standard, selected by craft, or keyed in as an exception overtime or premium rate.

PROGRAM PRODUCTS

System/32 CMAS (cont'd)

- Clear audit and accounting procedures aid in maintaining an in-balance Payroll system.
- Handwritten checks (payoffs, special, etc.) are easily handled.
- Standard union deductions are used to prepare two standard union deduction reports. Multiple union reporting is supported.
- Workmen's compensation calculations and a workmen's compensation worksheet report provide a mechanism for weekly tracking of insurance premiums.
- A standard tax algorithm calculates federal, FICA, and all state income taxes based on customer-provided data. Local taxes may fit the standard tax algorithm provided.
- Deductions by percent, fixed amount, upper limit, and miscellaneous deductions.
- Taxable or non-taxable adjustments
- State Disability Insurance is calculated and reported.
- Federal Unemployment Insurance and State Unemployment Insurance are calculated and reported.
- Check writing and reconciliation are provided.
- A payroll journal provides a clear audit trail of entries to the CMAS General Ledger application.
- Labor cost management reports are provided with unit cost, budget comparison, and projected profit or loss based on field reporting of percent complete or quantity put-in-place. The reports are available with distribution by company, job, pay item, cost code, cost type, and job class.
- 941-A, W-2, and Certified Payroll reports are provided.

GENERAL LEDGER (5725-M64)

General Journal entries may be entered for end of month closings or for out-of-balance conditions.

Journal entries identified by journal names and numbers are indicated on the Financial Statement Worksheet and Trial Balance Listing. These entries are automatically accepted from the Payroll, Accounts Payable, and Job Costing applications.

On an out-of-balance condition, a procedure is provided to rearrange the entries into journal reference number sequence and print out a selective audit listing. This listing can be compared with the monthly journals to quickly identify the out-of-balance entry.

An Income Statement and Balance Sheet are standard report outputs which provide the user with the flexibility of defining these reports with an easy-to-use format description procedure. This definition may be changed as needs vary.

Financial reports can illustrate current financial data as compared to budget or historical information.

Users may define their own chart of accounts or use a suggested account structure provided with the application. The fiscal year start date is user defined.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

This IBM System/32 program will execute on all models of the IBM System/32.

It is recommended that users of IBM Construction Management Accounting System (CMAS) review with their Marketing Representatives their direct access storage requirements which are a function of the size of master data files and transaction volumes. The size of the user's files will dictate the size of the storage capability required. Listed below are some guidelines which should be helpful in determining user disk requirements.

Distributed System for System/32 5 Megabyte file (1,968 Blocks)

Files	Number of Blocks*
System Control Programming	239
SORT Executable Code	34
CMAS Executable Work Units	98

\* These block figures are for the System/32 feature only.

Application Files (Online all the time)

- Payroll System - 250 Active Employees Design 476
  - Payroll System File - 3 Records
  - Employee Master - 250 inactive, 250 active employees
  - Current Hours - 1,400 Distributions/Pay Period
  - Employee Deductions - 2,000 Deductions for active or inactive
  - Check Reconciliations - 1,250 Outstanding Checks (250 checks x 5 weeks)
  - Job Classifications - 65 Job Classes
  - Distribution - 160 Payroll Distribution Codes
  - Active Labor Cost Distributions - 700 Weekly Distributions
  - Union Master Deductions - 80 Union Deductions 10 Unions + (10 Unions x 7 deductions/union)
  - Monthly Union Deductions - 3,000 deductions
  - Tax Tables Federal/State/Local - 30 tax brackets (Federal, single, weekly, 10 \$ Brackets)
  - Employee State and Local Taxes - 2,000 Deductions with additional withholding (2 states x 2 locals x 500 active/inactive employees)
  - Insurance File - 155 Insurance company masters
  - Insurance Summary - 1,200 Employee Workmen's Compensation
- Accounts Payable - 1,200 checks design 401
  - Payables Systems File - 3 records
  - Active Vendor Master - 900 name and address
  - Checks Written - 1,200 check/month
  - Open Payables Distribution - 1,000 Outstanding Invoices with three distributions per invoice (3,000 records)
  - Active Subcontracts - 1,000 Subcontracts
  - Payables Work File - 1,400 Invoices and distributions
- Job Costing - 100 Job Vouchers/Month Design 117
  - Job Costing Systems File - 3 records
  - Job Work File - 400 Job Vouchers/ Batch
  - Job Name Master - 240 Active Jobs
  - Job Cost Detail - 2,100 Costing Entries (Active Job Costing Distributions + Income Distributions)
- General Ledger - 200 Journal Entries/Month 389
  - General Ledger Systems File - 3 records
  - General Ledger Work File - 200 General Journal Entries
  - General Ledger Chart of Accounts - 800 accounts
  - Temporary General Ledger Account Transactions - 9,200 entries
  - General Ledger Format - 400 formatting records

Application Work Files Area

- (Loaded by Application) 208
  - Paid for CMAS User 6
- Total Blocks 1,968

The OCL and file sizes, as distributed, have been fixed at the maximum capacity with normal distribution for the 5 MB file.

Any changes to file sizes other than those shown above should be carefully reviewed by the customers and IBM System Engineering to determine the necessity for more storage, estimate of time required to convert OCL procedures, and estimate throughput performance.

The IBM System/32 disk is backed up by dumping the disk to multiple diskettes. IBM-supplied system programs are provided to the user on diskettes initially and should be retained by the user for backup. The user-created application data files must also be backed up on diskette. Users are required to provide their own backup diskettes for CMAS procedures, programs, and data files.

Number of User-Supplied Diskettes Required for Backing Up the System/32 Distributed System and Data Files

	System/32 Back Up*	
	Single Level	Double Level
Payroll	18	36
Accounts Payable	12	24
Job Costing	8	16
General Ledger	13	26
All 4 Applications	38	76

\* Includes Backing Up: Daily Transactions; CMAS Machine-Readable Object Programs; Disk-Resident Application Files

It does not include SCP 5725-SC1, Utilities 5725-UT1, RPG II 5725-RG1 machine-readable materials (PID shipment) or any other programs, procedures, data files, and spare diskettes to replace damaged or worn diskettes.

The System/32 user will require either the sum of the backup diskettes for each application installed or 38 diskettes, whichever is less.

SOFTWARE REQUIREMENTS

The CMAS licensed programs are written in IBM System/32 RPG II and operate under control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data (SORT) and Source



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PP 5725-M61.3

Mar 83

Major Revision

PROGRAM PRODUCTS

**System/32 CMAS (cont'd)**

Entry Utility (SEU) for making RPG II source program corrections. If compilation of the RPG CMAS source programs is required, the IBM System/32 RPG II Compiler (5725-RG1) must be available.

**DOCUMENTATION**  
(available from Mechanicsburg)

*CMAS Specification Sheets: ... Payroll (GC21-5120) ... Accounts Payable (GC21-5117) ... Job Costing (GC21-5119) ... General Ledger (GC21-5118) ... Job Costing: ... Installation Guide (SC21-7624) ... Runbook (SC21-7630) ... Accounts Payable: ... Installation Guide (SC21-7626) ... Runbook (SC21-7629) ... Payroll: ... Installation Guide (SC21-7625) ... Runbook (SC21-7268) ... General Ledger: ... Installation Guide (SC21-7623) ... Runbook (SC21-7631) ... Job Costing Reference Manual (LY21-0549) ... Accounts Payable Reference Manual (LY21-0548) ... Payroll Reference Manual (LY21-5110) ... General Ledger Reference Manual (LY21-0550) ... Construction Industry Brochure for System/3 (GC20-1999).*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**SYSTEM/32 RPG II  
5725-RG1**

**PURPOSE**

System/32 RPG II provides the following capabilities:

- RPG II Language Level
- System/32 Device Support
- Auto-Report
- Binary Synchronous Communications (BSC)

**DESCRIPTION**

**RPG II Language Level:** The RPG II language is supported as on the System/3 mdl 6. Overlays are automatically generated when necessary. Differences do occur due to different devices and SCP function.

**System/32 Device Support:** All the devices available on the System/32 are supported by System/32 RPG II, except the diskette drive. Through the use of System/32 OCL, the diskette drive is supported as an offline multivolume sequential input, output or update file. The shared input/output access method is also supported. The following expanded device support is provided:

- **SET/KEY Display Support:** The field light capability (System/3 mdl 6) has been replaced by a prompting capability which will use messages stored either in the program or the library to prompt the operator.
- **CONSOLE File Support:** Through the use of normally coded File Description and Input Specifications, the CONSOLE File (keyboard/display) is supported in a buffered interactive mode. The operator is prompted by field name, one field at a time.

All input is buffered and overlapped with processing. The program is coded to process records as from any other sequential input device.

**Auto-Report:** Auto-Report is included with the System/32 RPG II compiler and includes the following features:

- **Copy:** Specifications may be cataloged in the library and included in any RPG II program via the COPY statement. It is especially useful for cataloging the File Description and Input Specifications for which overrides may be coded to specify such things as control levels. By using the COPY statement, only one description of the file need be cataloged and changed for all programs using the file.
- **Page Headings:** Page headings can easily be specified on Output Specifications without the need for Output Indicators or end positions. The heading is centered over the report complete with page numbers and date.
- **Simplified Report Specifications:** A report may be produced by listing on Output Specifications the fields desired in the order desired. On one Output Specification, the field, column heading, and an indication for column totals may be entered. The column headings, fields, and column totals are automatically generated.

**Binary Synchronous Communications (BSC):** The Telecommunications Specification is supported in System/32 RPG II. Support of Binary Synchronous Communications will be provided by System/32 to communicate with:

- Another System/32 with RPG II
- System/34 with RPG II and Assembler
- System/3 with ML/MP, CCP or RPG II
- System/7 with MSP/7
- S/360 with any of the following:  
BTAM  
TCAM/NCP\*  
CICS/DOS, CICS/OS
- S/370 with any of the following:  
BTAM  
TCAM/NCP\*  
VTAM/NCP  
CICS/DOS, CICS/OS, CICS/VS  
IMS/VS
- S/360 mdl 20 with BSCA IOCS
- 3741 mdl 2 or 4
- A 3747
- A 5110 Computer System supported as a 3741 mdl 2 or 4
- 5231 mdl 2, Receive mode only. Supported as a 3741 mdl 2 or 4
- 5280 Distributed Data System

- \* **Note:** The 3704/3705 Emulation Program (EP) or the Partitioned Emulation Program (PEP) extension to 3704/3705 NCP can be used to emulate the 2701.

The BSC support for System/32 is supported on the host system as System/3 BSC.

The RPG II device names are DISK, PRINTER, CRT, CONSOLE, KEYBOARD and BSCA. The user indicators (U1-U8) may be turned on and off in the RPG II program. The status of these indicators may then be tested by OCL. The DSPY operation code is not supported. See

"System/32 Device Support" for the expanded definition of SET/KEY which replaces the function.

- Header specification entries have been added to specify UDATE formats of mm/dd/yy, dd/mm/yy, yy/mm/dd and to designate the edit character to be used with the Y edit code. The Shared I/O Access Method is supported. The MOVEA and SETLL operation codes are supported.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

System/32 RPG II supports all models of the IBM 5320 and the following special features:

- #1005 Additional Storage
- #2074 BSCA
- #1100 1255 Attachment
- #3200 Data Recorder Attachment

**SOFTWARE REQUIREMENTS**

A current version of IBM System/32 System Control Programming (5725-SC1) is required.

**DOCUMENTATION**

(available from Mechanicsburg)

*Introduction to RPG II (GC21-7514) ... RPG II Additional Topics Programmer's Guide (GC21-7567) ... Disk Concepts and Planning Guide (GC21-7571) ... RPG II Disk File Processing Programmer's Guide (GC21-7566).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/32 MOTOR FREIGHT  
ACCOUNTING SYSTEM (MFAS)  
5725-T21**

**PURPOSE**

This application provides small to medium size general commodity or specialty motor freight carriers with a powerful aid in managing their business.

The MFAS Revenue Accounting IAP offers conventional revenue accounting functions to the small and medium size general commodity and specialty carrier in the motor freight industry. These functions are divided into the five categories of (1) Freight Bill Entry and Daily Reports, (2) Accounts Receivable, (3) Interline Payables, (4) Shipment Analysis, and (5) Owner/Operator Accounting.

The application is designed to help the general freight and specialty carrier manage revenue accounting requirements and report prime motor freight sales and operational data.

The entry of data from a coded copy of the freight bill establishes records for daily statistical reporting, accounts receivable, interline payables, shipper/consignee and interline statistics and shipment analysis.

The entry of the owner/operator accounting data produces records of owner/operator freight bill revenue, expenses, charges, advances, and settlement amounts. Owner/operator accounting will also produce settlement sheets detailing those items used in settling with the owner/operator. Owner/operator accounting is by owner and/or driver or unit.

**HIGHLIGHTS**

- Wide variety of reports and report options included:
  - Management and operational data reporting is a byproduct of normal data entry
  - Detail or summary listings within a range of keys is supported in many reports
  - Statements for freight bill accounts receivable optionally printed on stock paper or preprinted forms with or without tear off portion for turnaround document.
- The Motor Freight Accounting System can co-reside in the System/32 with the Distribution Financial Accounting System and all application areas with the exception of owner/operator accounting can supply data to general ledger.
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided
  - Security code deters unauthorized execution of programs
  - A journal reference numbering system supplies an audit trail for any area that generates transactions for the DFAS General Ledger
- Can be installed without customer programming capability:
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures provided
  - Detailed runbook
  - Operator self-study course is available
  - Step-by-step installation activity plan provided by the *Application Reference Manuals*
  - User's information supplied to the supervisor by the *Application Reference Manuals*

**DESCRIPTION**

The Motor Freight Accounting System is a ready-to-execute application for the small to medium size motor carrier.

The system uses the Data File Utility as its data entry approach. Support is provided for transaction entry through the System/32 keyboard or through a diskette keyed offline on a 3740 Data Entry System. The Motor Freight Accounting System Revenue Accounting IAP can be installed with the Distribution Financial Accounting System General Ledger, Accounts Payable, and Payroll IAPs in separate steps, at different times and be an interrelated system.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a carrier's requirements. It provides the following:

- Tailoring the application on-site at installation time.
- Allows the users to change selections of provided functions as the business changes.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted as needed by rerunning the System Tailoring Procedure.

Volume 1 of the *Application Reference Manual* provides a step-by-step installation activity plan including sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. Volume 2 of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed set of instructions showing all the activities necessary to run the procedures on a System/32. The Operator Reference Summary Card is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly familiar with the particular procedure.

Instructional material with exercises is provided to train the operator in the use of the *Runbook*.

An *Application Logic Manual* is provided, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross references, data dictionary, and detailed descriptions of each program.

**Application Description:** The Motor Freight Accounting System is a full function, ready-to-execute application. Included are Source Code, Object Code, execution procedures, and the *Application Logic Manual*.

These are some general features which the Motor Freight Accounting System has:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline data entry through the System/32 console or by means of diskettes keyed offline on a 3740 Data Entry System.
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Selective printing options are available for many report functions

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM System/32 Industry Application Program feature will execute on all models of the IBM System/32 which have 24K bytes of main storage. The programs are compiled assuming a 24K system. Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (128-character feature #5455 and feature group A #4004).

**SOFTWARE REQUIREMENTS**

The application programs are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Programming (5725-SC1 Version 5). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBMSystem/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

**DOCUMENTATION**

(available from Mechanicsburg)

*Runbook* (SB30-0111) ... *Reference Manual Vol. 1* (SB30-0112) ... *Reference Manual Vol. 2* (SB30-0113) ... *Logic Manual* (LB30-0114).



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PROGRAM PRODUCTS

PP 5725-T21.2

Mar 83

Major Revision

**System/32 MFAS (cont'd)**

**Education:**

Industry Marketing Education Self-Study Binder (ZR30-0202) ...  
*Industry Marketing Education Self-Study Workbook Vol 1* (SR30-  
0203) ... *Industry Marketing Education Self-Study Workbook Vol 2*  
(ZR30-0207) ... Industry Marketing Education Audio Cassettes  
(ZV30-0098).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/32 UTILITIES  
5725-UT1****PURPOSE**

The following utilities are provided with the Utilities licensed program:

- Data File Utility (DFU)
- Sort
- Source Entry Utility (SEU)

The following data base management functions are provided as part of DFU:

- Data File Creation and Maintenance
- Data File Inquiry
- Data File List

**DESCRIPTION**

All functions of the above utility take advantage of cataloged RPG II File Description and Input Specifications. To use any of the functions, the user need only know the name of the file and the name of the cataloged RPG II specifications. The functions will prompt for all the other information necessary to tailor the job to the user's task. Field names are included with the prompts to aid the user in selecting the data fields to be used.

**Data File Creation and Maintenance:** This function provides the necessary capabilities to create and maintain data files in a data base. Maximum use is made of the display to prompt the operator by field name for the data to be entered. For update, the data currently in the field is displayed. This function operates only with indexed sequential files. Highlights include:

- Formatted Report for an Audit Trail
- Auto-Duplication of Fields
- Control Totals
- Generated Keys
- Modulus 10 and 11 Self-Check Digit

**Data File Inquiry:** This function provides the necessary capability to allow inquiry into a file. Any indexed file may be inquired into. The records are displayed showing the current status of the information in the file. Highlights include:

- Retrieval by record key
- The capability to roll forward or backward in key sequence through the file.
- The ability to optionally print a record with the 'PRINT REC' command key.
- All displayed fields include column headings for easy identification.

**Data File List:** This function provides the capability to list and summarize selected information from any indexed or sequential file in the data base. The function is very useful for obtaining one-time reports and for creating recurring management reports. Highlights include:

- Page headings including date and page number
- Column headings
- Edited data fields
- Column totals - both final and subtotals
- Selection based on record codes and/or field values
- Sort-Ascending or Descending
- Summary list with totals only
- Retrieve and print data from a related file
- Calculate and print additional fields

**Sort:** The System/32 Sort utility provides the function and capability of the proven System/3 Sort. Highlights include:

- Selection based on field contents: for example, record codes
  - Support of any data field
  - ADDROUT (Tag) Sort
  - Summary Sort
  - Automatically allocated work file
  - Ascending or descending sequence

**Source Entry Utility (SEU):** SEU can be used to create and maintain OCL procedures, RPG II and FORTRAN IV source statements and SORT source statements. Highlights include:

- Sort formats to aid in entering Sort statements.
- RPG II and Auto-Report formats to aid in entering RPG II and Auto-Report statements.
- Optional RPG II and Auto-Report syntax checking
- Optional resequencing of statements in library.

- The ability to move statements around in a program.
- The ability to include statements from another library member.
- The ability to delete statements.
- Statement insertion.
- Rolling forward or backward through cataloged statements.
- Optional listing of statements.
- Use of display to show statement being entered or updated.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

IBM System/32 Utilities licensed program supports all models of the IBM 5320 and #1005 Additional Storage.

**SOFTWARE REQUIREMENTS**

A current version of IBM System/32 System Control Programming (5725-SC1) is required to support IBM System/32 Utilities licensed program (5725-UT1).

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/32 FILE CONVERSION UTILITY (FCU)  
5725-UT2****PURPOSE**

The File Conversion Utility (FCU) is a stand-alone System/32 utility accepting input from and providing output to 5321 Magnetic Card Unit or fixed disk (Link Direct Access Method [LDAM], sequential, direct or indexed sequential file organization).

**DESCRIPTION****Functions**

- Convert numeric fields to packed, unpacked or signed binary.
- Convert monospace EBCDIC characters to lowercase or to proper noun (characters following blank or hyphen and first character of field converted to uppercase; all others converted to lowercase).
- Convert lowercase EBCDIC to uppercase.
- Format numeric data for word processing (insert minus sign, insert decimals, right or left justify, suppress leading zeroes and trailing blanks).
- Resequence fields in an output record
- Insert constant data.
- Process selected records (include or exclude based on field comparison).
- Display audit totals (sum, maximum and minimum) for packed or unpacked numeric fields over an entire file.
- Combine a primary Magnetic Card, LDAM or System/32 file with a secondary input file to produce a merged output file. (The secondary file must be indexed by a field in the primary file.)
- Can process up to 512-byte records.
- Support all System/32 Keyboard/Display character sets for update. Supports Magnetic Card data.
- Access variable-length fields separated by field separator characters.
  - Proper noun conversion exceptions. Names requiring nonstandard capitalization (such as von Fleet, McKinley, O'Connor) can be properly converted to upper/lowercase by defining special conversion specifications.
  - Abbreviation expansion.
- LDAM records up to 512K bytes can be processed when 24K bytes of main storage are available.

User instruction and/or input is provided the utility through data specification forms similar to forms used by RPG.

This utility provides support for the sharing of stored information between application programs. The utility provides the user with the capability of converting a file formatted for IAP or data processing applications to a format acceptable to the word/text processing applications. Similarly, data entered into Document Libraries can be used by other data processing programs after conversion by the utility (each user installation requires analysis for limitations).

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

IBM System/32 File Conversion utility supports all models and features of the IBM 5320. For IBM 5321 Magnetic Card Unit support to LDAM support, the Word Processor feature. (#6002) on 5725-SC1 is required. 24K bytes of main storage is required for processing records greater than 256 bytes.

**SOFTWARE REQUIREMENTS**

A current version of IBM System/32 System Control Programming (5725-SC1) is required to support IBM System/32 File Conversion Utility (5725-UT2).

**TERMS and CONDITIONS:** See PP Index



## SYSTEM/32 STATISTICAL SYSTEM 5725-XA1

### PURPOSE

The System/32 Statistical System is a set of routines offered for use by Problem Solvers to satisfy their needs in statistical data analysis. This licensed program is a set of four major tools: Stepwise Linear Regression Analysis, Factor Analysis, Analysis of Variance, and Orthogonal Polynomial Curve Fitting.

This flexible statistical system accepts user-supplied commands and data which instruct the system to perform one or more of the above analyses. Many options are available to the user, as described below.

- Orthogonal Polynomials Curve Fitting - derivatives can be obtained ... polynomials can be reentered for evaluation at a specified set of points.
- Analysis of Variance - four factors are allowed ... balanced designs can be analyzed, using factorial techniques ... a program for arranging the Analysis of Variance table to conform to specific design needs is included.
- Factor Analysis - twenty-five variables are allowed ... eigenvalues produced using the QR algorithm matrix output from programs can be used as input for later analyses ... orthogonal and oblique reference frames are possible.
- Stepwise Linear Regression Analysis - matrix output can be used and pooled with other matrices for use as input in later analysis ... twenty-five variables are allowed ... deletion and entry of variables are automatic.

In addition, many output report options may be selected by the user.

### HIGHLIGHTS

- Data input to the Statistical System can be entered from the keyboard at the time of execution or read from the disk (stored from a previous run) or read from disk where the data had been created offline and transferred from diskette.
- Output to be retained will be saved on disk.
- Although FORTRAN coding knowledge is desirable, it is not required to use the Statistical System.
- Prompting messages on the display device will aid the user in selecting options available.
- Interactive response is provided for the user via the keyboard.
- Error checking and associated messages will be furnished.

### CUSTOMER RESPONSIBILITIES

This program is distributed in machine-readable form (diskette). It is the customer's responsibility to provide for safekeeping of the diskette to ensure continued operation (back-up). A *User's Guide* is also provided. Procedures for installation are furnished.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The IBM System/32 Statistical System is designed to operate on all models of the IBM System/32.

The IBM System/32 Control Storage Increment (#1500) is required.

FORTRAN graphics on IBM 5320 B and C models are provided by the 64-character EBCDIC print belt or by a new 48-character FORTRAN print belt. This new belt is recommended and may be ordered as #9492 as the belt provided with the system, or as feature #5552 as an additional print belt.

IBM 5320 A models automatically provide FORTRAN graphics.

#### SOFTWARE REQUIREMENTS

The IBM System/32 System Control Programming (5725-SC1), Version 6 or later is required.

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## PROGRAM PRODUCTS

**SYSTEM/32 RETAIL DATA PREPARATION  
5725-XA2****PURPOSE**

The System/32 Retail Data Preparation licensed program is designed to satisfy the basic functional requirements of retailers. It is available for a System/32 with 32K. It provides flexible, ready-to-execute programs specifically designed for processing transaction log data produced on 5265 Point-of-Sale Terminals.

**HIGHLIGHTS**

- Transaction data may come from diskettes created on 5265 Point-of-Sale Terminals (TP or hand carry).
- Processing frequencies are user-specified, governed only by file capacities and execution of prerequisite programs.
- File sizes can be periodically reallocated.
- Process-convert-separate transaction log data.
- Establish control counts.

**Publications:** The *RMAS General Information Manual* contains a description of RMAS and its application features and functions as they may be used by a typical customer. It contains three sections. The first introduces IBM's retail offering, as it pertains to the 5265 terminals, with special attention to the licensed programs, of which Data Preparation is the only one for System/32. The second provides more detailed information on the major functions and operations associated with the application programs. The last section reviews installation and planning tasks, and customer responsibilities.

The *Data Preparation User's Guide* provides the technical planning, reference, and operational information needed to understand, install, manage, and use Data Preparation.

A *Logic Manual* is provided, as licensed material, for use by the self-sufficient customer and for the systems engineer in maintaining and modifying Data Preparation. The *Logic Manual* contains information on naming conventions, controls, program functions and specifications, problem determination and resolution steps and other application-independent information. In addition, the *Logic Manual* will contain information that is relevant to the application, such as program descriptions, cross-reference lists and data dictionary.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in the installation of IBM licensed programs. However, the responsibility for personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum system configuration is an IBM System/32 consisting of:

- IBM 5320 System Unit mdl A01 (with 3.2 megabytes of disk storage)
- Two #1005 Additional Storage special features (to 32K)

Although there is nothing inherent in the design of the IBM System/32 Retail Data Preparation program to prevent the use of the minimum system configuration stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size, and operating requirements.

The amount of disk storage required is influenced by:

- The volume of daily transactions
- The frequency of processing

**SOFTWARE REQUIREMENTS**

The IBM System/32 Retail Data Preparation programs are written in IBM System/32 RPG II programming language and execute under control of the IBM System/32 Control Program (5725-SC1) (Version 8 or later). The IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II compiler (5725-RG1) is required if modification of the source code is desired.

**DOCUMENTATION**

(available from Mechanicsburg)

*5260 Introduction (GA21-9284) ... RMAS General Information Manual (GH30-0136) ... Executive Brochure (G580-0201) ... Product Brochure (G580-0202) ... Industry Segment Brochures: ... Department/Discount Stores (G580-0203) ... Specialty Stores (G580-0204) ... Drug Stores (G580-0205) ... Apparel/Shoe Stores (G580-0206) ... Hardgoods Stores (G580-0207) ... Home Furnishing Stores (G580-0208)*

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**SYSTEM/32 SUBROUTINE LIBRARY - MATHEMATICS  
SL-MATH (5725-XM1)**

**PURPOSE**

The Subroutine Library - Mathematics (SL-MATH) is a set of basic computational subroutines for the solution of mathematical problems. It includes a wide variety of subroutines, but is not exhaustive in terms of either functions performed or methods used. It provides powerful tools for the solution of many problems in industry, science, and engineering. The subroutines, which are designed as computational building blocks, operate on data that resides in main storage.

Included are three subroutines dealing with optimization. The solution of a standard linear programming problem by (1) the revised simplex method with bounds and ranges and (2) the revised dual simplex method is provided. The third optimization subroutine provides for the solution of a capacitated network flow problem (generalized transportation problem). Sample programs will be provided for two of the optimization subroutines.

**HIGHLIGHTS**

Some of the characteristics of SL-MATH are:

- The subroutines are purely computational in nature. They do not contain references to external devices, but operate exclusively on data already contained in main storage. The user must prepare a main program calling the SL-MATH subroutines and must furnish, as part of this program, the input/output and, possibly, other operational routines for the total solution of the problem.
- All subroutines comply with the FORTRAN IV conventions. They are called by means of the FORTRAN CALL statement, and are executed according to the normal rules of FORTRAN IV.
- The numerical mathematics part often provides multiple algorithms for one problem class, allowing the user to choose the method appropriate to the specific problem.
- Certain classes of errors are detected and flagged. The program takes appropriate action and warns the user.

**CUSTOMER RESPONSIBILITIES**

The Subroutine Library - Mathematics is distributed in machine-readable form (diskettes). It is the customer's responsibility to provide for safekeeping of the diskettes to ensure continued operation (back-up). A *User's Guide* is also provided. The user must be familiar with FORTRAN and must prepare a main program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The storage requirements for a specific problem will depend on the routines used, the size of the main program, and the data storage requirements. The IBM System/32 Control Storage Increment (#1500) is required.

FORTTRAN graphics on IBM 5320 mdl B and C models are provided by the 64-character EBCDIC print belt or by a new 48-character FORTRAN print belt. This new belt is recommended and may be ordered as Specify #9492 as the belt provided with the system, or as feature #5552 as an additional print belt.

IBM 5320 A models automatically provide FORTRAN graphics.

**SOFTWARE REQUIREMENTS**

The SL-MATH subroutines require the following:

- IBM System/32 System Control Program (5725-SC1) Version 6 or later is required.
- IBM System/32 FORTRAN IV (5725-FO1)

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 WORD PROCESSOR/32  
5725-XX1****PURPOSE**

The Word Processor/32 (WP/32) licensed program provides a set of office-related word processing functions to process text information from a keyboard, store it in document form, and operate on and print this information in a batch mode.

**DESCRIPTION**

Word Processor/32 (5725-XX1), combined with the System/32, offers a comprehensive office data and word processing system.

The Word Processor/32 licensed program provides programming that supports System/32 word processing features:

- 5321 Magnetic Card Unit
- Dual Case Keyboard/Display with keys and functions corresponding to standard typewriter keyboards
- Print features, including superscripting and subscripting

This combination of licensed program and System/32 hardware features provides a comprehensive systems solution for:

- Document and letter generation from stored and original text
- Document editing at the magnetic card typewriter or via batch edit
- Creation, maintenance, sequencing, and selection of lists used for mass mailing or miscellaneous administrative support
- Sharing data for word processing and data processing use
- Production statistics reports

It provides functions ranging from automatic printing of data from magnetic cards prepared at a magnetic card typewriter, to comprehensive formatting and editing of long documents stored in a document library on the System/32 nonremovable disk storage facility.

Word Processor/32 will execute with System/32 System Control Program (SCP), 5725-SC1. SCP feature #6002 is required.

**HIGHLIGHTS**

- Existing functions of the Magnetic Card Selectric® typewriters are enhanced by providing automatic printing and extended word processing functions on the System/32.
- Multiple input media
  - Magnetic cards recorded on (standard features supported):
    - Magnetic Card Selectric®
    - Magnetic Card II
    - Magnetic Card/A
    - Magnetic Card Executive®
    - Communicating Magnetic Card Selectric® (in nonteleprocessing mode)
    - Format Feature on Magnetic Card II and Magnetic Card/A for input or output
  - Standard System/32 keyboard redefined to support one of twelve-character arrangements (requires Dual Case Keyboard and Display feature #3400.)
  - Diskette created on 3741 or 3742 in monospace or upper/lowercase convention. (3742 requires the 28-character blocking feature #5455).
- Comprehensive document formatting including:
  - Stored formats for standard settings such as margins, tabs, line spacing, page length, etc.
  - Headings and footings
  - Page numbering
  - Footnote control and numbering
  - Line numbering
  - Automatic pagination control including ability to keep blocks of text together or reserve white space on a page (for insertion of figures and tables) and controlled start/end of pages (sections, chapters, etc).
  - Right margin justification
  - Line ending adjustment to accommodate change (no adjust is an option).
  - Centering
  - Superscript/Subscript, Word Underscore
- Document Generation from a combination of original text and prestored text. Documents can range from simple letters built from paragraphs to multi-page specifications.
- Media Handling Efficiency through storage and retrieval of documents from System/32 nonremovable disk.
- Insertion of variables at designated places within text, such as tailoring a form letter with name and address and personal comments.
- Decimal Arithmetic performed on numeric symbol values.
- Keyboard efficiencies including:
  - Automatic paragraph and section numbering
  - Encoding/Expansion using three character 'symbols' to generate long names or phrases commonly used
  - Global change
  - Support of tables with:
    - Easy definition and entry
    - Headings centered on columns
    - Headings repeated on multipage tables
    - Blank space optionally padded with fill characters
    - Right, left, and decimal alignment
    - Automatic layout of table between margins
- Forms fill-in with prestored definition of form and position of variables
- Mass mailing including:
  - Conditional generation of paragraphs or whole letters based on a test or comparison
  - Easy definition and edit of name and address files
  - Sequencing of letters; for example, into zip code order
  - Direct access to contents of a System/32 data processing file with data conversion to a format suited to text printing (unpacked, commas inserted, decimals inserted, names converted to upper/lowercase, etc.)
- Preparation of code-compatible magnetic cards for revision or playback at a magnetic card typewriter, except proportional spacing at Magnetic Card Executive.
- Revision of disk-resident text with editing instructions entered from magnetic card, System/32 keyboard, or diskette created on 3741 or 3742. Change list printed during edit provides ease of proofing. Author/operator 'comments' or instructions can appear in proof copy with automatic deletion in final print.
- Production statistics control information trailer sheet printed at the end of each task giving as appropriate: Date, operator, author, department, task name, number of output pages, number of output cards, number of input lines.
- Production statistics reports printed daily, weekly, or monthly detailing production volumes and system utilization by author, department, and job, including year-to-date summary.
- Administrative lists (personnel listings, telephone directories, sales and inventory summaries, document logs of location of incoming and outgoing correspondence, etc.) supported by:
  - Formatting and printing of lists with headings, page numbers, etc.
  - Word processing-oriented definition and update of lists
  - Sort and selection of lists via typist-oriented commands
- Document security prohibiting read/write access by unauthorized WP/32 users
- Alternate use of the System/32 for word processing and data processing applications

**CUSTOMER RESPONSIBILITIES**

- Document security including Security Key assignment and Document Class assignment
- Manual operations and backup procedures
- Data conversion
- Implementor, system operator, and typist training
- Installation of hardware and prerequisite programs
- System/32 operation
- Installation of the licensed program

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

IBM System/32 with at least 3.2 million bytes of disk storage, 50 lpm line printing speed, and 16K bytes of main storage capacity (an IBM 5320 System Unit mdl B or C).

**SOFTWARE REQUIREMENTS**

This Word Processor/32 licensed program is distributed as IBM System/32 load modules. It is released to execute with Version 6 of the IBM System/32 System Control Program (SCP), 5725-SC1, and all subsequent versions and modifications unless so stated in a future revision of this document. Some production statistics report generation programs are written in RPG.

SCP feature #6002 is required.

Notes:



Do not reproduce without written permission

PP 5725-XX1.2

Mar 83

Major Revision

PROGRAM PRODUCTS

**Word Processor/32 (cont'd)**

1. There is no increase in printing throughput on C model systems over B model systems for Word Processor/32 applications.
2. Some applications executing complex PRINT task in a 16K main storage environment may exhaust available main storage. If this occurs, it will be called to the attention of the IBM System/32 operator by a message, and will require the operator to rerun the PRINT task preceded by a PROOF task. The print speed, when executing most print tasks, will be less than rated printer speed. The speed of printing is dependent upon factors such as memory size and the complexity of the task formatting requirements of the application.
3. Thorough evaluation of each prospect's throughput and file sizing requirements must be made prior to proposal of either 16K main storage or 3.2 million bytes of fixed disk storage, or both.

Support is provided for the following:

IBM 5321 Magnetic Card Unit  
IBM 5321 Magnetic Card Unit Attachment  
Dual Case Keyboard and Display  
Half Line Space  
48-character EBCDIC Print Belt  
64-character EBCDIC Print Belt  
96-character Artisan Print Belt  
96-character Modified Courier Print Belt

Magnetic Card Typewriters supported by Word Processor/32 must have the Paragraph Indent Feature.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Product Flyer (G580-0095) ... Executive Brochure (G580-0094).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/32 LETTER WRITING APPLICATION  
5725-XX2****PURPOSE**

System/32 Letter Writing Application licensed program provides the System/32 user with the additional data processing capability of printing personalized letters for large volume distribution. The Letter Writing Application licensed program is directed toward the user with a System/32 installed or on-order, whose primary volume letter generation or response is nonexistent or presently done by means of preprinted forms or flyers.

**DESCRIPTION**

The Letter Writing programs produce a letter in upper and lower case with the ability to insert name and addresses into the address line, and other variable information into the body of the letter. When inserting variable information, the text line is spread, the phrase inserted, and unnecessary blanks deleted. The resulting line length must not exceed 80 positions or data will be lost. A maximum of 73 phrase characters, including phrase separator (>), blanks, and shift designator (-), can be entered for any one name and address record for insertion into the body of the letter. Multiple phrases are separated in the phrase field of the name and address record by the phrase separator (>), and are used sequentially as phrase insert characters. Logical OR symbols (| - upper shift 1) are encountered in the letter text. Labels can be produced from the Name and Address File as one-, two- or three-up across the page for mailing purposes. A statistical detail or summary report may be printed showing the number of name and address records on file by zip code or one of two user-specified codes (5 alphanumeric positions each).

The system has three primary files, a Name and Address file, a Letter Text file and a Title Table file.

The Name and Address file contains first and last name, address information, a letter code, a title code and 2 user codes. It also has space for limited phrases which may be inserted automatically into the body of the letter. The letter code specifies which letter, from the Letter Text file, the individual is to receive. This code may be changed if desired, so that all addresses in the name and address file get the same letter.

The Letter Text file contains fixed format text lines along with control information for the selection of salutation format (casual or formal), letter style, tab stops, date location and spacing, and name and title default values, if they are not present in the name and address record. The casual format allows use of first names or nicknames in the salutation line while containing the surname in the address name line. Suffixes to the last name (Jr., Sr., etc.), may be specified to print on the name line but omitted from a formal salutation.

The Title Table file contains thirty-six titles which may be specified in the name and address record by a title code. This information is automatically inserted into the name line of the address and salutation line, if desired.

File creation is in the form of diskettes from the 3740 Data Entry System or through the System/32 keyboard. Maintenance is via the System/32 keyboard only.

Text changes to the Letter Text file are limited to one line at a time. All text changes to the Letter Text file are done as a replace function. This means that the entire line displayed on the CRT, a maximum of 40 characters including blanks, must be retyped. (40 characters represents 1/2 line.) Changes to the Name and Address file are handled in the same manner on a field by field basis.

**HIGHLIGHTS**

- Full operator guidance through interactive CRT prompting for ease-of-use.
- Input from either the System/32 keyboard or diskettes from the 3740 Data Entry System. Maintenance is from System/32 Keyboard only.
- Routines for creation and maintenance of name and address records and their translation into upper/lowercase characters.
- Routines for creation and maintenance of text files made up of multiple letters and their translation into upper/lowercase characters.
- Routines for creation and change of title table file, which contains up to 36 title descriptions for insertion into the name line.
- Letters printed in block, modified block, or personal format.
- Casual or formal salutation.
- Variable phrase insertions into the body of the letter from the phrase field of the name and address record.

- User codes in the name and address record.
  - A three-position letter identification code in the name and address record to specify the letter to be printed from the letter text file.
  - Two user codes of 5 alphanumeric positions each in the name and address record to allow selective processing and sorting by user-defined data when printing labels or letters.
- Selective printing of letters from the text file by a letter identification code in the name and address record.
- Label printing 1-, 2-, or 3-up with optional print alignment pattern.
- Selective printing of labels or letters for any valid range of zip codes, or range within one of the two user-specified codes.
- Additional selective printing capability for restart of letters or labels (skip X number of records, print Y number of records).
- Sort and print labels or letters in sequence by zip code, or one of two user codes, or original entry sequence.
- Print total at the end of each label or letter run to show the number of labels or letters printed.
- Print a brief statistical report showing detail or summarized total for name and address records on file, by zip code, or one of two user-specified codes.
- Print proof listing for all, or selected, labels or letters.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the following:

- Personnel selection and training: The customer is responsible for selecting at least one person who will oversee the installation and at least one person to assume the duties of an operator. The customer is also responsible for the coordination and education of the various departments affected by the installation.
- Providing for installation assistance if required and completing the file sizing necessary to insure adequate disk space for proper installation.
- Acquiring all forms and supplies.
- Making all decisions regarding the application processing options or user codes in the name and address records.
- Gathering data for name and address file and generating all master files.
- Providing any programs that may be required to interface with existing user programs, PPs or IAPs.

**SPECIFIED OPERATING ENVIRONMENT**

Due to the unique upper and lower case printing requirements of IBM System/32 Letter Writing Application, throughput performance will not be enhanced by upgrading from an IBM 5320 mdl B2X to a mdl B3X. However, the joint letter writing/data processing user may require a mdl B3X for increased throughput when using a monospace print belt for data processing applications.

It is recommended that IBM representatives review their direct access storage requirements with their customers that have the System/32 Letter Writing Application. Storage requirements are a function of the size of the master data files and transaction volumes. The size of the master files will also dictate the size of the diskette storage capacity required.

The Letter Writing Application was designed to execute on all B and C models of the IBM System/32. The following file capacities are programmed into the Letter Writing OCL statements:

- 1,898 name and address records (256 characters each) in the Name and Address file
- 1,898 lines of text (96 characters each) in the Letter Text file
- 36 records in the Title file

With the above file size allocations, the Letter Writing Application requires a minimum of 478 blocks of available data file area on the system's fixed disk for proper execution. This space is required only while using the Letter Writing Application, and may be returned for the use of other applications after Letter Writing tasks have been completed.

The above file volumes are not restrictive but can be used as a guide to determine if the Letter Writing files can be contained within the system where other Application files are also online. Further information regarding disk allocation, diskette requirements, and file size modifications are contained in the *Application Reference Manual/Runbook* (SH30-0207).

Any changes to file sizes should be carefully reviewed by the customer and IBM Systems Engineering to determine the necessity for more storage, estimate the time required to convert OCL procedures, and estimate throughput performance.

**System/32 Letter Writing Application (cont'd)****HARDWARE REQUIREMENTS**

This IBM System/32 licensed program was designed to execute on all line printing B and C models of the IBM System/32. Matrix printing is not supported. In addition to the system, a 96-character print belt (RPO #GG0339) is required for the upper/lowercase type. Program maintenance may be performed on all models of the IBM System/32. Dual Case Keyboard and Display (#3400) for the IBM System/32 is not supported by the IBM System/32 Letter Writing Application.

**SOFTWARE REQUIREMENTS**

The Letter Writing programs are written in IBM System/32 RPG II and operate under control of the IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data. If procedure and source program modifications are to be made, Source Entry Utility (SEU) must be installed.

If compilation of the RPG II Source Programs is required, the IBM System/32 RPG II Compiler (5725-RG1) must be available.

**System and File Backup:** The System/32's disk is backed up by dumping the disk to multiple diskettes. IBM-supplied system programs are initially shipped to the user on IBM-provided diskettes which should be retained by the user for backup. The user created application data files (Name and Address file, Letter Text file and Title file) may be backed up on one or more diskettes (depending on the size of the file), using the file backup procedure provided in the Letter Writing Application. The user is required to provide backup diskettes for procedures, programs, and data files.

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/32 JOB ANALYSIS SYSTEM (JAS/32)  
5725-XX3****PURPOSE**

The System/32 Job Analysis System (JAS/32) is a powerful tool to aid management in the planning, supervising, and controlling of project-oriented work by the critical path method. It is designed to be easily used by nontechnical personnel.

The JAS/32 operates under the System/32 System Control Program, (5725-SC1). Depending on main storage availability, the JAS/32 has the ability to handle 275 to 736 activities or work items and relationships per subnet.

**HIGHLIGHTS**

- Front-to-back interfacing of up to 10 subnets to form a network with up to 7,360 activities.
- Up to 10 subnets per master file.
- Up to 32 calendars.
- Four types of time relationships between work items.
- Multiple starts and ends.
- Reports easily modifiable.
- Progress reporting specifying actual start date and/or remaining duration.
- Three types of schedule dates: Actual, data, scheduled.
- Nine levels of milestones.
- Free-form or fixed-data input.

**CUSTOMER RESPONSIBILITIES**

All users should know the various features of this system before attempting to use it for actual project control. Users will need to know the fundamentals of the critical path technique before they can prepare input.

The customer must describe the activities which form the project network. This data may be recorded on diskettes for entry into the System/32 using an IBM 3740, or it can be entered directly from the keyboard. Processing and report requests may also be entered in either fashion.

The customer should provide for safekeeping of the diskette to ensure continued operation (backup). A *User's Guide* will also be provided. Procedure for installation will be furnished.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The JAS/32 is designed to operate on all models of the IBM System/32.

**SOFTWARE REQUIREMENTS**

- IBM System/32 System Control Programming (5725-SC1), Version 6 or later Source Entry Utility licensed program (5725-UT1).

**TERMS and CONDITIONS:** See PP Index



**SYSTEM/34 BASIC ASSEMBLER AND  
MACRO PROCESSOR  
5726-AS1****PURPOSE**

The Basic Assembler licensed program is a symbolic programming language used to write programs or subroutines for the IBM System/34. Source programs written in this language are processed by the Basic Assembler licensed program to produce relocatable object programs which are subsequently converted to executable format by the System/34 System Support Program Overlay Linkage Editor facility. The System/34 Libraries are used to store the source statements, relocatable object programs and executable 'load' programs.

The Basic Assembler may also be used for assembly of relocatable subroutines for use with System/34 RPG II and COBOL. The subroutines written in the Basic Assembler language are coded by the user and separately assembled. The process of program linking is accomplished during compilation of the RPG II and COBOL source programs.

**HIGHLIGHTS**

Some of the features provided by the Basic Assembler licensed program are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Convenient Data Representation
- Operand Field Expressions
- Source Identification - Sequence Fields
- Assembler Instructions
- Cross-Reference Listings
- Error Checking and Diagnostic Messages

**DESCRIPTION**

**System/34 Macros:** System/34 Macros provide support to the Assembler user through the Macro Processor for the following System Support Program facilities: Disk functions, printer operation, keyboard and display screen access, 1255 device control, binary synchronous communications, SNA/SDLC communications and other SSP services such as Timer, EOJ, Message Log, program load.

The macros are supplied to provide an interface to existing SSP support.

The BSC Macros provide communication with:

- Another System/34 (RPG II or Basic Assembler)
- System/32 (RPG II or Basic Assembler)
- System/3 (MLMP, CCP or RPG II)
- System/7 (MSP/7)
- System/360 (BTAM or TCAM/NCP)\*
- System/370 (BTAM, TCAM/NCP, VTAM/NCP, CICS/VS or IMS/VS)\*
- 3741 mdl 2 or 4
- 3747
- 5231 mdl 2 (Receive Mode only) - supported as 3741 mdl 2 or 4
- 5280 Distributed Data System
- Series/1 (supported as a System/3)
- \* **Note:** The 3704/3705 Emulation Program (EP) or Partitioned Emulation Program (PEP) extension to 3704/3705 NCP can be used to emulate the 2701.

Additional macros and macro extensions will provide support for the Interactive Communications Feature (SSP-ICF) provided by the System/34 SSP. Specific support is for:

- System/370 IMS/VS (IRSS and SNA/SDLC), CICS/VS, and CICS/DOS/VS using BSC or SNA/SDLC protocols
- System/3 mdl 15 CCP using BSC protocols
- System/34, System/32, 5110, 3741, 5230 using BSC protocols (point-to-point only)

The assembler macros will support the loadable SORT interface from the System/34 Utilities Program and the SSP checkpoint/restart facility.

Additional System/34 macros provide interfaces to the scientific instruction set.

Additional macros may be written by the user using the macro definition language provide.

All macro instructions are expanded into Assembler source language statements by the Macro Processor that in turn can be processed by the Basic Assembler.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

IBM System/34 Basic Assembler and Macro Processor licensed program runs on all models of the System/34 and supports all features.

**SOFTWARE REQUIREMENTS**

The current release of IBM System/34 Basic Assembler and Macro Processor licensed program operates under control of the current release of IBM System/34 System Support Licensed Program (5726-SS1).

**Program Use During Customer Preinstallation Testing:** The System/34 Basic Assembler and Macro Processor licensed program (5726-AS1) is available to customers for preinstallation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

**DOCUMENTATION**  
(available from Mechanicsburg)

*System/34 Basic Assembler and Macro Processor Licensed Program Specifications (GC21-7677) ... System/34 Basic Assembler and Macro Processor Reference Manual (SC21-7705) ... System/34 Reference Summary (GX21-7674).*

RQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/34 BASIC  
5726-BA1**
**PURPOSE**

BASIC (Beginners All-purpose Symbolic Instruction Code) is a high-level interactive language for users who have commercial data processing requirements or who need to solve business, technical, and scientific problems. IBM System/34 BASIC is designed to be easy-to-learn, easy-to-use, and easy-to-remember, enabling the programmer or casual user to concentrate on the application aspects of the programming task. The System/34 BASIC implementation uses a design such that code not executed does not take up main storage, and program size is not limited to region size. System/34 BASIC has the ease-of-use characteristics of an interactive interpreter, and yet offers some of the performance advantages of a compiler.

System/34 BASIC is designed in accordance with the American National Standard Minimal BASIC (x3.60-1978) as understood and interpreted by IBM as of September 1979.

**HIGHLIGHTS**

System/34 BASIC offers the following functions and advantages to the user:

- Variable and function names can be up to 8 characters long.
- Longer variable and function names provide many unique names and improve the readability of BASIC programs.
- Program lines can be up to 4 display screen lines long. Read/write lists and other statements that extend for more than one line can be entered as one statement.
- A BASIC program line can contain multiple BASIC statements. Multiple statements on a line can shorten a program.
- BASIC program lines can be selectively renumbered. By renumbering program lines you may move lines within a program.
- The number of program statements is not limited by region size.
- Allows the user to stop program execution, examine or change variables, and then resume execution.
- The display may be formatted using the FIELDS parameter of the INPUT and PRINT statements. Most of the screen formatting capability of SFGR may be performed in BASIC.
- The screen may also be formatted using formats created by the screen format generator SSP Utility or by the Screen Design Aid (SDA) portion of the Utilities Program.
- Checks the syntax of each source statement. If a syntax error occurs, the operator can press the HELP key to automatically display the syntax and explanation of the BASIC statement used.
- BASIC program execution flow may be traced and displayed or printed. Simple commands control the start and stop of tracing.
- Provides a HELP function that displays descriptions of the BASIC commands, statements, and intrinsic functions. The HELP function also displays the syntax of each BASIC command and statement.
- BASIC program lines can contain a label. A line can be referenced with either a line number or a label. Labels can simplify programming.
- BASIC procedures may be created. BASIC procedures contain BASIC commands which are used to control the loading and running of BASIC programs. BASIC procedures may also contain BASIC statements, comments and data.
- BASIC supports input and update operations for user switches and local data areas.
- BASIC supports all System/34 file organizations and file access methods (see "Software Requirements").
- Fields of a disk file can be in zoned decimal, packed decimal, binary (1, 2, 3, and 4 bytes), or alphanumeric format. Files may be interchanged between BASIC, COBOL, and RPG.
- You can read and write library source members and OCL procedure members from a BASIC program.
- Logical (AND, OR, NOT) and Relational (for example, >, <, =, <=, >=, and <>) operators are provided.
- Input/Output may be formatted with the FORM or IMAGE statement or will assume default formats, if unformatted.
- Command keys provide forward and backward full screen paging through a program and the roll keys provide up and down line-at-a-time paging when the BASIC list command is being used.
- Supports the following matrix operations:
  - Addition
  - Subtraction
  - Multiplication by a scalar
  - Setting of all elements to a constant

– Creation of an array of index elements that specifies ascending or descending sequence of the data associated with each index element.

- Matrix multiplication, matrix inversion and determinant calculation suggested user-defined functions are provided in the BASIC reference manual.
- ADDROUT SORT files can be read by BASIC.
- A parameter (XREF) on the LIST command provides a cross-reference of a BASIC program.
- The BASIC OCL command procedure converts a BASIC source member into a BASIC member ready to be executed. All invalid statements are flagged and changed to comment statements. This procedure can simplify conversion of programs from another system.
- Support for Multiple Requestor (MRT) programs.
- Support for interactive communications (SSP-ICF).
- Support for timed wait in (SSP-ICF) as an intrinsic function.
- Cross-reference program listings provided.
- An error message may be written on the error line of a display.
- Enhanced support for multiple spooled printer files in one program.
- Support for additional error control on the file OPEN statement.
- Support for specifying, on the OPEN statement, a value for disk file extension when using extendable disk files.
- Additional TRACE support.
- Library name added to program listings.
- Support added to trap all run time syntax errors.
- Option added to BASICP, and BASICR to print HELP STATUS.

**DESCRIPTION**

**BASIC Design Overview:** System/34 BASIC is an interactive compiler; it provides the ease-of-use characteristics of an interactive interpreter. For example, some characteristics are: Syntax checking after each statement is entered; capability to run the program immediately; capability to stop program execution, examine or change variables, and then resume execution. After each statement is entered, it is changed to an internal source text. It is because the program is maintained in this internal source text that it can easily be changed, corrected, or executed by the programmer.

System/34 BASIC also provides some of the performance advantages of a compiler. The primary advantage of a compiler is improved execution performance over that of an interpreter. System/34 BASIC provides this advantage when there is sufficient region-size to contain all of the program during execution, because the source text is compiled only once for that execution of the program.

**Support for Multiple Requestor (MRT) Programs:** BASIC has added support to allow users to code MRT (multiple requestor) programs. This capability can provide improved performance in some situations. By recoding an SRT program as an MRT program, users can reduce the number of active copies of the program to 1. In the case of frequent swapping, performance may be improved by using more MRT programs. Caution must be exercised to ensure that MRT programs are not used in situations that could cause multiple users to wait for an excessive amount of time. To run a BASIC MRT program, a BASIC procedure must be written by the user.

**Support for Interactive Communications (SSP-ICF):** BASIC users may code programs that handle communications using SSP-ICF. No restrictions are placed on the BASIC programmer. All subsystems available to the RPG II and COBOL programmer are available to the BASIC programmer except that BASIC does not support the encryption routine for the Finance Subsystem.

**Support for Timed Wait in SSP-ICF as an Intrinsic Function:** BASIC users may use the SSP-ICF function of a timed wait. This capability is provided as an intrinsic function. The BASIC programmer need only place a timer interval of 'HHMMSS' in the intrinsic function and the timer wait is set. A 'WAITIO' operation is used to test the completion of the operation.

**Cross-reference Program Listings Provided:** BASIC supports an option in the LISTP command and the BASICS procedure to provide a sorted cross-reference listing used in the program as follows:

- line numbers
- labels
- variable names
- user-defined functions

The cross-reference listing has two sections - one section for variables, arrays, and user-defined functions, and a section for line numbers and

**S/34 BASIC (cont'd)**

labels. This assists users in documenting and debugging BASIC programs.

**An Error Message may be Written on the Error Line of a Display:** BASIC allows users to display a user-defined error message on the error line of a currently-attached display. This function places up to 78 characters on the last line of the display after saving the previous contents of the line and locking the keyboard. When the operator presses the Error Reset key, the previous contents of the line are redisplayed and the keyboard is unlocked. This function can be used to provide operator guidance during entry/edit applications.

**Enhanced Support for Multiple Spooled Printer Files in One Program:** Restrictions that were originally placed on the BASIC user when spooling printed output have been removed. Users are no longer restricted in the number of print files opened or the number of times they are opened and closed.

**Support for Additional Error Control in the File OPEN Statement:** BASIC allows users program control of additional file error conditions that were previously trapped by the system. The user is able to intercept errors such as:

- opening an indexed file for direct or consecutive update or output
- opening a direct file for consecutive output
- opening a consecutive file for direct output
- opening a direct or consecutive file for indexed access

**Support for Specifying, in the OPEN Statement, a Value for Disk File Extension when Using Extendable Disk Files:**

BASIC allows users to specify a file extend value on the disk file OPEN statement. Previously, this was defaulted to by BASIC and the user could not override it with the OCL. Users may also specify that a file is not extendable.

**Additional TRACE Support:** The TRACE function has been enhanced to allow STEP mode (in STEP mode one statement is executed each time the ENTER key is pressed). To start this function, the keyword STEP has been added to the TRACE statement. This enhancement provides greater flexibility when debugging complex programs.

**Support Added to Trap All Run-Time Syntax Errors:** Run-time syntax errors are intercepted as conversion errors. Also, the OPEN statement has been modified to permit users to explicitly specify NOSHR.

**Option Added to BASICP and BASICR to Print HELP STATUS:** An option has been added to BASICP and BASICR to allow the user to obtain a listing of the same information provided by HELP STATUS in BASIC mode. This information is useful to improve performance and/or storage utilization of programs that are initiated with BASICP or BASICR.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/34 BASIC licensed program will run on models of the IBM System/34 having at least 48K bytes (mdl BXX) of main storage. The minimum region size is 24K bytes. Programs may require a larger region size. A larger region size than is required may improve performance.

IBM System/34 BASIC requires a print belt with a minimum of 64 characters to print all of the uppercase characters on the IBM 3262 or 5211 printer. A print belt with a minimum of 96 characters is required to print lower case characters.

When BASIC is installed with the Multinational Character Set feature, keyboards that do not contain the \$, # or < symbols are used, these characters must be entered as their two character hexadecimal equivalent.

**SOFTWARE REQUIREMENTS**

All IBM System/34 licensed programs are designed to operate in an environment that includes the System Support Program (5726-SS1) or its equivalent.

The BASICR Operation Control Language command provides the capability to evoke a BASIC program without using BASIC command mode. BASICR also supports the use of a procedure that could contain // FILE OCL to override parameters in a BASIC file OPEN statement.

The System Support Program (5726-SS1) or its equivalent must be configured for extended disk data management to use BASIC support for deleted records.

FORTRAN programs or programs using the Scientific Instruction Set may not be executed concurrently with BASIC command mode or program execution.

BASIC does not support logical processing of unformatted sequential access files created by the System/34 FORTRAN IV licensed program (5726-FO1).

Source Entry Utility (SEU as part of Utility Program, 5726-UT1) is available to help the data entry person enter BASIC source statements into a library source member. Previously entered source statements may also be changed with SEU. A BASIC program must be in a library source member in order to use SEU. The SEU scan feature may also be useful when changing a BASIC program.

The SORT program can be used to sort all BASIC disk data record files.

**COMPATIBILITY**

Differences do exist between 5100/5110 BASIC and System/34 BASIC. Conversion of most source programs will be required. An outline of these differences will appear in the *System/34 BASIC Reference Manual*.

**Program Use During Customer Pre-installation Testing:** The System/34 BASIC licensed program (5726-BA1) will be available to customers for pre-installation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/34 BASIC Licensed Program Specifications (GC21-7841) ... System/34 BASIC Reference Manual (SC21-7835).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/34 BASIC SUBSET  
5726-BA2**

**PURPOSE**

This program is intended to support the Preconfigured IBM System/34 System Support Program Subset (5726-SS2).

BASIC (Beginner's All-purpose Symbolic Instruction Code) is a high-level interactive language for System/34 users who have commercial data processing requirements or who need to solve business, technical, and scientific problems. System/34 BASIC is designed to be easy-to-learn, easy-to-use, and easy-to-remember, enabling the programmer or casual user to concentrate on the application aspects of the programming task. The System/34 BASIC implementation uses a design such that code not executed is kept out of main storage, and program size is not limited to region size. System/34 BASIC has the ease-of-use characteristics of an interactive interpreter and yet offers some of the performance advantages of compiled code (see BASIC Design Overview).

System/34 BASIC is designed in accordance with the American National Standard Minimal BASIC (x3.60-1978) as understood and interpreted by IBM as of October 1979.

**HIGHLIGHTS**

System/34 BASIC offers the following advantages to the user:

- Variable and function names can be up to 8 characters in length. Longer variable and function names improve the readability of BASIC programs.
- A source statement can be up to four display screen lines in length. Thus, read/write lists and other statements that extend for more than one line can be entered on one statement.
- A BASIC program line can contain multiple BASIC statements. Multiple statements on a line shorten a BASIC program.
- BASIC program lines can be selectively renumbered. By renumbering program lines, you may also move lines within a program.
- The number of statements in a program is not limited by the region size.
- You can stop execution of a program or a BASIC procedure to examine or change variables and then resume execution.
- BASIC checks the syntax of each source statement. When a syntax error occurs, the cursor is positioned under the error.
- BASIC program lines can contain a label. You can reference a line with either a line number or a label. Labels improve program readability.
- BASIC has two entry modes: Program and data. When program mode is active, you can enter BASIC program lines and BASIC commands, which are syntax-checked as they are entered. When data mode is active, you can enter any data that you want to save in a library source member. The data is not syntax-checked.
- When data mode is active, you can create BASIC procedures which can be used to load and run BASIC programs. BASIC procedures can contain BASIC commands, BASIC statements, comments, and input data.
- BASIC supports input and update operations for user switches and the display station local data area.
- BASIC supports all System/34 file organizations and file access methods (see "Software Requirements").
- The fields of a disk file can be in zoned decimal, packed decimal, binary (1, 2, 3, and 4 bytes), or alphanumeric format; thus, you can create and update files in BASIC that can also be used by RPG II.
- You can read to and write from library source members and System/34 procedure members from a BASIC program.
- BASIC allows multiple print files.
- BASIC can use display screen formats created by the screen format generator SSP utility program (SSFGR).
- You can write to and read from the display screen using the PRINT FIELDS and INPUT FIELDS statements. The display screen is formatted by a character array in the PRINT FIELDS or INPUT FIELDS statement. A single field can be formatted by a character expression.
- After BASIC programs are entered, they can be saved in either library source or library subroutine members. For enhanced performance when loading a program, save it in a subroutine member.
- After BASIC procedures are entered, BASIC saves them in library source members.
- The procedure command, BASICP, allows you to execute BASIC procedures from System/34 command mode.

- The procedure command, BASICR, allows you to execute BASIC programs from System/34 command mode.
- The procedure command, BASICS, allows you to convert a source member containing a BASIC program into a subroutine member and to obtain a listing of all syntax errors (if any exist) in the program. The BASICS procedure command must be entered from System/34 command mode.
- BASIC stores numbers internally in a decimal, floating-point format. This format can prove the magnitude and accuracy required by the scientific user and the discrete penny accuracy required by the accountant and commercial user.
- BASIC supports logical (NOT, AND, OR) and relational (<, >, >=, <=, <>, =) operators.
- Input and output can be formatted with the FORM statement, and output can be formatted with the IMAGE statement. If unformatted, input and output will assume default formats.
- When the BASIC LIST command is entered, command keys provide forward or backward, full-screen paging through a BASIC program or a BASIC procedure, and the roll keys provide up and down, line-at-a-time paging.
- BASIC supports the following matrix operations:
  - Addition
  - Subtraction
  - Multiplication by a scalar
  - Setting of all elements to a constant
  - Creation of an array of index elements that specify the ascending or descending sequence of the data associated with each index element.

**DESCRIPTION**

**BASIC Design Overview:** System/34 BASIC subset is an interactive compiler; it provides the ease-of-use characteristics of an interactive interpreter. Some of these characteristics are: Syntax checking after each statement is entered (if program mode is active); the capability to run a BASIC program immediately; and the capability to stop program execution, examine or change variables, then resume execution. After each statement is entered, it is changed to an internal source text. Because the program is maintained in this internal source text, it can easily be changed or corrected by the programmer.

System/34 BASIC subset also provides some of the performance advantage of compiler code. The primary advantage of a compiler is improved performance over that of an interpreter. System/34 BASIC subset provides this advantage when there is sufficient region size to contain all of the program during execution, because the source text is compiled only once for that execution.

When sufficient region size is not available, the compiler fetches as much source text as storage permits, compiles it, executes it, and goes back for more source text. Code not executed is not compiled.

For example, if there is sufficient storage for the main loop of a program, the source text for the main loop might need to be compiled only the first time through the loop, and, if compiled, can be used throughout the execution of the loop.

**Using the BASIC Licensed Program:** BASIC is invoked by entering the procedure command, BASIC. Once BASIC is invoked, a program can be entered from the keyboard, loaded from a library subroutine member (SUBR or R) or loaded from a library source member (SOURCE or S). As each statement is entered from the keyboard or from a library source member, its syntax is checked. Execution of a program can be started at any time with the RUN command. BASIC can also be used to enter and update other library source members.

The following System/34 BASIC Subset (5726-BA1) function is *not* supported:

- BASIC HELP

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

This IBM System/34 BASIC Subset (5726-BA2) runs on all models of IBM System/34 having at least 48K bytes of main storage. The



PROGRAM PRODUCTS

**S/34 BASIC Subset (cont'd)**

minimum region size is 24K bytes. Some programs might require a larger region size.

**SOFTWARE REQUIREMENTS**

This IBM System/34 BASIC Subset (5726-BA2) operates under the control of the IBM Preconfigured System/34 System Support Program Subset (5726-SS2), or Release 7 of 5726-SS1 while it is available, or its equivalent.

The System/34 BASIC Subset (5726-BA2) consists of parts of System/34 BASIC (5726-BA1) stabilized at Release 7. No release update or enhancements are planned.

The procedure commands, BASICR and BASCIP, allow you to invoke a BASIC program or a BASIC procedure, respectively, from System/34 command mode. The procedure command, BASICS, allows you to convert a library source member containing a BASIC program into a library subroutine member and to obtain a listing of all syntax errors (if any exist) in the program. The procedure commands, BASIC, BASICP, and BASICR, also support the use of a procedure that could contain a // FILE OCL statement which can be used to override parameters in a BASIC OPEN statement.

BASIC does not support the logical processing of unformatted sequential access files created by the System/34 FORTRAN IV licensed program (5726-FO1).

**System/34 Licensed Utility Programs:** The Source Entry Utility (SEU) portion of the Utilities Subset (5726-UT2) can be used to enter BASIC source statements into a library source member. The syntax of these statements must be checked later by BASIC. SEU can also be used to change programs that were previously entered with SEU or BASIC. Programs changed by SEU must be in library source members. The SEU scan function might also be useful for changing a BASIC program.

The Sort portion of the Utilities Subset (5726-UT2) can be used to sort BASIC disk record files.

**COMPATIBILITY**

Differences do exist between 5100/5110 BASIC and System/34 BASIC. Conversion of most source programs will be required. An outline of these differences appears in the *System/34 BASIC Reference Manual*.

**Program Use During Customer Pre-installation Testing:** The IBM System/34 BASIC Subset (5726-BA2) will be available to customers for pre-installation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/34 BASIC Subset Licensed Programming Specifications (GC21-9035) ... System/34 BASIC Reference Manual (GC21-7835) ... System/34 BASIC Command Reference Summary (GX21-7853).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/34 BUSINESS REPORT/APPLICATION  
DEVELOPMENT SYSTEM (SYSTEM/34 BRADS)  
5726-BR1****PURPOSE**

The IBM System/34 Business Report/Application Development System brings data base power to users of the IBM System/34. Using BRADS, users can productively develop and install system-justifying applications, often without becoming or hiring programmers.

Users can also expand the value of applications which run on their IBM System/34 by querying the data bases and by developing new reports.

**HIGHLIGHTS**

System/34 BRADS may be used to:

- Create, maintain and update data files.
- Create screen-driven data entry programs.
- Retrieve information from the files using a simple query.
- Create formatted reports using prompted report generation screens.
- Develop complete applications through use as a:
  - Highly productive development tool. The System/34 BRADS facilities can be used to create applications that execute under the control of System/34 BRADS.
  - Program generator for screens and reports. The screen and report programs generated by BRADS can be added to other BASIC programs to create applications that execute independently or in conjunction with System/34 BRADS.
- Create additional queries and reports for applications by creating BRADS file definitions.
- Provide design documentation maintained as a by-product of System/34 BRADS, which fulfills much of the user's documentation requirements.

Files may be shared for input among workstations while executing QUERY, REPORT, or COPY commands.

System/34 BRADS also contains a spread sheet generator facility which may be used to:

- Produce forecasts showing expected revenues, operating costs, capital expenditures, taxes, and other expenditures.
- Try a variety of what-if adjustments on the original spread sheet data to investigate alternative plans.
- Produce reports that examine the differences (variances) between plans or between plans and actual performance.
- Produce reports showing percentage relationships between rows or between columns (for example, growth from month-to-month).
- Consolidate or deconsolidate plans and evaluate performance of separate operating entities (for example, departments, companies, products).
- Combine historical and predictive data together.

The spread sheet generator facility provides the user flexibility in addressing applications such as:

- Balance Sheets
- Budget Planning and Forecasting
- Cash Requirements and Forecasting
- Commercial Loan Evaluation
- Common Sizing Analysis
- Comparative Analysis
- Consolidation and Deconsolidation
- Investment Analysis
- Material and Labor Requirements
- Manpower Projection
- Merger and Acquisition Analysis
- Product Planning
- Profit and Loss Statements
- Real Estate Investment

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility of personnel selection and training, installation and continued day-to-day operation lies solely with the customer. The customer is responsible for error detection and analysis, and submission of APARS, but can obtain phone assistance from the Atlanta National Market Support Center.

The customer is responsible for applying any program fixes distributed by IBM Central Service.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/34 Business Report/Application Development System (System/34 BRADS) is designed to operate on all models of the IBM System/34 having at least:

- 96K bytes of main storage
- One Printer
- One 1920-character display with keyboard

Since BRADS is an SRT requiring a 64K region, additional main storage will enhance performance when more than one workstation is operating concurrently. System/34 BASIC requires a minimum of 64 characters to print all of the BASIC characters. A printer with a minimum of 96 characters is required to print both upper and lower case characters.

**SOFTWARE REQUIREMENTS**

The IBM System/34 Business Report/Application Development System (System/34 BRADS) programs are written in IBM System/34 BASIC programming language, and are designed to execute under control of Release 7 or later of System/34 System Support Program (5726-SS1) and System/34 BASIC (5726-BA1), or Preconfigured System/34 System Support Program Subset (5726-SS2) and System/34 BASIC Subset (5726-BA2). System/34 Utilities (5726-UT1 or 5726-UT2), which includes SORT, is required for execution.

**Customer Education:** First time System/34 BRADS users should read self-study manuals: *System/34 BRADS Learning 1 and Learning 2*. A similar publication, *System/34 BRADS Learning 3*, covers the spread sheet generator facility.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/34 BRADS Reference* (SB30-2550) ... *System/34 BRADS Reference - Spread* (SB30-2553) ... *System/34 BRADS Learning 1* (SB30-2547) ... *System/34 BRADS Learning 2* (SB30-2548) ... *System/34 BRADS Learning 3* (SB30-2552) ... *System/34 BRADS Messages* (SB30-2549) ... *System/34 BRADS Planning Guide* (GX60-0521) ... *BRADS Marketing Flyer* (G580-0390) ... *BRADS Features and Sample Reports* (G280-0237) ... *System/34 BRADS Licensed Program Specifications* (GB30-2554).

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/34 COBOL COMPILER AND LIBRARY  
5726-CB1**

**PURPOSE**

IBM System/34 1974-level COBOL is a licensed program that operates under control of the System/34 System Support Program (5726-SS1). The compiler and library are disk resident. The compiler requires as input a COBOL source language program and produces as output, by means of the system's Overlay Linkage Editor, a System/34 machine language object program cataloged in an object library. A source program listing, diagnostic messages, and main storage map can also be requested.

This compiler is designed according to the 1974 standard, which makes it more compatible with other COBOL compilers. The high level of function makes it more valuable to users who wish to do the major development of application programs centrally and then distribute the source code for final development and testing to a System/34.

**Enhancements**

- Language extensions to support workstations and interactive communications using SSP-ICF.
- The COBOL SORT/MERGE verbs are supported for up to eight input files. Multiple sorts are allowed in the same program.
- Nested IF statements are supported.
- ADD, SUBTRACT, and MOVE CORRESPONDING are now supported. This will aid users allowing a reduction in the number of instructions required to edit group items for printing or data conversion of group items.
- Support for abbreviated combined relations will allow users to code implied subjects and operands such that the following statement will be valid:  
If A = B, OR C...
- Substring capability has been added so the user can now use the verbs STRING and UNSTRING to combine or take apart fields respectively. These powerful instructions are useful in text processing.
- Table processing has been enhanced to support the ASCENDING/DESCENDING options and the functions:
  - SEARCH
  - SEARCH ALL
- Variable length tables are also supported by the OCCURS DEPENDING ON option to allow the user to restrict table searches to valid data only and thus save processing time.
- The INSPECT verb replaces the 1968-level EXAMINE. The function has been enhanced to allow use to multiple characters.
- File processing support:
  - The record DELETE option is supported.
  - Add to sequential files is supported via the OPEN WITH EXTEND option.
  - The START verb will support NOT LESS THAN as well as EQUAL keys which will allow the user to do generic searches on indexed files.
  - Optional files are supported to allow the user to continue to run even if some of the files do not exist.
  - The DYNAMIC ACCESS option is supported so that a user can now process the same file both sequentially and randomly without having to doubly define the file.
  - The user can specify top and bottom margins for a printer file.
  - The FILE STATUS function is supported so that the user can interrogate the result of a file operation.
  - USE after STANDARD ERROR/EXCEPTION is supported to allow the user to combine error/exception logic in one section of the program.
  - RERUN is supported. This allows a user to checkpoint long running programs and restart them from the last checkpoint in case of a program failure. Multiple programs using RERUN can be executing at the same time.
- The value clause for level 88 supports multiple values. The THROUGH option also allows users to easily do range checking.
- Multiple result fields in arithmetic statements are supported.
- The REMAINDER option of the DIVIDE is supported.
- The RENAMES capability has been extended with:
  - Level 66 items
  - THROUGH option is supported
- The edit character of '/' for data edits is allowed.
- The COPY function supports the REPLACING option. This allows users to replace copied character strings, either entirely or partially, to fit the requirements of the source program.

- The 1974 DEBUG module is supported. This gives the user a special group item called DEBUG-ITEM which can be processed at desired debug points in the program. This support also includes both compile and execution time switches for suppression of the debug function.
- Additional debug support of EXHIBIT and TRACE.
- Additional compiler options include:
  - A cross-reference listing of data names and labels.
  - Flagging of all statements exceeding a specified FIPS (Federal Information Processing Standard) level.
  - Syntax-only compiles to allow users to check syntax prior to generating object code.
- Semi-interactive syntax checking is provided to allow users to compile and correct source programs without requiring a source listing printout.
- Enhanced support for multiple spooled printer files in one program.

**Industry Standards:** System/34 COBOL is designed according to the following industry standards as understood and interpreted by IBM as of September, 1978:

- American National Standards (ANS) COBOL, X3.23-1974 ANS COBOL is identical to ISO 1989-COBOL, approved in February, 1978 by the International Organization for Standardization. The following ANS processing modules are included:

```

2 NUC 1, 2
2 TBL 1, 2
2 SEQ 1, 2
2 REL 0, 2
1 INX 0, 2
2 SRT 0, 2
1 SEG 0, 2
2 LIB 0, 2
1 DEB 0, 2
1 IPC 0, 2
  
```

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level specified for American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the standard.

- December 1975 Federal Information Processing Standard, (FIPS PUB 21-1), Low-Intermediate level. However, additional support is provided for many features of higher FIPS level.

The following exceptions apply to the above standards:

- The DELETE function is implemented by marking deleted records with a hexadecimal FF in position one of the record. When operating with DELETE mode files, the user is excluded from placing a hexadecimal FF in this position.
- No position in a key for indexed random READ or indexed START statements can be hexadecimal FF.

**Additions:** In addition to the standard language, the following additional features are provided:

- Extensions to the modules of American National Standard COBOL listed above include certain language elements which are defined in higher levels of the American National Standard COBOL than those listed.
- The following extensions are also supported:
  - Use of apostrophe instead of quotes.
  - Extended data types of computational-3 (packed) and computational-4 (binary).
  - Indexed file support for CORE-INDEX.
  - Additional debugging support with EXHIBIT and TRACE.
  - ACCEPT from console.
  - DISPLAY upon console.
  - File definition using the FILE CONTROL entries of SELECT and ASSIGN.
  - Standard error handling using FILE STATUS and the USE procedure in the DECLARATIVES SECTION.
  - Extensions to standard file processing verbs for:
    - OPEN/CLOSE
    - READ/WRITE
  - Support for display format indicators as boolean data types (0,1) and turning them on and off via the SET statement.
  - Acquire and release workstations and SSP-ICF sessions supported through ACQUIRE and DROP.
  - Support for UPSI switches.
  - ACCEPT/DISPLAY statements support reading and writing of the work station local data area (WSDA).

**Additional Compiler Features:**

## S/34 COBOL Compiler and Library (cont'd)

System/34 COBOL offers additional compiler features which can be chosen by the programmer:

- **FIPS Flagger** - Issues messages identifying statements and clauses in a COBOL source program that exceed a user-specified FIPS level.
- **Symbol Cross-Reference** - Produces two alphabetic listings of user-specified names; one of names defined in the Data Division and one of names defined in the Procedure Division.
- **Semi-Interactive Debugging** - Builds a file that can be retrieved and displayed at a work station. The file that is created contains source statements, merged diagnostics and summary information. The file can be moved by an IBM-supplied procedure to a library member, which can then be reviewed and updated using SEU (Source Entry Utility). The source can then be reintroduced to the compiler. Inserted messages will be ignored by the compiler.
- **Syntax Checking Compilation** - Scans a source program for syntax errors. If errors are found, error messages are generated. No object code is produced.
- **Parameter Prompting** - Allows the user to request prompt screens for the specification of parameters needed for entering, updating, compiling, or executing COBOL programs.
- **Multiple Printer Files** - Allows the specification of up to 15 different printer files in the same program.
- **Standard Program Linkage** - Allows programs written in System/34 COBOL to call or be called by other programs written in System/34 COBOL, System/34 FORTRAN, or System/34 Assembler language.

**Disk File Support:** The access methods supported by System/34 COBOL, based on physical data organization, are as follows:

- **Sequential Organization**
  - Consecutive processing - including update in place and consecutive add (extend).
  - Random processing - by relative record number, including updating.
- **Indexed Organization**
  - Random processing - by key or relative record number.
  - Sequential processing - by key including file loading.
- **Direct Organization**
  - Random processing - by relative record number, including updating and file loading.
  - Consecutive processing.

Standard System/34 disk labels are mandatory for all disk files, nonstandard labels cannot be used except as data records within a file.

Record size can range from 1 byte to 4,096 bytes, and records may be processed as blocked or unblocked. The block size for a given file may be varied between programs up to a maximum block size of 9,999 bytes. Logical records may span physical disk sectors, blocks, tracks, or cylinders.

Offline multivolume files are supported. (System/34 allows these files only on the diskette magazine facility.)

**Workstation Support:** Low-volume, unformatted, line-at-a-time workstation support is provided with the ACCEPT and DISPLAY verbs. File processing has been extended to support a TRANSACTION organization type. Using this organization type, the user can define one file that supports single or multiple workstations, and single or multiple SSP-ICF sessions in any combination. Since the support is provided in a COBOL logic file, the user codes standard COBOL verbs, with extensions where necessary, to accomplish the job.

**Enhanced Support for Multiple Spooled Printer Files in One Program:** COBOL provides enhanced support for multiple spooled print files in a program. This enhancement removes a previous restriction of eight spooled print files in a program. Also, these printer files can be opened or closed at any time. Any spooled print files that are closed during the execution of a program will be marked as 'Ready to Print', and will be printed by the spool writer according to the print files position in the spool queue, regardless of whether or not the program has ended. Any COBOL programs compiled prior to Release 8 will have to be recompiled in order to utilize this function. The restriction of 25 total files in a COBOL program still applies.

**Data Communications:** The System/34 Interactive Communications Feature (SSP-ICF) is supported for the COBOL user via TRANSACTION organization type. Standard COBOL verbs, with extensions where necessary, may be used since this organization type provides a COBOL logical file support.

**Operational Considerations:** The System/34 COBOL compiler runs on all models of System/34. The compiler will execute on a minimum system of 32K bytes. The System/34 COBOL compiler requires an 18K-byte region for execution. Additional main storage may allow

faster compilation of a large source program. The Overlay Linkage Editor constructs overlays (if necessary and possible) to fit the object program into the available main storage. The region size required for an object program is a function of source program complexity and its ability to be overlaid.

The System/34 COBOL compiler accepts source statements from the source member on disk, from a procedure member on disk, or from a display station keyboard. Compiler output can consist of a source listing and diagnostic messages on the printer, messages on the display screen, an object module on disk, and a diagnosed source file.

During execution of the COBOL object program, input is accepted from the keyboard, from a library procedure member (if that procedure is defined as the system input device), or from data files on disk. Output from the executing COBOL program is to the printer, display screen, or to data files on disk.

### CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The IBM System/34 COBOL licensed program runs on all models of IBM System/34.

#### SOFTWARE REQUIREMENTS

The current version of the IBM System/34 COBOL licensed program operates under control of the current version of the IBM System/34 System Support Program (5726-SS1).

#### CONVERSION/COMPATIBILITY

There is a high degree of compatibility between the System/34 COBOL compiler and System/38 COBOL, the System/3 subset '68 COBOL, System/32 PRPQ COBOL, and System/34 PRPQ COBOL compilers. Differences do exist and some conversion effort will be required.

Installation of System/34 licensed programs is a customer responsibility.

**Program Use During Customer Pre-installation Testing:** The IBM System/34 COBOL (5726-CB1) will be available to customers for pre-installation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

#### DOCUMENTATION

(available from Mechanicsburg)

*System/34 COBOL Licensed Program Specifications (GC21-7745) ...*  
*System/34 COBOL Reference Manual (SC21-7741).*

**TERMS and CONDITIONS:** See PP Index

**CLIENT ACCOUNTING AND FINANCIAL REPORTING  
SYSTEM FOR SYSTEM/34  
(Single Program mode) (CAFRS)  
5726-C21**

**PURPOSE**

The IBM System/34 Client Accounting and Financial Reporting System (CAFRS) offers the public accounting profession a comprehensive aid to solving the problems of client accounting. It assists the certified public accountant, public accountant, or bookkeeper in operating a more profitable and productive practice.

**HIGHLIGHTS**

CAFRS can be installed without in-house programming capability:

- File sizes may be changed, within limits, as needed, by the system tailoring procedure to allow additional clients to be serviced or to offer optional processing features to more clients
- File load and maintenance procedures provided
- System-controlled master and transaction file backup procedures
- Easy-to-use runbook
- Step-by-step installation activity plan and detail user's information supplied by application reference manual

CAFRS provides ease of use options to the user:

- Designed to fit industry requirements
- OCL procedures, sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of procedures, prevents execution of a program until preceding programs have been completely and successfully executed
- Compatible online/offline file maintenance and transaction data entry via the System/34 keyboard or diskettes created on the 3740 Data Entry System
- Dynamic backup and recovery system forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Selective printing options are available for many report functions

CAFRS uses recognized accounting techniques and terminology to provide a solid accounting system:

- Sample user-oriented forms for data preparation, file, creation, audit and control are provided
- Clear audit trails and control techniques are provided
- Standard types of accounting reports, such as journals, ledger, trial balance and financial statements plus special supporting analyses and lists, are provided

**DESCRIPTION**

The Client Accounting and Financial Reporting System is a ready-to-execute application for the small accounting firm.

It combines two data entry approaches; operator-oriented and batch-oriented. Support is provided for transaction entry through the System/34 keyboard or through a diskette created on a 3740 Data Entry System.

The application has certain records within a control file which contain questionnaire responses. These records allow the application to select file sizes and functions to suit each firm's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The system tailoring procedure allows these responses to be entered.

The system tailoring procedure utilizes the answers to a series of questions regarding the firm's requirements. It provides the following:

- Tailoring the application on-site at installation time.
- Allows the user to activate and deactivate provided functions as requirements change.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted, as needed, by rerunning the system tailoring procedure.

An *Application Installation Guide* provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, control forms with suggested procedures. The *Application Reference Manual* provides information on the day-to-day use of the application.

The runbook provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs on a System/34. The *Procedure Reference Summary* is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly trained in the particular application.

Instructional material in the form of a self-study course is provided for the operator for self-training in the use of the runbook (System/32 only).

An *Application Logic Manual* is provided for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

The System/34 licensed program makes available Client Accounting and Financial Reporting System on System/34 in single program mode. The System/34 licensed program supports one work station, no spooling, no multiprogramming and no file sharing.

It is designed to allow flexibility in the options included to meet an individual client's special needs:

- Up to 13 periods per fiscal year
- Automatically calculated journal entries based upon algorithms previously defined by the accountant
- Multiple special purpose journals with source code, related accounts, and headings specified by client
- Ability to correct prior periods
- Extensive chart of account flexibility to provide desired heading and account description information, up to 9 levels of subtotals for combining accounts, spacing and paging control
- Optional titles and formats for financial statements

Support is provided for the optional consolidation of multiple clients. Maintenance is provided for eliminating entries. Controls are included to force fiscal period alignment of clients being consolidated. The same processing capabilities are available for the consolidated client as for others.

Optional features and reports are available for any client, such as:

- Last year comparative data on financial statements
- Print suppression of zero-balance accounts on financial statements
- Balance sheet
- Income and expense statement
- Combined department income and expense reporting
- Income and expense comparison to budget
- Income and expense account balance comparison to a specified account balance, by department
- Income and expense account balance comparison to a client-specified base, such as number of rooms, square feet, or miles driven
- Supporting schedules
- Statement of changes in financial position with related worksheet and ability to process adjustments
- Reporting of financial ratios, defined by client, with comparison to industrial averages
- Employee payroll register
- Printing of 941-A and W-2 forms
- Accountant's transmittal letter
- Notes to the financial statements

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer. For customers who have modified their installed System/32 IAPs and who choose to have IBM make the same modifications on the System/34 product, the reinstallation of the modifications on the new product will be at additional charge under SES. The customer is responsible for transferring data files from one system to the other. Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

This IBM System/34 licensed program will execute on all models of the System/34, in Single Program Mode. The programs are compiled assuming a 32K minimum system. Because of volumes and time



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PP 5726-C21.2  
May 83  
Major Revision

PROGRAM PRODUCTS

**CAFRS (cont'd)**

constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-Character Record feature (#5455) and Feature Group A (#4004).

For presentation purposes on the reports, left and right parentheses have been included to indicate a credit or debit dollar amount opposite of an account's normal balance. The 64-character set feature is required for the System/34 to print the parentheses.

Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other licensed program or user-written program may co-reside with this Application unless stringent coding requirements for these programs are met to insure compatibility with the Client Accounting and Financial Reporting System. The *Application Logic Manual* discusses in detail the coding conventions used for the development of CAFRS.

**SOFTWARE REQUIREMENTS**

The IBM System/34 licensed programs are written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support Program (5726-SS1). IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Work Station Utility is required for execution of the programs. The System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Installation Guide* (SB30-0231) ... *Reference Manual* (SB30-0232) ...  
*Runbook* (SB30-0233)

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**SYSTEM/34 CLIENT ACCOUNTING AND  
FINANCIAL REPORTING SYSTEM (CAFRS II)  
5726-C22**

**PURPOSE**

The IBM System/34 Client Accounting and Financial Reporting System (CAFRS II) offers the public accounting profession a comprehensive aid to solving the problems of client accounting. It helps the certified public accountant, public accountant, or bookkeeper to operate a more profitable and productive practice.

**HIGHLIGHTS**

- File sizes may be changed, within limits and as needed, by the system tailoring procedure to service additional clients or offer optional features to more clients.
- File load and file maintenance procedures are provided.
- System-controlled master and transaction file backup procedures are provided.
- Easy-to-use runbook and operator self-study courses are available.
- Step-by-step installation activity plan and detailed user's information are supplied in the application reference manuals.
- OCL procedures, sort specifications, and processing programs are packaged into logical work units which simplify system operation.
- Monitoring of procedures prevents execution of a program until preceding programs have been completely and successfully executed.
- Compatible online/offline file maintenance and transaction data entry.
- Dynamic backup and recovery system, optional at system tailoring, forces periodic backup of master files and edited transactions, and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files.
- Selective printing options are available for many report functions.
- Standard types of accounting reports, such as journals, ledgers, trial balances, and financial statements, plus special supporting analyses and lists, are provided.

**DESCRIPTION**

The Client Accounting and Financial Reporting System II is a ready-to-execute application.

It combines two data entry approaches: Operator-oriented and batch-oriented. Support is provided for transaction entry through a System/34 workstation or through a diskette created on a 3740 Data Entry System.

The application has certain records within a control file which contain questionnaire responses. These records allow the application to select file sizes and functions to suit each firm's needs. The questionnaire responses are typed in during initial installation and may be changed as needed. The system tailoring procedure allows these responses to be entered.

An *Application Reference Manual* provides a step-by-step installation activity plan, including sample numbering systems, sample input and maintenance data forms, file loading sequences, and control forms, with suggested procedures. The *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs on a System/34.

Instructional material in the form of a self-study course is provided for operator self-training in the use of the *Runbook*.

An *Application Logic Manual* is provided, as basic licensed material, for use by the self-sufficient customer and for continuing SE support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

The Client Accounting and Financial Reporting System II (CAFRS II) is designed to allow flexibility in the options included to meet an individual client's special needs:

- Up to 13 periods per fiscal year.
- Automatically calculated journal entries based on algorithms defined by the accountant.
- Multiple special purpose journals with source code, related accounts, and headings specified by client.
- Ability to correct prior periods.
- Extensive chart of account flexibility to provide desired heading and account description information, up to 9 levels of subtotals for combining accounts, and spacing and paging control.

- Optional titles and formats for financial statements.
- Consolidation is provided for clients with more than one business entity. Maintenance is provided for eliminating entries. Controls are included to force fiscal period alignment of clients being consolidated. The same processing capabilities are available for the consolidated client as for others.

**Features**

- Last year comparative data on financial statements
  - Print suppression of zero balance accounts on financial statements
  - Balance sheet
  - Income and expense statement
  - Combined departmental income and expense reporting
  - Income and expense comparison to budget
  - Income and expense account balance comparison to a specified account balance, by department, such as gross sales
  - Income and expense account balance comparison to a client-specified base, such as number of rooms, square feet, or miles driven
  - Supporting schedules
  - Statement of changes in financial position with related worksheet and ability to process adjustments
  - Reporting of financial ratios, defined by client, with comparison to industrial averages
  - Employee payroll register
  - Printing of presently formatted 941-A and W-2 forms
  - Notes to the financial statements
  - 8-1/2" x 11" general ledger or a full-size general ledger
  - Trial Balance with both current and year-to-date data, or year-to-date only
  - Cumulative general ledger
  - Automatic reversing entries
  - Budget amounts on budgeted income statements variable by period
  - Choice of four customer-entered footnote messages
  - Choice of four customer-entered disclaimer messages relating to auditability of reports
- The System/34 CAFRS II Application Program supports the following functions which take advantage of the System/34:
- Workstations are used for file maintenance, data entry, and inquiry.
  - All programs are online with the exception of the system tailoring procedure.
  - Spooling and priorities are used for printed output.
  - Operator selection of screens from a menu screen.
  - All files are 'shared.'
  - Multiple, interactive display stations may operate concurrently.
  - Multiple programs may operate concurrently.
  - Error messages and operator communications are displayed on the screen.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, for installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

This licensed program will execute on all models of the IBM System/34 with a minimum of 48K bytes of main storage. Performance of application programs, as shipped, may be enhanced by increased print speeds and/or increased main storage. If an IBM 3742 is to be used, it must have the 128-character set feature (#5455) and feature group A (#4044). IBM 3741s must have feature group A (#4002).



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PP 5726-C22.2

May 83

Major Revision

PROGRAM PRODUCTS

**CAFRS II (cont'd)**

For presentation purposes on the reports, left and right parentheses have been included to indicate a dollar amount opposite an account's normal balance. The 64-character set feature is required for the System/34 to print the parentheses.

Although nothing in CAFRS II prevents the use of the minimum system configuration, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size, and operating requirements.

**SOFTWARE REQUIREMENTS**

IBM Client Accounting and Financial Reporting System II is written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support licensed program (5726-SS1). It also requires the IBM System/34 Utilities licensed program (5726-UT1).

IBM Client Accounting and Financial Reporting System II is shipped with object code included (compiled for a 24K user area). Standard modifications use the system tailoring procedures and require no recompiling. Nonstandard modifications to the RPG II source programs require the IBM System/34 RPG II Compiler (5726-RG1).

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (GH30-0425) ... CAFRS II General Information Manual (GH30-0230) ... Customer/Prospect Self-Study (SV30-0100-SR30-0210) ... Reference Manual (SB30-0329) ... Runbook (SB30-0330) ... Installation Guide (SB30-0335) ... Logic Manual (LB30-0331).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/34 OVER-THE-COUNTER INVOICING AND  
ACCOUNTS RECEIVABLE INQUIRY FOR DISTRIBUTORS  
MANAGEMENT ACCOUNTING SYSTEM II (DMAS II)  
5726-DM5****PURPOSE**

IBM System/34 DMAS II is designed to satisfy the data processing needs of a broad spectrum of distributors.

Some distributors have special needs relative to credit management and immediate invoice printing for over-the-counter order entry business.

With Over-the-Counter Invoicing and Accounts Receivable Inquiry (5726-DM5), a DMAS II user may inquire into accounts receivable information including detailed transaction activity and quickly print an invoice for a specific order.

**HIGHLIGHTS**

- Search for customer number based on customer name
- Obtain accounts receivable detail information for credit management purposes
- Know a customer's accounts receivable status prior to releasing goods
- Print an invoice for a single order, at the counter
- Allocate inventory required to satisfy the order
- Print invoices for a range of orders
- Print a duplicate copy of an invoice

**DESCRIPTION**

These capabilities are realized by using specialized routines easily called by the entry of short keywords which enable the user to quickly perform the operations without switching menus or answering multiple option prompts.

The licensed program enhancements have been specifically designed for quick turnaround, over-the-counter business, typical of some DMAS II users. The enhancements eliminate the necessity of manually producing invoices by enabling the user to quickly produce an invoice on the system. The time to prepare an invoice is significantly reduced as is the potential problem of costly incorrect pricing. The customer receives a timely, easily read, machine-prepared invoice which is accurate and complete. In addition, the DMAS II user is aided in the control of credit by being able to display complete account status including detailed transaction activity.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection, training, and continued day-to-day operation lies solely with the customer.

Installation of this System/34 licensed program is a customer responsibility.

**Customer Installation Tasks**

- Copy the installation procedure to disk
- Execute the installation procedure following displayed information
- Operating instructions will be printed during the installation process
- Read the operating instructions runbook carefully before executing the new operating procedure
- Following the operating instructions, execute the operating procedure

**Modifications:** The modification of this enhancement or the addition of new ones may be done by a programmer experienced in RPG II and the System/34.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration requirements are an IBM System/34 with:

- 5340 System Unit with Diskette 1 Drive, 8.6 MB of disk storage and 48K (mdl B11) or 64K (mdl C11) bytes of main storage depending on the application
  - 64K for Billing, alone or in combination with any of the other DMAS II applications
  - 48K may be used in certain environments when neither Purchasing nor Billing is included

- A minimum of one IBM 5256 or 5211 or 3262 B1 Printer
  - A second printer (5256), dedicated to over-the-counter invoice printing, is recommended.

Although there is nothing inherent in the design of DMAS II to prevent the use of the minimum system configurations stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size and operating requirements.

The standalone DMAS II File Size Procedures are unaffected by this enhancement. A particular customer's file size requirements may vary depending on individual use of the system and applications. While it is the customer's responsibility to determine the necessary file size, you may contact your IBM representative for guidance.

**SOFTWARE REQUIREMENTS**

These programs are written in IBM System/34 RPG II programming language and execute under control of the IBM System/34 System Support Program (5726-SS1). The IBM System/34 Utilities (5726-UT1) must be ordered for use with the system. The IBM System/34 RPG II (5726-RG1) must be available if modifications to the application programs are expected. These enhancement programs operate in conjunction with DMAS II, augmenting rather than replacing DMAS II. DMAS II Billing is prerequisite to the use of the DMAS II Over-the-Counter Invoicing function. DMAS II Accounts Receivable is required as a prerequisite to using the Accounts Receivable Inquiry function.

The Over-the-Counter and Accounts Receivable Inquiry licensed program will operate in conjunction with DMAS II FDPs such as 5798-NXY and/or 5798-NXZ; however, these FDPs are not required.

RPGs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**DISTRIBUTORS MANAGEMENT ACCOUNTING SYSTEM  
(DMAS) FOR SYSTEM/34**

**BILLING ... 5726-D4A**  
**ACCOUNTS RECEIVABLE ... 5726-D4B**  
**INVENTORY CONTROL ... 5726-D4C**  
**SALES ANALYSIS ... 5726-D4D**

**PURPOSE**

These modular licensed programs are available for either a 32K or 48K IBM System/34. The application function and data base are exactly the same as the IBM System/32 DMAS offering. These applications run in single program mode on the IBM System/34. Performance improvements in the larger memory size version come from the reduction of overlays, incorporation of larger blocking factors, and use of dual I/O areas. This is most beneficial for the customer who has no requirement for an interactive workstation system in the near future.

When all four programs are installed they constitute an interrelated application set with an integrated data base. These applications have the industry-oriented function and marketing support that will capture the interest of your distribution prospect. They can help the users manage their two largest business assets, accounts receivable and inventory, and give them profit performance data on their products, customers, and salespersons. These programs can also help the user increase operational efficiency and customer service.

The open order file, warehouse sequenced picking lists and automated pricing and discounting methods can help improve order processing speed and accuracy. The inventory control system provides information to the buyers that will help them optimize inventory investment by identifying the obsolete, slow moving, and unprofitable items and help increase inventory turns and service levels. Automatic credit limit checking, variable credit terms, late charges on open item and balance forward accounts, delinquency notices, and aged receivables reports provide tools for reducing bad debt losses and increasing cash flow. Daily, monthly, and on demand sales reports help monitor the attainment of the distributor's sales objectives.

The Payroll, Accounts Payable, and General Ledger programs of the Distribution Financial Accounting System (DFAS) can co-reside with DMAS. With DMAS and DFAS, you can address the major data processing requirements of the Distribution customers and can select the applications that best meet their needs.

**DESCRIPTION**

**BILLING (5726-D4A)**

A postbilling system with data entry from the System/34 display station and/or from diskettes keyed on a 3740 Data Entry System, with editing, invoicing, invoice register, and a salesperson's recap. Features include:

- Open orders file with listing by customer and/or item that provides for printing order acknowledgements or picking lists.
- Ship-to address file
- Variable price selection methods
  - Contract pricing
  - Unit price or extended price entered by operator
- Variable item discount or markup flexibility
  - Operator override of discount/markup percent
  - Quantity discount for up to 5 quantity break ranges
  - Combination of customer class (8) and item class (99) selects discount/markup percent. Markups can be greater than 100%.
  - Choice between discounting or marking up is controlled by code in customer record
- Variable trade discount on invoice total
  - Selection of one of 5 discount percents, based on code in customer record
  - Selection of one of 5 discount percents, based upon invoice amount
- Variable payment terms and cash discounts
  - One of 9 cash discount percents
  - One of 10 term descriptions (for example, 2% 10, net 30)
  - Terms and discount percents based on customer code
- Broken case pricing with surcharge
- Pricing unit conversion - when inventory unit differs from selling unit
- Container charges automatically applied
- Price list
- Optional invoice format with or without a tearstrip (profit stub)
- Daily backorder slips
- Federal Excise tax calculated

- State sales tax (standard) plus two local sales taxes
- Monthly tax totals report

**ACCOUNTS RECEIVABLE (5726-D4B)**

A combined balance forward and open item method, with data editing, monthly statements, and delinquency notices. Features include:

- Balance forward or open item selectable by account
- Late charges for both open item and balance forward accounts
- Future dating
- Credit limit checked during order edit if Billing is installed
- Monthly statements and delinquency notices
- Aged trial balance monthly or on demand - summary or detail
- Statements by job or branch location
- Aging of customer invoices with three past due periods

**SALES ANALYSIS (5726-D4D)**

Sales and profitability figures by salesperson, customer, item, and item class. Availability of the information in the following reports is dependent upon the applications selected and their installation sequence.

- Daily sales recap by salesperson (data from Billing or Accounts Receivable)
  - Sales dollars
  - Cost
  - Gross profit
  - Gross profit percent
- Monthly salesperson sales analysis - current and year-to-date (data from Billing or Accounts Receivable)
  - Sales dollars
  - Cost
  - Gross profit
  - Gross profit percent
  - Number of orders
- Monthly customer sales analysis - current and year-to-date (data from Billing or Accounts Receivable)
  - Sales dollars
  - Gross profit
  - Gross profit percent
  - Drop ship sales - year-to-date only
  - Gross profit amount
- Monthly salesperson/customer sales analysis - current and year-to-date (data from Billing or Accounts Receivable)
  - Date of last sale
  - Sales dollars
  - Gross profit
  - Gross profit percent
  - Number of orders
- Monthly salesperson/customer/item class sales analysis - current and year-to-date (data from Billing)
  - Sales dollars
  - Gross profit
  - Gross profit percent
  - Number of orders
  - Totals by customer and salesperson
- Monthly item and item within item class sales analysis - current and year-to-date (data from Billing or Inventory)
  - Quantity
  - Sales dollars
  - Gross profit
  - Gross profit percent
  - Number of orders
  - Up to 99 item classes

If Sales Analysis is the first or only DMAS program installed, the customer must provide data entry and edit programs.

**INVENTORY CONTROL (5726-D4C)**

A system which allows management to obtain the information needed for purchasing and profitability analysis, including a perpetual inventory system and a physical inventory system. Features include:

- Stock Status Review - on demand, selectable for
  - All items, items within limits, active items only
  - Sequence by vendor, item class, or item
  - Exceptions only: Below minimum, cost deviation, *backordered*, or quantity zero

PROGRAM PRODUCTS

**DMAS for S/34 (cont'd)**

- Current stock position: On hand, on order, *backordered*, on reserve
- Sales and cost information: This month and year-to-date
- Stock Status Report - monthly
  - Year-to-date drop shipped quantities
- Inventory Analysis Report - on demand in sequence by
  - Item number
  - Date of last sale
  - Gross profit year-to-date
  - Profit % year-to-date
  - Months' supply on hand
  - Extended cost on hand
  - Vendor number
  - Item class
  - Vendor/item class
  - Alternate cost on hand
  - Sales year-to-date
- Basic Unit Cost - average cost method
- Alternate Cost - last cost method
- Multiple Warehouses

**FUNCTIONS**

- Integrated data base which simplifies file maintenance and provides for more efficient disk utilization.
- User-maintained constants file is used in most programs which allows operator to modify data subject to change, such as late charge rate, tax rates, terms, or aging dates, without the need to change and recompile programs.
- Specific load and maintenance programs are included for each master file.
- Easy-to-use printed runbook for each application
- Contains additional space in item and customer master records for customer use.
- OCL procedures, sort specifications, and processing programs are cataloged into logical work units which optimize system utilization.
- Automatic monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed.
- Offline 3741 data entry diskette formats.
- Dynamic file space checking capability of transaction edit programs tells the operator in advance when a file is approaching its maximum size so that action may be taken in time to prevent an interruption in processing.
- Dynamic backup and recovery system provides for periodic backup of master files and edited transactions, and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files.
- Reprint options are possible because file updating is separated from report printing functions. Reports or parts of reports can be reprinted to provide extra copies, or some report printing can be deferred to a more convenient time.
- Selective printing allows the operator to control the printing mode for reports by entering a keyboard response to prompts on the CRT. In this way, for example, reports may be printed for a range of customers or items, or only for accounts with balances or past due amounts.
- Inquiry programs, with data retrieval options selectable at program run-time, provide current information from the customer and item master files.

**File Size and Application Function Tailoring Capability:** All necessary programs and procedures for file allocation are included with DMAS. The customer can allocate file space during installation and change file space allocations as business volumes change, and may control the operation of some application functions by file maintenance and by operator-controlled run time options.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility. For customers who have modified their installed System/32 IAPs and who choose to have IBM make the same modifications on the System/34 product, the reinstallation of the modifications on the new

product will be billable under SES. It is the customer's responsibility to transfer data files from one system to the other.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration requirement is an IBM System/34 with:

- 32K or 48K bytes of main storage
- 8.6 megabytes of disk storage
- 40 characters per second matrix printer
- IBM 5251 mdl 11 Information Display Station

**SOFTWARE REQUIREMENTS**

- IBMSystem/34 System Support licensed program Version 1 (5726-SS1)
- IBM System/34 Utilities licensed program (5726-UT1)

**Instructional Materials**

**Operator Introduction and Exercises:** These materials, consisting of a Student Guide, audio cassettes, and System/32 diskettes, will help the operator learn and practice IAP operation without using the customer data files. One copy will be provided at no charge to the customer.

One copy of the following material is supplied via SLSS when program number and initial library are specified.

Audio Cassettes (2)	SV30-0002
System/32 Diskettes (3)	SV30-0003
Student Guide	SR30-0171
Advisor Guide	SR30-0169
Runbook	SR30-0170

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications*(GH30-0521) ... *Installation Considerations for Single Program Mode Applications* (GH30-0514) ... *Runbooks: System Operations* (SH30-0515) ... *Billing* (SH30-0516) ... *Accounts Receivable* (SH30-0517) ... *Inventory Control* (SH30-0518) ... *Sales Analysis* (SH30-0519).

Since application functions and data base are identical to System/32 versions of these programs, the following available System/32 publications provide appropriate information.

*Executive Guide* (G580-0112) ... *General Information Manual* (GH30-0093) ... *Application Logic Manual* (SH30-0140) ... *Application Reference Manual* (SH30-0141).

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

LUMBER DEALERS MANAGEMENT ACCOUNTING SYSTEM (LDMAS) FOR SYSTEM/34 (Single Program Mode)

- BILLING ... 5726-D4E
ACCOUNTS RECEIVABLE ... 5726-D4F
INVENTORY CONTROL ... 5726-D4G
SALES ANALYSIS ... 5726-D4H

PURPOSE

These modular programs are available for either a 32K or 48K IBM System/34. The function and data base are exactly the same as the System/32 LDMAS offering.

When all four programs are installed, they constitute an interrelated application set with an integrated data base. They can help the users manage their two largest business assets, accounts receivable and inventory, and give them profit performance data on their products, customers, and salespersons.

The Payroll, Accounts Payable, and General Ledger programs of the Distribution Financial Accounting System (DFAS) can co-reside with Lumber Dealers Management Accounting System application programs.

HIGHLIGHTS

- An automated estimate preparation procedure provides the capability to bid on more jobs for increased business.
Lien expiration notification helps dealers avoid losing their rights to file a lien when they have not been paid for the delivered material.
The complexities and error potential of pricing by different units of measure such as board foot, square foot, and linear foot, should be reduced because applicable conversions are automatically applied.

For example, one 8-foot length of 2x4 is converted to the correct number of board feet. A roll of roofing paper is converted to its pricing unit, square feet. A length of molding, priced by the linear foot, is not converted.

- A unique billing and inventory technique can handle a large number of items with a reduced number of item records. For lumber items, which are sold in different lengths but accounted for in board feet, one item record can be used for one size and grade such as 2' x 4' Redwood Common.

DESCRIPTION

BILLING (5726-D4E)

A postbilling system with data entry from the System/34 display station and/or diskettes keyed on a 3740 Data Entry System. Editing, invoice printing, invoice register, and sales summary. Features include:

- Ship-to address file
Variable price selection methods
Price conversion, with computations for square foot, linear foot, and board foot items.
Estimate preparation
Price list printing - six prices in addition to list price
State sales tax and one local sales tax
Customer code selects 1 of 6 payment terms

ACCOUNTS RECEIVABLE (5726-D4F)

A combined balance forward and open item method, with data editing, monthly statements, and delinquency notices. Features include:

- Balance forward or open item selectable by account
Lien expiration date checking
Late charge capability for both open item and balance forward accounts
Credit limit checked during order edit if Billing is installed
Variable statement format - two options
Aged trial balance monthly or on demand

- Statement by job for contractors or by branch for multilocation wholesalers

INVENTORY CONTROL (5726-D4G)

A system which allows management to obtain the information needed for purchasing and profitability analysis, including reports to assist in taking inventory. Features include:

- Stock Status Review - on demand, selectable for
Stock Status Report - monthly
Inventory Analysis Report - on demand in sequence by
Basic Unit Cost - Standard cost method
Alternate Cost - average cost
Multiple Warehouses

SALES ANALYSIS (5726-D4H)

Sales and profitability figures by salesperson, customer, item, and item class. Availability of the information in the following reports is dependent upon the applications selected and their installation sequence.

- Daily sales recap by salesperson (Data from Billing or Accounts Receivable)
Monthly salesperson sales analysis (Data from Billing or Accounts Receivable)
Monthly customer within salesperson sales analysis (Data from Billing or Accounts Receivable)
Monthly customer sales analysis (Data from Billing or Accounts Receivable)
Monthly item and item within item class sales analysis (Data from Billing or Inventory)
Monthly item class within customer sales analysis (Data from Billing)
The ability to report sales information for groups of items which do not have inventory records on file
If Sales Analysis is the first or only Lumber Dealers Application Program installed, the customer must provide data entry and edit programs.

FUNCTIONS

- Integrated data base which simplifies file maintenance and provides for more efficient disk utilization
User-maintained constants file is used in most programs which allows operator to modify data subject to change, such as late charges rate, tax rates, terms, or aging dates, without the need to change and recompile programs.
Specific file load and maintenance programs are included for each master file
Easy-to-use printed runbook for each application
Contains additional space in item and customer master records for customer use
OCL procedures, sort specifications, and processing programs are cataloged into logical work units which optimize system utilization
Automatic monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
Dynamic file space checking capability of transaction edit programs tells the operator in advance when a file is approaching its

**LDMAS for S/34 (cont'd)**

- maximum size so that action may be taken in time to prevent an interruption in processing
- Dynamic backup and recovery system provides for periodic backup of master files and edited transactions, and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report printing functions. Reports or parts of reports can be reprinted to provide extra copies, or some report printing can be deferred to a more convenient time
- Selective printing allows the operator to control the printing mode for reports by entering a keyboard response to prompts on the CRT. In this way, for example, reports may be printed for a range of customers or items, or only for accounts with balances or past due amounts.
- Inquiry programs, with data retrieval options selectable at program run time, provide current information from the customer and item master files
- Offline 3741 data entry diskette formats

*Executive Guide (G580-0121) ... General Information Manual (GH30-0166) ... Application Logic Manual (LH30-0169) ... Application Reference Manual (SH30-0168)*

**TERMS and CONDITIONS:** See PP Index

**File Size and Application Function Tailoring Capability:** All necessary programs and procedures for file allocation are included with the application programs. The customer can allocate file space during installation and change file space allocations as business volumes change, and may control the operation of some application functions by file maintenance and by operator-controlled run time options.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility. For customers who have modified their installed System/32 IAPs and who choose to have IBM make the same modifications on the System/34 product, the reinstallation of the modifications on the new product will be billable under SES. It is the customer's responsibility to transfer data files from one system to the other.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration requirement is an IBM System/34 with:

- 32K or 48K bytes of main storage
- 8.6 megabytes of disk storage
- 40 characters-per-second matrix printer
- IBM 5251 mdl 11 Information Display Station

**SOFTWARE REQUIREMENTS**

- System/34 System Support licensed program Version 1 (5726-SS1)
- System/34 Utilities licensed program (5726-UT1)

**Instructional Materials**

**Operator Introduction and Exercises:** These materials, consisting of a *Student Guide*, audio cassettes, and System/32 diskettes, will help the operator learn and practice IAP operation without using the customer data files. One copy will be provided at no charge to the customer.

One copy of the following material is supplied via SLSS when program number and initial library are specified. Additional copies may be obtained by ordering them individually from Mechanicsburg.

Audio Cassettes (2) (SV30-0002) ... System/32 Diskettes (3) (SV30-0003) ... *Student Guide* (SR30-0171) ... *Advisor Guide* (SR30-0169) ... *Runbook* (SR30-0170) ... *Binder* (SV30-0024)

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications* (GH30-0538) ... *Installation Considerations For Single Program Mode Applications* (SH30-0514) ... *Runbooks: System Operations* (SH30-0533) ... *Billing* (SH30-0534) ... *Accounts Receivable* (SH30-0535) ... *Inventory Control* (SH30-0536) ... *Sales Analysis* (SH30-0537).

Since application functions and data base are identical to System/32 versions of these programs, the following available System/32 publications provide appropriate information.

**SYSTEM/34 DISTRIBUTORS MANAGEMENT  
ACCOUNTING SYSTEM II (DMAS II)**

**BILLING ... 5726-D41**  
**ACCOUNTS RECEIVABLE ... 5726-D42**  
**INVENTORY CONTROL ... 5726-D43**  
**SALES ANALYSIS ... 5726-D44**  
**PURCHASING ... 5726-D46**

**PURPOSE**

IBM System/34 DMAS II is a workstation application system that puts data processing in the hands of the using departments. Customer orders can be entered from the order desk, cash posted to customer accounts by the Accounts Receivable clerk, purchase orders created online by a buyer, and stock receipts entered by either warehouse or receiving department personnel. This can result in stock balances that reflect realtime data, lead to improved customer service, fewer lost sales, and optimum inventory investment; at the same time, greater control can be provided over the entire purchasing process and the cash commitment it involves.

**HIGHLIGHTS**

- Interactive data entry is designed for simplicity and operator efficiency. Using this method, an operator gets a maximum amount of system-provided information in response to entering a minimum amount of data. Screen displays guide the operator through the data entry operation in a logical sequence. Data entry errors are signalled and descriptive data from master files is displayed to aid in visual verification. Errors are corrected interactively.
- The additional processing capability of the System/34 allows System/32 DMAS customers to convert to System/34 DMAS II using diskette entry and batch processing. This DMAS capability has been retained to facilitate the transition of customers using batch processing and diskette entry to that of interactive online processing. Concurrent with batch operations, the customer can use the Workstation Operator Instruction Course. This capability provides for the processing of existing daily work, the training of operators and the ability to put new applications 'online' at a controlled pace.
- Multiple, interactive display stations may operate on one job or concurrently on different jobs. Several workstations can be used for customer order entry, while others may be used for posting payments, creating purchase orders, or entering inventory receipts. While this is occurring, a batch job may be running in the background. These capabilities dramatically increase the efficiency of entering data from the various centers of activity in a distribution business.
- The alpha search feature allows inquiry about customers and items when the workstation operator does not have the customer or item number available. By keying a portion of either the customer's name, or city, or both, the system will locate and display all customers meeting that criterion. Similarly item name, item class, or both can be used to display items. An optional search field can be used when the customer or item is to be found by other than the first portion of the customer or item name.
- Comprehensive inquiry offers current data on demand. Displays show key information such as customer accounts receivable summaries, aged receivables status, customer sales and billing summaries, realtime item inventory balances, item sales summaries, item price and cost data, vendor purchasing data, and active purchase orders for any item. In addition, a credit check which includes a summary of all A/R, all in transit to A/R, and all orders in process for a customer can be obtained. Alpha search can be used to locate desired customer and item inquiry data.
- Order status inquiries show the current status of customer or purchase orders in process or on file in the system. The user may choose to display all orders or only those meeting selection criteria.
- Comparative sales analysis provides inquiry displays which show historical comparisons and ratios. Quantitative figures and graphical comparisons are displayed for both item and customer data. Latest-month data can be compared to the preceding month, to the same month in the preceding year, and to the latest 12-month average. Also, the current year-to-date data can be compared to the same period-to-date data in the previous year. The latest 13-month figures for any customer or item can be displayed in bar graph form. The various comparative sales analyses can show dollar sales, dollar profit, and quantity sold (items) or number of orders (customer) data, as selected by the user.
- Interactive file maintenance permits easy and accurate additions and corrections to master files from any workstation. Field descriptions, field lengths, and explanations of coded data are provided, while entered data is edited for reasonableness. A special feature allows rapid review and/or change of any or all item list prices. New prices are edited for reasonableness, as a protection against gross keying errors.

- All application procedures may be executed from a menu screen. Menu screens simplify the operators' duties by displaying a list of job numbers, with descriptions, that can be run. This reduces operator keying time and errors.
- Application options may be selected, depending on the type, at install time, run time, or by overriding standard data during data entry. Files may be resized as necessary to accommodate growth. Warning messages signal when files are approaching their capacity.
- Diskette magazine support for master file backup and recovery for all five DMAS II application programs.
- Enhanced auditability and control.
  - Order Reconciliation list.
  - System balancing to optional operator-entered control totals and the notation of any forced control totals.
  - Transaction registers.
  - Backing up of transaction files and master files.
  - System-produced notations of price-related operator overrides in the Billing application.
  - Financial data (receivables amounts and stock on hand) cannot be altered through file maintenance operations.
  - Sales statistics from deleted records are stored in summary form through year end, so that year-to-date sales and cost amounts balance to controls.
  - All pages of transaction registers (Invoice Register, Inventory Transaction Register, Receivables Transaction Register, Items Ordered/Received Register) are numbered with a perpetual serial page count to prevent valid report copies from being inadvertently destroyed or lost unnoticed.
- Prompting to override default options.
- No customer programming capability is required. An education program is provided that is intended to help the customer attain operational self-sufficiency.
- Each application may be installed separately or in conjunction with the others. However, when Billing is installed, its output automatically serves as input to the Accounts Receivable, Inventory Control, and Sales Analysis; output from Purchasing updates related data in the inventory records, if Inventory Control is also installed.
- Reserved user space in master records.
- Basic screen functions across applications.
  - Ability to change mode between entry and review.
  - Cancel function may be performed.
  - Ability to add or insert new lines.
  - 1 to 8 lines may be entered and edited per body screen.
  - Ability to delete transactions.
  - Screens displayed in logical sequence.
  - Ability to unlock keyboard to make changes during review or entry.
- Flexible backup/recovery/restart to minimize the recovery process.

**DESCRIPTION****BILLING (5726-D41)**

- Dynamic stock on-hand balance maintained and quantity available may be allocated to orders as they are entered. This allocate feature is optional with postbilling and standard in prebilling.
- Post- or prebilling methods available. Users may select either method, and change their choice at a later time.
- Credit limit checking (if A/R is installed) warns when customers' posted balance exceeds 90% of their credit limit.
- Extended credit check option displays total due currently posted in A/R, plus future and in-transit to A/R charges, plus total of all orders in process. Comparison to credit limit and orders on credit hold are shown.
- Price check during order entry option will display complete order pricing data prior to picking list printing.
- Back orders are automatically reentered for customer and items that qualify.
- The printing of picking lists and invoices may be initiated following entry of an order. After an order has been entered, any operator may initiate the printing of a picking list on a printer located in the warehouse. The operator can also expedite delivery by calling for the printing of particular invoices to that warehouse.
- Alpha search on customer and item.
- Diskette and online workstation data entry.
- Multiprogramming allows for other batch and/or workstation jobs to operate concurrently.
- Multiple order entry workstation.

**S/34 DMAS II (cont'd)**

- Orders may be entered for new customers and for new items not on file. No file maintenance required prior to entering orders.
- Flexible pricing, including: Discount from list or markup from cost, item quantity discounts, contract prices, or manually entered overrides.
- Operator override allows the operator to override defaults and information contained in master file data records.
- Orders may be cancelled, corrected, released to invoicing or retained in the file for later processing.
- Invoices/credit memos may be entered directly and changed, cancelled or remain in file for later processing.
- Picking documents and invoices printing flexibility:
  - For a particular warehouse or all warehouses
  - Within order number or invoice number limits
  - Based on 'all ready to be printed' or up to a specified number (for example, first 20).
  - Can be directed to different printer
  - The standard picking list printing sequence (list organization and content) can be overridden.
- An on-reserve warning is displayed when the quantity available of an item is less than the quantity on reserve.
- Interactive File Maintenance permits easy, accurate customer master file maintenance from any workstation.

**ACCOUNTS RECEIVABLE (5726-D42)**

- Cash application is simplified. The operator can select invoices for payment from a display of all of a customer's open items and selectively apply payments.
- Balance forward or open item. Either method is selectable for each account. The individual accounts can be changed from one method to the other at the end of an accounting period.
- Multiple cash entry workstations.
- Diskette and online work station data entry.
- Statements with past and future aging, late charges, and optional remittance tear strips are prepared monthly.
- Aged Trial Balance and a Customer Account Status Report are available on demand. An option allows the Aged Trial Balance to be sequenced by customer within salesperson.
- Delinquency notices are available.
- Multiprogramming allows for other batch and/or workstation jobs to operate concurrently.
- Deferred statement printing is provided for. Data is saved on diskettes for the printing of statements at a more convenient time.
- A zero-balance statement option permits the printing or bypassing of statements for customers with zero amount due, but who had transactions during the latest month.
- Print paid open item proof, and paid item list.

**INVENTORY (5726-D43)**

- Dynamic stock-on-hand balances maintained. Sales, receipts and adjustment are immediately reflected in the quantities available.
- Alpha search on item.
  - Item price, cost, and quantity sold inquiry capability.
- Multiprogramming allows for other batch and/or workstation jobs to operate concurrently.
- A stock status report, stock status review and a variety of other analytical reports can provide stock movement data to assist in the buying process, optimize inventory investment, and provide a high level of customer service.
- Broken case quantities maintained.
- Accounting for warehouse and drop shipments.
- Multiple warehouse activity supported. Inventory balances can be maintained separately for multiple warehouses. Inventory Analysis reports can show either the items in all warehouses, or only those in a specific warehouse.
- Two costing methods are supported: Average cost, for calculation of profit, and last cost, which usually represents your current replacement cost. Both costs can be displayed during item balance inquiry.
- Backorder release lists, one in item sequence and one in order number sequence, show customer orders being held pending receipt of backordered items.
- Physical inventory lists assist when taking inventory.

- Diskette and online work station data entry.
- Quantity on reserve and on backorder.
- Interactive File Maintenance permits easy, accurate item master file maintenance, including item price changes by item class, from any work station.

**SALES ANALYSIS (5726-D44)**

- Sales analysis reports assist in answering questions like:
  - What is selling and what is not selling?
  - Which profitable items should be promoted and which unprofitable ones should be dropped?
  - Which customers are profitable?
  - Which salespersons are effective and profitable?
- Depending on other licensed programs installed, reports are sequenced:
  - By item.
  - By item within item class.
  - By item class within customer within salesperson
  - By customer
  - By customer within salesperson
  - By salesperson.
  - Within limits
- Deferred printing of reports.
- Comparative Sales Analysis displays show historical data about items and customers at any workstation.
  - Data displayed is dollar sales, dollar profit, and quantity sold (items) or number of orders (customers).
  - Analyses for a sales territory or an item class show four comparisons of latest period data to previous time periods. Quantitative data and the ratio between periods is shown.
  - Analyses for a single customer or item show four comparisons of latest period data to previous time periods. These analyses show quantitative data and ratios for sales, profits, and orders for that item or customer.
  - Trend charts, showing up to 13 months of sales, profit, or order history for a single customer or item are displayed in bar graph form.
  - Comparative Sales Analysis data is collected and retained on file as the result of month-end DMAS II processing.

**PURCHASING (5726-D46)**

- Build order by scan through vendor's line, identifying desired items and accepting or overriding normal order quantity - as alternative to key entry of individual items. Scan can be confined to items with below minimum availability status.\*
  - Item inventory status can be displayed.\*
  - Quantity/price break points can be displayed. Program assigns vendor price appropriate to quantity ordered.
  - Cumulative order weight and cost displayed and updated as order is modified during entry.
- Handles items that are ordered from more than one vendor.
- Orders can be entered for items that are not on the file.
- Orders can be entered for vendors who are not on the file.
- A standard general ledger account number is assigned to the order, but the operator can assign a different number to the order or to any item(s) on it.
- Messages can be entered to be associated with an order or a particular item on the order, and to appear only on the screens and reports destined for specific operating areas (for example, on the purchase order for the vendor, or on receiving reports and displays for the warehouse).
- Total order weight and cost is displayed after order entry, and updated if the order is modified at entry time.
- Orders can be held for later approval and/or can be printed individually or in batches at any time.
- Purchase orders can be printed on the system printer, or on a workstation printer (for example, at the buyer's desk), as predetermined by the user.
- When the purchase order has been entered, it updates Quantity on Order in the item records.\*
- Multiple-warehouse activity is supported.
- Daily purchase order reconciliation report
  - Log of all orders
  - Transaction and status record for each order
  - Summary reconciliation of status changes and activities for all orders

\* If the DMAS II Inventory Control application is installed.

**S/34 DMAS II (cont'd)**

- Summary of open order dollar value by order status and buyer
- Report of shipments expected, by due date
  - For expediting
  - For warehouse labor scheduling
- Receiving lists and reports, to aid in
  - Warehouse operations and space planning
  - Checking receipts with minimum clerical effort
  - Determining stocking locations for incoming merchandise
  - Maintaining audit trail
- Extensive order status reports and displays - with multiple selection criteria.
- Item purchase order search, and display of status
- Interactive application of receipts to open orders
  - Updates purchase order quantities
  - Dynamically updates quantities available to fill customer orders\*
  - Updates quantity on order and quantity on hand in item records\*
  - Updates open order cash commitments
- Accounts Payable input
  - Interactive reconciliation of vendor invoice quantities and amounts to purchase order and receiving data.
  - Closing report for quantities approved for payment, with cost by assigned General Ledger account numbers.
  - Interactive input of vendor invoice Accounts Payable data, for transfer via diskette to the DFAS II Accounts Payable application.
- Operator can override defaults and information obtained from master file data records.
- Multiprogramming allows for other workstation and/or batch jobs to operate concurrently.
- Multiple workstations can enter purchase orders concurrently.

**AUTOMATED INSTALLATION AID**

DMAS II Self-Install, an interactive installation method consisting of a workbook and diskette, enables customers to install any of the existing DMAS II applications with little or no SE assistance. These applications include Billing, Accounts Receivable, Inventory Control, Sales Analysis, and Purchasing. They may be installed in any sequence. DMAS II Self-Install is designed for the novice who is installing an application for the first time. It is also intended for the experienced DMAS II user who wishes to add a new DMAS II application.

DMAS II Self-Install consists of:

- An installation workbook that guides the user step-by-step through the planning and installation of a DMAS II application. File sizing and run time options are explained and then entered by the user in the workbook. The workbook should be ordered so the customer can use it prior to installation.
- Data forms for all application master files are included along with lists of descriptions for the information fields in all the forms.
- A set of programs, invoked by one command, that prompts for workbook responses, calculates disk/diskette requirements, initializes required diskettes, loads programs to DMAS II libraries, and backs up all files and libraries. The programs are included with the application code shipped from PID.

**PTF APPLICATION SERVICE AID**

This new service aid will provide an improved method of support and control for application of PTFs, as well as an automated audit trail of the activity. This service aid has been designed so that customers can increase their self-sufficiency by being able to apply their own PTFs and refreshes.

This aid provides the following features:

- The total or partially automatic replacement of corrected modules in a refresh.
- Built-in safeguards to prevent inadvertent replacement of modified modules.
- Source code image PTFs additionally provided with refresh diskettes to facilitate manual application to modified modules.
- Cross-reference listings of PTFs contained in refresh.
- Audit trail listing of PTFs applied during refresh session.
- Automatic logging of PTF numbers into the library log.

**Customer Education**

**Distribution Customer Executive Seminar:** A half-day seminar to introduce distribution executives to the concepts, features, and advantages of System/34 and DMAS II.

**Distribution Industries End-User Orientation:** A half-day seminar for department heads, covering the concepts, features, and advantages of System/34 and DMAS II.

**Buyer Orientation:** A class for purchasing agents and buyers, covering the concepts, features, and advantages of INVEN/34. The capabilities and benefits of DMAS II-Purchasing are also discussed.

**Instructional Materials**

**DMAS II Workstation Operator Instruction:** This Workstation Operator Instruction Course will provide hands-on experience to the workstation operator in the daily operations of DMAS II Billing, Inventory Control, Accounts Receivable, Comparative Sales Analysis, Purchasing, Inquiry, and Interactive File Maintenance. It will co-reside with DMAS II. A major advantage of this feature allows the customer to train operators on new applications and new operators on existing applications, while also operating DMAS II.

The self-study course consists of an Advisor Guide, Study Guide, Audio Cassettes and System/34 Diskettes. One set will be provided, at no charge to the customer, when the initial DMAS II order is first placed.

Additional components may be obtained by ordering them individually. An additional complete set of this material can be supplied via SLSS when ordered under bill-of-forms number SBOF-4031. Material and form numbers are as follows:

Advisor Guide	SR30-0256
Study Guide	SR30-0257
Audio Cassettes	SV30-0504
Diskettes	SV30-0505
Binder	SV30-0156

**Note:** A copy of the *DMAS II System Operator Instruction Study Guide* (SR30-0254) is also provided when ordering SBOF-4031.

**Recommended Prerequisites:** *System/34 Operating Concepts* (T2020) ... *System/34 Work Station Users Guide* (SR30-0240).

**DMAS II System Operator Instruction:** A self-study course to provide hands-on experience to the System/34 operator in the daily, weekly, and monthly operations of DMAS II. One copy of this guide, provided at no charge to the customer, is supplied via SLSS when ordering the *DMAS II Workstation Operator* course (SBOF-4031).

**Note:** The DMAS II System Operator Instruction requires the diskettes (SV30-0505) used in the DMAS II Workstation Operator Instruction Course.

**Recommended Prerequisites:** *System/34 Operating Concepts* (T2020) ... *System/34 Work Station Users Guide* (SR30-0240) ... *System/34 System Operations* (D2050).

**Data Base Conversion Programs:** These programs are available for customers converting from System/32 DMAS to System/34 DMAS II Release 2.

Responsibility for conversion rests with the customer, although assistance via SES may be available. To help the customer convert DMAS to DMAS II Release 2 data files, data base conversion programs will be included at no extra charge in the licensed machine-readable material ordered with DMAS II Release 2. They are supplied to all new users of DMAS II, along with the publication *Data File Conversion Instructions* (SH30-0195).

The feature #7041 diskettes contain programs and pertinent OCL for converting the ten permanent data files. The conversion is performed on the System/34. The programs assume that no changes were made in the DMAS Application Program data base.

**CUSTOMER RESPONSIBILITIES**

Installation of System/34 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer. The customer has responsibility for providing data base conversion programs when either the conversion is from a system other than that described above, or the conversion is from a System/32 DMAS installation in which the licensed program data base has been changed.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration requirements are an IBM System/34 with:

- 5340 System Unit with Diskette 1 Drive, 8.6 MB of disk storage and 48K (mdl B11) or 64K (mdl C11) bytes of main storage depending on the application (see below)
- One IBM 5256, 5211 or 3262 Printer

**S/34 DMAS II (cont'd)**

- One IBM 5251 Display Station mdl 11
- 64K for Billing or Purchasing, alone or in combination with any of the other DMAS II applications
- 48K may be used in certain environments when neither Billing nor Purchasing is included.

Although there is nothing inherent in the design of DMAS II to prevent the use of the minimum system configurations stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size and operating requirements.

The amount of disk storage required is influenced by:

- The number of applications installed
- The volume of daily transactions
- The number of customer, item and ship-to records
- The number of open customer orders and unpaid invoices
- The number of purchase orders on file
- The number of contract items and items with quantity discounts
- The number of vendor and vendor/item records
- The number of Accounts Payable entry records stored

Additionally, a main storage capacity greater than the stated minimum required will often provide improved performance. For example, performance is affected by:

- The number of DMAS II application tasks operating concurrently.
- The number of workstations operating concurrently on the same or different applications, and
- Any other applications operating concurrently.

**SOFTWARE REQUIREMENTS**

The programs are written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support Program (5726-SS1), Release 5, or later. The IBM System/34 Utilities (5726-UT1) must be ordered for use with the system. IBM System/34 RPG II (5726-RG1) must be available if modifications to the programs are expected.

**DOCUMENTATION**

(available from Mechanicsburg)

*Executive Brochure (BICARSA) (G580-0234) ... Executive Brochure (Purchasing) (G580-0255) ... Business Information For the Executive (GH30-0593) ... Reports and Displays (G280-0079) ... Application General Information Manual (GH30-0185) ... Licensed Program Specifications (GH30-0501) ... An Auditor's Perspective (GH30-0543) ... System Reference Manual (SH30-0193) ... Billing Reference Manual (SH30-0510) ... Inventory Control Reference Manual (SH30-0507) ... Accounts Receivable Reference Manual (SH30-0508) ... Sales Analysis Reference Manual (SH30-0509) ... Purchasing Reference Manual (SH30-0601) ... Self-Installation Workbook (SH30-0610) ... System Logic Manual (LH30-0191) ... Billing Logic Manual (LH30-0552) ... Inventory Control Logic Manual (LH30-0553) ... Accounts Receivable Logic Manual (LH30-0554) ... Sales Analysis Logic Manual (LH30-0555) ... Purchasing Logic Manual (LH30-0603) ... System Runbook (SH30-0506) ... Billing Runbook (SH30-0502) ... Inventory Control Runbook (SH30-0503) ... Accounts Receivable Runbook (SH30-0504) ... Sales Analysis Runbook (SH30-0505) ... Purchasing Runbook (SH30-0602) ... Interactive File Maintenance Runbook (SH30-0591) ... Data File Conversion: DMAS to DMAS II (SH30-0195).*

**RPQs ACCEPTED:** No

**DISTRIBUTION FINANCIAL ACCOUNTING SYSTEM  
(DFAS)  
FOR SYSTEM/34 (Single Program Mode)****GENERAL LEDGER ... 5726-D6A  
ACCOUNTS PAYABLE ... 5726-D6B  
PAYROLL ... 5726-D6C****PURPOSE**

These three IBM System/34 applications provide the distributor with an aid for managing the business.

**HIGHLIGHTS**

- Independent or Interrelated applications approach:
  - Modular design facilitates sequential application installation
  - Single data entry results in multiple application updates
  - Modular design allows users to choose the applications that address their problem areas
- Wide variety of reports and report options included:
  - Management reporting is a byproduct of normal data entry
  - The 941-As and W-2s are saved on diskette and may be printed later
  - Detail or summary listings within a range of keys is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation, audit, and control are provided
  - Security code deters unauthorized execution of key programs in each application
  - A journal reference numbering system supplies an audit trail for any application that generates transactions into the General Ledger
- The System/34 application program may co-reside, but not interact, with the Motor Freight Accounting System (5726-T21) and with certain Distribution IAPs which have System/34 application programs (DMAS, FDMAS, LDMAS) or that were converted using conversion guidance from Menlo Park.
- Can be installed without customer programming capability:
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures provided
  - Easy-to-use runbook
  - Step-by-step installation activity plan provided by the *Application Installation Guide*
  - User's information supplied to the supervisor by the application reference manuals

**DESCRIPTION**

These three applications are independent yet interrelated, ready-to-execute applications for the small distributor:

- General Ledger
- Accounts Payable
- Payroll

The system combines two data entry approaches: Operator-oriented and batch-oriented. Support is provided for transaction entry through the System/34 keyboard or through a diskette keyed offline on a 3740 Data Entry System. The three easy-to-operate applications can be installed in separate stages at different times and still be an interrelated system.

Each application has certain requirements records within a cross-application Constants File which contain questionnaire responses. These records allow the application to select certain fields for editing, file sizes, and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a distributor's requirements. It provides the following:

- Tailoring the application on-site at installation time
- Allows the user to change selection of provided functions as business changes.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted as needed by rerunning the System Tailoring Procedure.

An application installation guide provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, and control forms with

suggested procedures. The application reference manual provides information on the day-to-day use of the application.

The runbook provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs on a System/34. The procedure reference summary card is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly trained in the particular application.

An application logic manual is provided for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

The System/34 application program makes available the Distribution Financial Accounting System on a System/34 in single program mode. The System/34 application program supports one workstation, no spooling, no multiprogramming, and no file sharing.

Applications Description - The three applications are ready-to-execute applications. Each includes source code, object code, execution procedures, and the application logic manual.

These are some general features which all three applications have:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort Specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline file maintenance and transaction data entry via the System/34 keyboard or diskettes created on the 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Some report printing can be deferred to a more convenient time
- Selective printing options are available for many report functions

**GENERAL LEDGER (5726-D6A)**

This application combines all the transactions affecting the financial status of the company during the period. They may be entered directly as a General Journal Entry or may have been previously entered through interface with Accounts Payable or Payroll. Support is provided for either a 13-period or 12-month fiscal year. At period-end closing time, audit listings and the Financial Statement Worksheet are provided to help verify that the user is still in balance before proceeding into the actual closing. The reports will also aid in generation of any necessary closing entries.

An Income Statement and Balance Sheet are standard report outputs. The user can design the format of these reports with an easy-to-use format description procedure. The financial reports can illustrate current financial data as compared to historical information, also to budget information on the Income Statement. The capability is provided to format Income Statements by subdivisions of a company, such as department. Several companies' financial information may be combined into one Balance Sheet and Income Statement. A Statement of Changes in Financial Position Worksheet is provided.

Users may define their own Chart of Accounts or use a suggested account structure provided with the application. The fiscal year start period or month is user-defined. Multiple company support for up to ten companies is included. Any transactions passed from Payroll are applied to company number one only.

**ACCOUNTS PAYABLE (5726-D6B)**

The Accounts Payable application provides an Open Payables and Cash Disbursements function on either an accrual or cash basis. Invoices and credit memos entered may be multi-lined and distributed by General Ledger account number. Entries may be for standard or one-time vendors and may be open or prepaid. Credit memos may be entered manually or initiated automatically by referencing a prior entered invoice. Invoice payments may be assigned to a vendor other than the original vendor. Invoices may be controlled through the application based upon a voucher number entered with the invoice.

A Purchase Journal provides the audit trail for cost transactions entering into the General Ledger system and into the Open Payables

**S/34 DFAS (cont'd)**

File. An Open Payables Report is provided in due date or vendor sequence. This turnaround document provides a way to select for payment by date, vendor, or invoice, including partial payments, for Cash Disbursements. Invoices may be entered or placed in hold status to prevent inadvertent payment. A Cash Requirements Report is used to assist in insuring sufficient funds are available and proper invoice selection was made before the checkwriting procedure begins. The Cash Disbursements Journal provides an audit trail for its transactions entering the General Ledger application and acts as the Check Register. Checkwriting and reconciliation are also provided.

A Vendor Analysis Report indicates key business volumes and discounts lost and taken for previous year and current year. An additional analysis report by business volume per vendor is also provided. Multiple company support for up to 10 companies is provided.

**PAYROLL (5726-D6C)**

This hourly salary executive payroll provides for regular, overtime, premium, vacation, and sick pay. It may be run weekly, biweekly, semimonthly, monthly. Hours may be entered daily or by pay period. Exception hours provide time and one-half, double time, and one-half, and triple time capabilities. Rates may be selected from the Employee Master Record or keyed in as an override. Shift differential capabilities are provided for second and third shift. The differential may be defined as a percentage of the rate or cents to be added to the rate.

Vacation/Holiday pay may be part of a regular pay check or on a separate check. A bonus payment is paid on a separate check with a flat percentage of income tax deducted. Sick pay may be fully nontaxable or only liable for income tax. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SU) are determined.

The ability to handle taxable or nontaxable adjustments, pay advances, and employer-paid union benefits (taxable and nontaxable) is also provided. Once the gross earnings is calculated, deductions will be taken to reach net pay. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Miscellaneous deductions may be taken by percent, fixed amount, hourly rate, upper limit, or cyclic within a user-specified frequency. Union deductions may be taken by percent, hourly rate, or fixed amount within a user-specified frequency.

Handwritten paychecks and paychecks never cashed (reversals) are also supported by the application. Once the payroll register and checks are printed, many analysis reports are produced: Labor Distribution, Miscellaneous Deductions, Union Deductions, YTD/QTQ Earnings, Workmen's Compensation Worksheet, and Payroll Journal. W-2 and 941-A reports are also provided.

The capability is provided to pass transactions to the General Ledger application, if installed. These transactions will be applied towards company one only. Payroll may be on either a cash or accrual basis. If the cash basis is selected, no transactions are passed to the General Ledger.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Each of these licensed programs will execute on all models of the IBM System/34 in Single Program Mode. The programs are compiled assuming a 32K minimum system on IBM System/34. Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features [128-character (#5455) and feature group A (#4004)].

The three applications are intended to be independent yet interrelated. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries.

Each application may co-reside, but will not interact with the Distribution IAPs and may also operate as stand-alone applications.

The Distribution IAP must have a Constants File with a record length of 64 characters. The original shipments of the Food and Paper IAPs for 24K machines had 59-character records. The customers that received

these original shipments will have to update their IAPs to the larger record size before they will co-reside with DFAS.

**SOFTWARE REQUIREMENTS**

The IBM System/34 Application Programs are written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support Program (5726-SS1 Version 1). IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Work Station Utility is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary.

**Instructional Materials**

*DFAS Operator Instructions (SBOF-3584)*

One copy is supplied via SLSS when program number and initial library are specified. Additional copies can be obtained by specifying SBOF-3584 which includes the following:

*Binder (SR30-0324) ... Study Guide (SR30-0117) ... Sample Run Book (SR30-0118) ... Advisor Guide (SR30-0119) ... Cassette (SV30-0073) ... Diskette (SV30-0074) ... Plastic Insert (S580-0116).*

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Ledger: Installation Guide (SB30-0189) ... Reference Manual (SB30-0190) ... Runbook (SB30-0191) ... Accounts Payable: Installation Guide (SB30-0193) ... Reference Manual (SB30-0265) ... Runbook (SB30-0194) ... Payroll: Installation Guide (SB30-0196) ... Reference Manual (SB30-0197) ... Runbook (SB30-0198) ... General Ledger Logic Manual (LB30-0192) ... Accounts Payable Logic Manual (LB30-0195) ... Payroll Logic Manual (LB30-0199).*

**TERMS and CONDITIONS:** See PP Index

**FOOD DISTRIBUTORS MANAGEMENT  
ACCOUNTING SYSTEM (FDMAS)  
FOR SYSTEM/34 (Single Program Mode)****BILLING ... 5726-D65  
ACCOUNTS RECEIVABLE ... 5726-D66  
INVENTORY CONTROL ... 5726-D67  
SALES ANALYSIS ... 5726-D68****PURPOSE**

These licensed programs are for either a 32K or 48K IBM System/34. The application function and data base are exactly the same as the System/32 Food Distributors Management Accounting System (FDMAS) offering. These applications run in single program mode on the System/34. Performance improvements in the larger memory size version come from the reduction of overlays, incorporation of larger blocking factors, and use of dual I/O areas.

When all four application programs are installed, they constitute an interrelated application set with an integrated data base. They can help users to manage their two largest business assets, accounts receivable and inventory, and give profit performance data on products, customers, and salespersons. These application programs can also help the user increase operational efficiency and customer service.

The open order file, slot-sequenced picking lists and automated pricing and discounting methods can help improve order processing speed and accuracy. The inventory control system provides information to the buyer that will help optimize inventory investment by identifying the obsolete, slow moving, and unprofitable items, and help increase inventory turns and service levels. Automatic credit limit checking, variable credit terms, late charges on open item and balance forward accounts, delinquency notices, and aged receivables reports provide tools for reducing bad debt losses and increase cash flow. Daily, monthly, and on-demand sales reports help monitor the attainment of the distributor's sales objectives.

The Payroll, Accounts Payable, and General Ledger licensed programs of the Distribution Financial Accounting System (DFAS) can co-reside with Food Distributors Management Accounting System Application Programs. With FDMAS and DFAS, the major data processing requirements of the food distribution customer can be addressed, and the applications that best meet the customer's needs may be selected. If Billing is used in the prebilling mode, a compatible Inventory Control System must be installed before or with the Billing licensed program.

**DESCRIPTION****BILLING (5726-D65)**

A prebilling system (when used with a compatible inventory control system) with postbilling capability, with data entry from the System/34 display station and/or from diskettes keyed on a 3740 Data Entry System, with editing, invoicing, invoice register, and a salesperson's recap. Features include:

- Open orders file with listing by customer and/or item that allows either case labels or picking list in warehouse (slot) sequence
- Ship-to address file
- Variable pricing methods, including:
  - Contract pricing
  - Customer class pricing (six classes)
  - Cost plus pricing
  - Catchweight pricing
  - Broken case pricing and surcharge
  - Special charges and allowances
  - Case label charges
  - Cash and trade discounts
- Sales and tobacco tax
- Credit limit checking
- Automatic invoice numbering
- Special deals
- Automatic substitution
- Suggested retail price on invoice and case labels

**ACCOUNTS RECEIVABLE (5726-D66)**

Accounts Receivable provides for the recording, controlling, and reporting of money owed for merchandise sold or services rendered. Recognizing that a major portion of a wholesale food distributor's assets may be tied up in accounts receivable, the application procedures are designed to provide timely information that helps your customer.

- Maximize profit and return on investment through tight control over all accounts due
- Minimize losses from bad debts through appropriate attention to slow paying accounts
- Maintain customer goodwill through prompt, accurate record keeping

The major features of Accounts Receivable include:

- Balance forward or open item selectable by account
- Late charges for both open item and balance forward accounts on monthly statements
- Credit limit checked during order edit if Billing installed
- Monthly or weekly statements and delinquency notices
- Aged trial balance monthly or on demand - summary or detail
- Aging into four aging periods

**INVENTORY CONTROL (5726-D67)**

Inventory control involves the recording of items received, sold, and on-hand, the updating of item costs and the recording of activity dates.

Inventory Control can provide accurate, periodic reviews of the status of each item, while identifying any exception conditions, to assist management in deciding what to buy, how much to buy and how often to buy.

Inventory Control provides information that helps:

- Maintain records of all items physically in stock as well as on-order, providing control and auditing for this major investment
- Arrange for timely, economical ordering of stock
- Minimize investment required to meet a specific service level, by highlighting overstocked or slow moving items.

The major features of Inventory Control include:

- Data entry and edit
- Two cost figures - last cost and burdened cost
- Maintenance of broken case quantities
- Warehouse location (slot)
- Physical inventory aids
- An array of reports to assist in:
  - Buyer ordering
  - Inventory management
  - Transaction recording and control
  - Inventory accounting

**SALES ANALYSIS (5726-D68)**

Sales Analysis offers sales and profitability figures by salespersons, customer, item, and item class. Availability of the information in the reports is dependent upon the applications selected and their installation sequence. Major Sales Analysis Reports include:

- Daily sales recap by salesperson (data from Billing or Accounts Receivable).
- Monthly salesperson sales analysis - current and year-to-date (data from Billing or Accounts Receivable).
- Monthly customer sales analysis - current and year-to-date (data from Billing or Accounts Receivable).
- Monthly customer sales analysis - current and year-to-date (data from Billing or Accounts Receivable).
- Monthly item and item within item class sales analysis - current and year-to-date (data from Billing or Inventory).
- Monthly item class, within customer, within salesperson sales analysis - current and year-to-date (data from billing).

If Sales Analysis is the first or only application program installed, the customer must provide data entry and edit programs.

**FUNCTIONS**

- Integrated data base which simplifies file maintenance and provides for more efficient disk utilization.
- User-maintained constants file is used in most programs which allows operator to modify data subject to change, such as late charge rate, tax rates, terms, or aging dates, without the need to change and recompile programs.
- Specific file load and maintenance programs are included for each master file.
- Easy-to-use printed runbook for each application.
- Contains additional space in item and customer master records for customer use.
- OCL procedures, sort specifications, and processing programs are cataloged into logical work units which optimize system utilization.

**FDMAS (cont'd)**

- Automatic monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed.
- Dynamic file space checking capability of transaction edit programs tells the operator in advance when a file is approaching its maximum size so that action may be taken in time to prevent an interruption in processing.
- Dynamic backup and recovery system provides for periodic backup of master files and edited transactions, and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files.
- Reprint options are possible because file updating is separated from report printing functions. Reports or parts of reports can be reprinted to provide extra copies, or some report printing can be deferred to a more convenient time.
- Selective printing allows the operator to control the printing mode for reports by entering a keyboard response to prompts on the CRT. In this way, for example, reports may be printed for a range of customers or items, or only for accounts with balances or past due amounts.
- Inquiry programs, with data retrieval options selectable at program run-time, provide current information from the customer and item master files.
- Offline 3741 data entry diskette formats.

*Executive Guide (G580-0120) ... General Information Manual (GH30-0156) ... Application Logic Manual (LH30-0159) ... Application Reference Manual (SH30-0158).*

**TERMS and CONDITIONS:** See PP Index

**File Size and Application Function Tailoring Capability:** All necessary programs and procedures for file allocation are included with the application programs. The customer can allocate file space during installation, change file space allocations as business volumes change, and may control the operation of some application functions by file maintenance and by operator-controlled runtime options.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration requirement is an IBM System/34 with:

- 32K or 48K bytes of main storage
- 8.6 megabytes of disk storage
- 40 characters-per-second matrix printer
- IBM 5251 mdl 11 Display Station

**SOFTWARE REQUIREMENTS**

IBM System/34 System Support licensed program (5726-SS1 Version 1), and System/34 Utilities licensed program (5726-UT1).

**Instructional Materials**

**Operator Introduction and Exercises:** These materials, consisting of a *Student Guide*, audio cassettes, and System/32 diskettes, will help the operator learn and practice IAP operation without using the customer data files. One copy will be provided at no charge to the customer.

One copy of the following material is supplied via SLSS when program number and initial library are specified. Additional copies may be obtained by ordering them individually from Mechanicsburg.

Audio Cassettes (2) (SV30-0002) ... System/32 Diskettes (3) (SV30-0003) ... *Student Guide* (SR30-0171) ... *Advisor Guide* (SR30-0169) ... *Runbook* (SR30-0170)

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications* (GH30-0531) *Installation Considerations for Single Program Mode Applications* (SH30-0514) ... *Runbooks: System Operations* (SH30-0526) ... *Billing* (SH30-0527) ... *Accounts Receivable* (SH30-0528) ... *Inventory Control* (SH30-0529) ... *Sales Analysis* (SH30-0530)

Since application functions and data base are identical to System/32 versions of these application programs, the following available System/32 publications provide appropriate information.

## SYSTEM/34 3270 DEVICE EMULATION 5726-EM1

### PURPOSE

The IBM 3270 Device Emulation licensed program allows the IBM System/34 and locally attached IBM 5250 Information Display System devices to appear as an IBM 3270 Control Unit and devices to a host system.

### HIGHLIGHTS

- System/34 appears to a host system as a 3271 under Binary Synchronous Communications (BSC) or as a 3274 under System Network Architecture/Synchronous Data Link Control (SNA/SDLC).
- A locally attached 5251 mdl 11 appears to a host system as a 3277 mdl 2 Display Station.
- A 5256, 5211, and 3262 printer locally attached to a System/34 will appear to the host system as a 3288 mdl 2 printer.
- Up to 16 device addresses are supported under BSC and up to 16 logical units under SNA/SDLC.
- The licensed program operates under System Support Program (5726-SS1) and the Interactive Communications Feature (SSP-ICF), #6000 or #6001).
- The Work Station Control Expansion A or B feature (#4900 or #4901) is required on the 5340 System Unit.
- Auto-call support is available with SNA/SDLC
- Numeric lock support

### DESCRIPTION

The 3270 Device Emulation licensed program is a utility program that supports both BSC and SNA/SDLC 3270 line protocols through SSP-ICF. No user code is required.

The 3270 Device Emulation program will allow the System/34 to appear to a host system as a 3271 mdl 2 (BSC) or a 3274 mdl 1C (SNA/SDLC) Control Unit. It will also allow the 5251 mdl 11 Display Station locally attached to a System/34 to appear to a host system as a 3277 mdl 2 Display Station. Keyboard Numeric Lock (#4690) on 3277 displays is optionally supported. The 5256 printers locally attached to a System/34 and the 5211 or 3262 printer on the System/34 will appear to the host system as a 3288 mdl 2 printer. The 3284 mdl 2 and 3286 mdl 2 printers are emulated as the 3288 mdl 2. Output to be printed can also be spooled.

Only the EBCDIC typewriter keyboards and EBCDIC transmission code are supported. Certain keys are in different locations on the 3277 and the 5231. Function keys on the 3277 will be mapped onto the 5251 keyboard to provide the same functions; that is, Field Mark, Erase Input, PA and PF keys. The copy command is not supported. However, the 5250 Print key can provide an equivalent function in many cases. The light pen and magnetic stripe reader are not supported.

Emulation of the 3270 devices allows the System/34 to reside on a multipoint communications link that supports a 3270. Since this program translates the data stream, host application programs will, generally, require no changes to support the System/34 when running under this device emulation. 'Screen wrap' is not supported. If the last position (24,80) on the screen is a field attribute character, it will be repeated in the first position (1,1).

Many users have large investments in 3270 application programs; and many host systems, especially under BSC, only support a single device type on a given communications line. The 3270 Device Emulation program will provide the System/34 user with an easy means of introducing an intelligent system into such a network. The end user at the System/34 will be able to execute the same host applications as with the 3270. At the same time, other applications can be developed on the System/34.

Host systems that support 3271 mdl 2 or 3274 mdl 1C control units on a multipoint network can have the System/34 with the 3270 Device Emulation program co-resident on that network. Such host system communication subsystems include: System/370 IMS/VS, CICS/VS, TSO, and System/3 mdls 15A, 15B, 15C and 15D CCP.

With Release 8, the 3270 Device Emulation Program has been modified to emulate the 3270 keyboard numeric lock feature. This change provides the capability of locking out all characters in a numeric field except 0-9, decimal sign, minus sign, plus sign, comma, space and DUP.

**BSC Considerations:** For BSC, the 3270 Device Emulation program emulates the 3271 mdl 2 control unit, the 1920-character 3277 mdl 2 display station, and the 3288 mdl 2 printer. The 3284 and 3286 printers are also emulated, but as a 3288.

The System/34 with the 3270 Device Emulation program acts as the 3271 mdl 2 control unit. The 5251 mdl 11 Display Station serves as the 3277; and the 5256, 5211, and 3262 printers serve as the 3288.

No auto-call support is available in BSC.

Only one line is supported.

The maximum receive buffer size supported will be 4096 bytes. This will include all line control characters.

The 3270 Device Emulation Program may generate BSC error status to the host under somewhat different conditions than the 3271. Customer host programs dependent on such specific link level 3270 BSC error status may require modification. The reference manual will detail these conditions.

**SNA/SDLC Considerations:** For SNA/SDLC, the 3270 Device Emulation program emulates the 3274 mdl 1C control unit, the 1920-character 3277 mdl 2 display station, and the 3288 mdl 2 printer. The 3284 and 3286 printers are also emulated but as a 3288.

The System/34 with the 3270 Device Emulation program acts as the 3274 control unit on a multipoint (nonswitched) or point-to-point (switched or nonswitched) line. The 5251 mdl 11 display station serves as the 3277; and the 5256, 5211, and 3262 printers serve as the 3288 (or 3287 in SCS mode only). Up to 16 devices (logical units) are supported using SNA/SDLC protocols.

Multiple lines can be used concurrently.

### CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The IBM System/34 3270 Device Emulation licensed program runs on all models of the System/34 with a minimum of 64K bytes of main storage. Communications to a host system requires a communications adapter on the System/34 (#2500, #3500, or #4500). Work Station Control Expansion A or B (#4900 or #4901) is also required.

#### SOFTWARE REQUIREMENTS

The IBM System/34 3270 Device Emulation licensed program will operate under control of the current release of the IBM System/34 System Support Program (5726-SS1) and the Interactive Communications Feature SSP-ICF, (#6000 or #6001).

#### SYSTEM/34 COMMUNICATION SUPPORT COMPATIBILITY

The 3270 Device Emulation licensed program can coexist in a System/34 with other communication support (that is, programs using remote 5250s, batch BSC, MRJE, SRJE, SSP-ICF, or System/34 Assembler macros). However, 3270 Device Emulation communications support can only share a communications line concurrently with SSP-ICF.

**Program Use During Customer Preinstallation Testing:** The System/34 3270 Device Emulation (5726-EM1) licensed program will be available to customers for preinstallation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

#### DOCUMENTATION

(available from Mechanicsburg)

*System/34 3270 Device Emulation Licensed Program Design Objectives (GC21-7749) ... System/34 3270 Device Emulation Licensed Program Specifications (GC21-7807) ... System/34 3270 Device Emulation Licensed Program User's Guide (SC21-7868).*

**TERMS and CONDITIONS:** See PP Index

## STUDENT ADMINISTRATION SYSTEM FOR SYSTEM/34 (Single Program Mode)

STUDENT RECORDS ... 5726-E31  
 STUDENT ACCOUNTING ... 5726-E32  
 STUDENT SCHEDULING ... 5726-E33

### PURPOSE

The IBM Student Records licensed program, which provides the data base and file maintenance functions, is a prerequisite for either or both of the other packages.

These three applications provide the school with a powerful aid in managing its student recordkeeping functions.

The system design of these packages incorporates many significant features:

- General - System tailoring to the school's unique requirements for number of periods in a school day, number of terms (or semesters) in a year, state reporting cycles, etc. All input specifications are described in terms familiar to school administrators and require no detailed knowledge of data processing techniques. Data files are shared among applications.
- Student Records - Provides common data base and file maintenance functions for the other applications. Basic record keeping and reporting functions essential for secondary schools are also included.
- Student Accounting - Consists of an Attendance Accounting Application and a Mark Reporting Application.
- Student Scheduling - Supports both machine scheduling and 'arena' scheduling of students to classes. Provides many reports to assist the principal and counselor in the scheduling process.

### HIGHLIGHTS

- Interrelated applications approach:
  - Modular design allows users to choose the applications that address their problem areas.
  - Modular design facilitates sequential application installation
  - Single data entry results in multiple application updates
- Wide variety of reports and report options included:
  - Management reporting is a byproduct of normal data entry
  - Optional sequences and selection within a range is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid student accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided
  - Security codes deter unauthorized execution of key programs in each application
- Can be installed without customer programming capability:
  - Designed to fit industry requirements
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance auditability provided
  - Easy-to-use runbook
  - Step-by-step installation activity plan and detailed user information provided by the *Application Reference Manual*

### DESCRIPTION

These three applications are an interrelated and ready-to-execute set of applications for the small school district or large secondary schools:

- Student Records
  - Data Base and Maintenance
- Student Accounting
  - Attendance Accounting and Mark Reporting
- Student Scheduling
  - Assignment of students to classes

The system combines two data entry approaches: Operator-oriented and batch-oriented. Support is provided for transaction entry through the System/34 keyboard or through a diskette keyed offline on a 3740 Data Entry System. Student Records is a prerequisite to the other applications which can be installed at different times.

Each application has certain requirements records within a cross-application Constants File which contain questionnaire responses. These records allow the application to select certain fields for editing, file sizes, and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered and maintained.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a school's requirements. It provides the following:

- Tailoring of the application at installation time.
- Allows users to change their selections of provided functions as the environment changes.
- All provided functions are included in the programs but only required functions are executed.
- Files may be resized as needed by rerunning the System Tailoring Procedure.

The *Application Installation Guide* provides a step-by-step installation activity plan including sample input and maintenance data forms and file loading sequences. There is only one *Application Installation Guide* which is delivered with the Student Records application. It contains information pertinent to all three applications. Each *Application Reference Manual* provides information on the day-to-day use of the application.

The runbook provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs on a System/34. The *Procedure Reference Summary* is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used as a quick reference once the operator is thoroughly trained in the particular application.

An application logic manual is provided for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

The System/34 licensed program makes available the Student Administrative System on System/34 in single program mode. It supports only one workstation, no spooling, no multiprogramming and no file sharing.

### APPLICATIONS DESCRIPTION

The three applications are ready-to-execute. Each includes source code, object code, execution procedures, and the application logic manual.

These are some general features which all three applications have:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort Specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed.
- Compatible online/offline file maintenance and transaction data entry via the System/34 keyboard or diskettes created on a 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing
- Selective printing options are available for many reports

### STUDENT RECORDS (5726-E31)

The Student Records area represents a systems solution to the problem of recording, retrieving, manipulating, and reporting student data. The student record is the key to the school's student accounting system. It is a vital source of information necessary to the implementation of the other applications. In addition to providing data to and collecting data from the scheduling, mark reporting, and attendance accounting applications, it contains student personal data for counseling. This data includes the student's name, school code, year of graduation, current grade level, sex, birth date, address, and a number of other data elements. It also contains student attendance information, the student's current schedule and mark reporting information, and the school's curriculum for the current school year. From these files, many reports can be provided for the school administration, teacher, counselors and parents.

As the Student Records system is designed to be an ongoing system, it is not necessary to recreate all of the basic files at the beginning of each school year. Programs are provided to accomplish a year-to-year transition by indicating the promotion of qualified students to the next grade level, and their new school, if that is indicated at promotion time. An important aspect of the student records application is the file maintenance functions. Programs are provided to update information in each of the files in the student records application as well as performing the year end transition functions (student transfers between schools, promotions of students from one grade level to the next, etc.)

**S/34 Student Administration System (cont'd)**

The integrity of the data in the files is maintained through the use of extensive editing of the data when it is entered into the system and through complete backup and recovery procedures which are an integral part of the package.

Output reports include:

- Student Listings
- Name and Address Labels
- Ethnic Distribution Report
- Student Profiles
- Student Schedules
- Room Schedules
- Instructor Schedules
- Class Rosters

**STUDENT ACCOUNTING (5726-E32)**

The Student Accounting package consists of two applications, Attendance Accounting and Mark Reporting.

The Student Records Package, which provides the data base and file maintenance functions, is a prerequisite to this package.

- Attendance Application

The maintenance of attendance records is an important aspect of Student Accounting. In many states the amount of state aid for public education is based on average student attendance. Under manual methods, a considerable amount of time is expended by teachers and staff personnel in keeping records and accumulating data for state reports. The Attendance Accounting application simplifies such tasks by collecting original data at the source through the use of attendance data gathering documents, enabling reports to be prepared accurately and rapidly, and reducing clerical transcriptions.

Output reports include:

- Daily Absence Phone List
- Daily Absence Report
- Unresolved Absence Report
- Student Attendance Register
- Student Category Register
- School Category Register

- Mark Reporting Application

The Mark Reporting application provides a means of recording student progress data for reports to parents and to school personnel. The prime data processed by this application are the student marks, which may be either numeric marks or alphabetic marks with optional plus or minus signs. In addition, up to two comments may be selected from a list of 99 user-defined comments and associated with each student's graded course. The Mark Reporting application is designed to fit the needs of many schools by providing a selection of reports and processing methods from which to choose. Output reports include:

- Report Card
- Labels for Permanent Records
- GPA Listings
- Mark Analysis
- Exception Reports

**STUDENT SCHEDULING (5726-E33)**

The Student Scheduling licensed program [Student Records (5726-E31) is a prerequisite] processes student course requests against a manually prepared master schedule of classes to produce a schedule of classes for each student. To assist the school administrator in preparing this master schedule of classes, the following reports are produced from the student course requests: Student Verification Report, Course Verification Report, Course Request Tally Report, and Potential Conflict Matrix. Once the master schedule of classes has been prepared, student requests are processed by the Main Scheduler programs, or, schools may wish to use the arena scheduling option. Whether the class assignments are accomplished through machine scheduling or arena scheduling, the results are the same: A data base reflecting each student's class assignments. For those students who could not be completely scheduled because of a conflict in their course requests, a Student Conflict report can be printed to assist the school administrator in resolving that student's conflict. Once a final scheduling run has been processed, the school may optionally run the student hall scheduler which will assign the student to study halls during any unassigned time in the school day.

Output reports include:

- Student Request Verification
- Course Request Verification
- Course Request Tally Report
- Potential Conflict Matrix
- Student Conflict Report
- Student Schedules

Programs are provided to pass basic student identifying information from Student Records to the Scheduling program. Once scheduling is completed and the scheduled term is about to begin, the student data records will be updated to reflect the student's current schedule of classes. One of the primary objectives of the Student Scheduling Package is to provide for the variety of scheduling philosophies present in today's secondary school environment. This flexibility is accomplished by offering a number of basic scheduling features and options which include:

- Scheduling of up to 4 terms, or semesters
- Up to 24 periods in a school day
- Up to 20 requests per student
- Flexibility in course requests - section requests, instructor requests, term requests, free time requests, and alternates
- Add-on scheduling
- Study hall scheduling option
- Arena scheduling option

Student scheduling is far more than a clerical chore. The basic educational philosophy of an institution is reflected in the manner in which students are assigned to a class section. For example, many school systems permit varying degrees of student-elected alternates and teacher preferences. This illustrates the need for flexibility in a student scheduling system in order to accommodate a wide spectrum of educational policies. The student scheduling package provides administrators with a variety of optional system features which can be used to tailor the scheduling system to coincide with the school's policies.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration requirements are an IBM System/34 with

- 48K bytes of main storage
- 8.6 megabytes of disk storage
- Character or line print capability with 132 print positions and the 48-character set
- IBM 5251 mdl 11 Display Station

The licensed programs are designed to process data recorded on the IBM System/34 keyboard or on a diskette created by the IBM 3740 Data Entry System. Because of volume and time constraints, there may be a requirement for providing offline key entry on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-Character Record feature (#5455) and Feature Group A (#4004).

The marketing representative must be careful when determining the printing, disk space, and key entry requirements. Some installations can use the character printer, but others may require greater print capability, and a larger disk file to handle the number of students and the printing volumes associated with them.

The three applications are interrelated. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other licensed program or user-written programs may co-reside unless stringent coding requirements for these programs are met to insure compatibility with the Student Administration System. The *Application Logic Manual* discusses in detail the coding conventions used for the development of the Student Administration System.



PROGRAM PRODUCTS

**S/34 Student Administration System (cont'd)**

Because of the printing volumes and timing constraints involved in the Mark Reporting applications, an 80-cps printer is recommended as a practical minimum.

**SOFTWARE REQUIREMENTS**

The IBM System/34 licensed programs are written in IBM System/34 RPG II programming language and executed under control of the System/34 System Support licensed program (5726-SS1). IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Work Station Utility is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary.

**DOCUMENTATION**

(available from Mechanicsburg)

*Student Records Reference Manual (SB30-0252) ... Student Records Runbook (SB30-0253) ... Student Accounting Reference Manual (SB30-0255) ... Student Accounting Runbook (SB30-0256) ... Student Scheduling Reference Manual (SB30-0258) ... Student Scheduling Runbook (SB30-0259) ... Student Records Logic Manual (LB30-0254) ... Student Accounting Logic Manual (LB30-0257) ... Student Scheduling Logic Manual (LB30-0260)*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/34 FORTRAN IV  
5726-FO1****PURPOSE**

IBM System/34 FORTRAN IV processes programs written in the IBM System/34 FORTRAN IV language, producing output suitable for execution with the IBM System/34 System Support Program (5726-SS1).

The System/34 FORTRAN IV language contains those features defined in American National Standard Basic FORTRAN, X3.10.1966; language extensions supported by IBM 1130, IBM System/3 and IBM System/32 Basic FORTRAN, and additional features and capabilities previously available only with certain Full FORTRAN compilers. These features include:

- Correction or modification of a program in a semi-interactive mode at the workstation by displaying a source program file into which the compiler has interspersed diagnostic messages. The compile turnaround time can be reduced because the programmer can start to correct or modify the program without waiting for a listing.
- Logical data, logical expressions, and logical IF are supported.
- Logical elements (constants, variables, and arrays) contain true or false values.
- Operation symbols are used in logical expressions:

.NOT. (negation)	.LT. (less than)
.AND. (conjunction)	.LE. (less or equal to)
.OR. (union)	.EQ. (equal)
	.GT. (greater than)
	.NE. (not equal)
	.GE. (greater or equal to)
- Logical expressions evaluate elements to obtain true or false values.
- Logical assignment statements define a relationship - placing the value of a logical expression in a variable or array element.

The System/34 FORTRAN IV library contains mathematical and service subprograms required during execution to perform arithmetic operations, input and output constant conversions and input/output control.

System/34 FORTRAN IV is supplemented by a commercial subroutine package which is equivalent in function to the System/32 Package insofar as is meaningful in terms of System/34 devices and data management.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/34 FORTRAN IV licensed program runs on all models of the System/34. FORTRAN graphics on the IBM 5211 Printer are provided by any 64-character or 96-character print belt or by the 48-character FORTRAN print belt. The IBM 5256 Printer automatically provides FORTRAN graphics.

**SOFTWARE REQUIREMENTS**

The current release of the IBM System/34 FORTRAN IV licensed program operates under control of the current release of IBM System/34 System Support licensed program (5726-SS1).

**Program Use During Customer Pre-installation Testing:** The IBM System/34 FORTRAN IV licensed program (5726-FO1) is available to customers for pre-installation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/34 FORTRAN IV Licensed Program Specifications (GC21-7685) ... System/34 FORTRAN IV Reference Manual (SC21-7706).*

**TERMS and CONDITIONS:** See PP Index

## SYSTEM/34 FINANCIAL INSTITUTIONS CUSTOMER ACCOUNTING SYSTEM

**CUSTOMER INFORMATION FILE ... 5726-F11**  
**DEMAND DEPOSIT ACCOUNTING ... 5726-F12**  
**SAVINGS ACCOUNTING ... 5726-F13**  
**INSTALLMENT LOAN ACCOUNTING ... 5726-F14**

### PURPOSE

These four IBM applications provide broad application support for the small commercial bank. The Customer Information File licensed program (CIF) includes the data base, application conversion procedures, and file maintenance procedures for the system. It is a prerequisite for the Demand Deposit Accounting, Savings Accounting and Installment Loan Accounting licensed programs, which may be installed independently of each other.

The Customer Information File licensed program enables the bank to associate all of a customer's checking, savings, and installment loan accounts with a single record that contains common information about customers and their relationship to the bank. This enables the bank to make decisions based on a broader knowledge of the status of the customer's accounts. Account and customer information is accessed by account number for daily transaction processing, and by customer name for management reports, inquiries, etc. The Demand Deposit Accounting, Savings Accounting and Installment Loan Accounting licensed programs support the three most important data processing applications in a commercial bank. Each of these licensed programs contains a variety of functional options, enabling the bank to tailor the application to its own requirements.

### HIGHLIGHTS

- Can be installed without customer programming capability:
  - Step-by-step installation activity plan and detailed user guidance is provided in the application installation guide.
  - System Tailoring Procedure accommodates account growth by allowing on-site changes to file sizes and functions used.
  - Application conversion procedures are provided.
  - Conversion aids are provided to assist in consolidating the master data from a customer's account records into a single CIF record.
  - Strict DP controls are enforced during conversion.
  - File maintenance is provided.
- Accounting and Control Techniques
  - Two levels of security codes help deter unauthorized access to programs and data.
  - Sample audit trail and control techniques are documented.
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided.
- Interrelated Application Design
  - Data base design reduces file space requirements.
  - Common procedures add new accounts and provide file maintenance for all installed applications.
  - Access to all application accounts through the CIF Master Record.

### DESCRIPTION

These four applications are an interrelated and ready-to-execute set of applications for the small commercial bank:

- Customer Information File
  - Data base, file maintenance, application conversion and customer-oriented reports.
- Demand Deposit Accounting
  - Processing of checking accounts with optional functions of overdraft banking, automatic funds transfer, and combined statements.
- Savings Accounting
  - Processing of savings accounts, both regular savings accounts and time deposit open accounts.
- Installment Loan Accounting
  - Processing of installment loan accounts, including simple interest, add-on, and discount loans.

The system provides transaction and file maintenance data entry through the System/34 keyboard or through a diskette keyed offline on a 3740 Data Entry System. The bank may optionally elect to use the 1255 Magnetic Character Reader (MCR) to capture transactions for Demand Deposit Accounting, Savings Accounting, and Installment Loan Accounting. An installation questionnaire and data capture programs are provided to support the 1255 MCR.

At installation time, the options provided in the system are selected through a System Tailoring Procedure which allows the user to:

- Tailor the application to use only the functions wanted.
- Change the functions to be executed as the environment changes.

- Resize files as the bank's business expands, or if the bank wishes to revise its original estimates.

There is an application installation guide provided with the Financial Institutions Customer Accounting System. It is shipped with CIF and provides instructions for installing and converting all of the Financial Institutions Customer Accounting System licensed programs. It contains guidance on installation planning, data gathering, and the use of the installation and conversion procedures. Samples of all required input data and control forms are included. An application reference manual is provided for each of the four licensed programs. These manuals contain information on the daily operations of the applications. Included is information on procedure scheduling, the operation of each procedure and the implementation of sound operational controls.

An application runbook and a procedure reference summary is provided for each application. The application runbook provides the operator with an easy-to-use set of instructions showing all the activities necessary to run the procedures on a System/34. The procedure reference summary is provided for the operator as a reminder of the functions and use of each procedure. It is intended to be used as a quick reference once the operator is thoroughly trained in the particular application.

An operator instruction manual with exercises is provided for operator training in the use of the runbook. The course is not oriented specifically to financial applications. Therefore, only one copy of the course is needed per customer regardless of which of the IAPs are installed. The course is System/34 only.

An application logic manual is provided for each application as basic licensed material. It is mainly useful for the self-sufficient customer and for systems engineering support. The manual describes the architecture of the Financial Institutions Customer Accounting System, and the logic of the programs and procedures. Data base cross-references and a data dictionary are also included.

The System/34 Financial Institutions Customer Accounting System executes on System/34 in single program mode. The System/34 licensed programs support one workstation, no spooling, no multiprogramming and no file sharing.

The four licensed programs are ready-to-execute applications. Each includes source code, object code, execution procedures and the application logic manual. These are some general features common to all four applications:

- Two levels of security codes help deter unauthorized access to programs and data.
- Application processing is tailored by the customer by including or excluding functions to be executed.
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation.
- Monitoring of execution sequence prevents execution of a program until the required preceding programs have been successfully executed.
- File maintenance and monetary transactions may be entered via the System/34 keyboard or diskettes created on a 3740 Data Entry System.
- Monetary transactions may be entered via the 1255 Magnetic Character Reader.
- A single set of Customer Information File (CIF) procedures enters and edits application conversion data for all applications and creates the master files.
- A single set of CIF procedures establishes new accounts and performs master file maintenance for the four applications.
- The backup and recovery design forces periodic backup of master files and transactions. This provides for tracking of what procedures need to be rerun in recovery to recreate the master files. Three generations of backup diskettes can be maintained, each containing a complete set of master files and transactions.
- Reprint options permit printing multiple copies of reports.

### CUSTOMER INFORMATION FILE (5726-F11)

The Customer Information File licensed program supports three general functions of the System/34 Financial Institutions Customer Accounting System:

- Application Conversion
- Master File Maintenance
- Cross-Application Reports

CIF is a prerequisite for Demand Deposit Accounting, Savings Accounting, and Installment Loan Accounting and is installed in conjunction with the installation and conversion of each of those licensed programs. The conversion process creates a CIF Master File

**S/34 Financial Institutions Customer Acctng Sys. (cont'd)**

(which contains customer-related data for each of the bank's customers) and separate Account Master Files for DDA, Savings and Installment Loans. The Account Master Files contain account-related data for each account in the three applications. The system maintains linkage from each customer's CIF record to the account master record for checking, savings, and installment loan accounts. In addition, a cross-reference file provides an access path from each account master record to all of the customers associated with the account, based on the account number.

**Application Conversion:** Separate programs are provided to enter and edit the customer and account data and to build the data base during application conversion. A two-phase conversion procedure is established for each application. During the first phase the data that is less subject to change (such as customer name and address, account type, etc.) is entered. The master data from each customer's account records is consolidated into a single CIF record. A unique access key is developed for each customer and all master records are created. At this stage the records can be maintained, but monetary transactions cannot be processed. This phase may take place over several weeks or months.

During the second phase the remaining data, such as account balances, are entered, edited and loaded into the master records created in the first phase. The records are placed in active status and the application is ready for daily processing.

Strict batch controls are implemented for both phases of conversion. The controls will not permit either phase to proceed if edit errors exist in any records or if the monetary controls do not balance.

**File Maintenance:** All maintenance of inter-application master files is performed by CIF programs. A single operator procedure is provided to add new customers or new accounts to any converted application. Another procedure is used to change the data in these master files - including such actions as changing an address, placing an account in dormant status, etc. Monetary data can only be changed through application transaction processing. A separate procedure is provided to change the operator and supervisor security codes.

**Cross-Application Reports:** A basic set of cross-application reports is provided. The advanced customer may wish to extend the use of the CIF data base through additional user-written report programs. (If these programs are to co-reside with the Financial Institutions Customer Accounting System, they must meet stringent coding requirements to insure complete compatibility.)

The following items are provided:

- A Customer Services Report, summarizing the number of customers using installed applications or combinations of applications.
- Mailing Labels, to assist the bank in selective marketing of its services, may be printed according to customer selection criteria established by the execution of the Customer Services Report.
- A Customer Profile showing information for an individual customer and the customer's account status.
- A Customer Inquiry, displayed on the console workstation, and containing a subset of the information printed for a Customer Profile. Inquiry may be by full or partial customer name, customer key, or an account number.
- A Spread Report showing the distribution of accounts and the total deposits for up to five user-supplied ranges of DDA and Savings account balances.
- A Master File List, in customer key sequence, to assist in the maintenance of customer and account data.

**DEMAND DEPOSIT ACCOUNTING (5726-F12)**

The Demand Deposit Accounting licensed program provides daily transaction processing and reporting for checking accounts for a commercial bank. The licensed program includes broad support for the standard processing functions and for two major optional functions - Overdraft Banking and Automatic Funds Transfer (AFT).

The customer Information File (5726-F11), which provides the data base and file maintenance functions, is a prerequisite for this product.

**Standard DDA Functions:** Transactions can be entered from the System/34 keyboard, a diskette created on a 3740 Data Entry System, or a 1255 Magnetic Character Reader.

Transactions can be posted against the current, available or collected balance in the account. The bank must select one of these options at installation time to apply to all DDA accounts.

Either one or two classes of float may be used for deposits to calculate the collected balance for accounts. The bank specifies the number of days it requires to collect each class.

The bank must assign one of the supported service charge options to each DDA account. In addition, if Savings Accounting (5726-F13) is installed, the service charge may be waived based on either a minimum

or average balance maintained in the customer's savings account. The supported service charge options are:

- Free Checking
  - No service charge.
- Single Plan
  - A fixed monthly service charge.
- Special or Thrift
  - A fixed monthly charge plus an extra charge for each item designated by the bank as 'service chargeable'.
- Minimum Balance & Charge Per Item
  - The same as the Special or Thrift Option except that provision is made for a charge for each item in a deposit. The service charge is zero if a bank-specified minimum or average current balance is maintained in the account during the statement period.
- Three-Two-One
  - The service charge for the account will be one of three fixed monthly charges, or will be zero, depending on the relationship of the minimum current balance for the period to three ascending balance levels designated by the bank. The account will be charged amount 1 if the minimum current balance is below level 1, amount 2 if it is between level 1 and level 2, amount 3 if it is between level 2 and level 3, and no charge if it is above level 3.
- Volume Earnings
  - The service charge is determined by calculating the cost of servicing the account, subtracting from this amount a credit for the amount the bank earned on the average collected balance, and charging the account the difference. The bank may include a fixed monthly cost, a cost per service-chargeable item, and a cost per item deposited in the cost computation. The earnings credit is a specified percentage of the average collected balance for the statement period. If the earnings credit exceeds the cost, the service charged is zero.

Stop payment actions may be ordered against a check, based on check amount or serial number. In addition a 'stop all' action may be initiated to prevent the posting of any checks to the account.

A hold for a specific amount may be specified against an account, or the account may be frozen - in which case all transactions against it are rejected.

The bank may specify a short list factor which applies to all accounts. When the daily number of checks for an account reaches the specified level, the checks are added together to form a single item for account posting and statement printing. A list of the checks that were combined to produce this single item is printed for filing in the customer's account folder. The short list factor may be overridden to always short list or never short list an account regardless of the number of checks.

The bank must select one of two procedures for determining how to handle an account when there are not sufficient funds to post all checks that are presented. They may choose to post each item individually until the balance is insufficient and then reject those items that cannot be posted; or, add all checks together and either post them or reject them.

**Overdraft Banking:** The overdraft banking function may be invoked for any specific account. If a check would normally cause the posting balance to fall below zero, a loan sufficient to cover the check is automatically advanced. Loans are always advanced in user-defined increments, with a credit limit specified for each account. The loan balance is maintained separate from the checking account balance, and deposits do not reduce the loan balance. Finance charges are accrued daily and added to the loan balance when the monthly statement is printed. A user-defined minimum payment is also calculated at statement time and automatically deducted from the DDA account balance. The overdraft banking format of the standard statement shows the running balance of the overdraft loan, its associated transactions, and the loan status.

**Automatic Funds Transfer (AFT):** The AFT function provides periodic transfers of funds from a checking account to another account - such as a savings or installment loan account. If Savings Accounting (5726-F13) or Installment Loan Accounting (5726-F14) is installed, the deposit or payment is also automatically credited. If the credit is to some other account, it is listed on a report and must be credited offline. The account holder may designate a frequency of weekly, biweekly, monthly or quarterly for the transfer. A number of transfers may be established against a single account.

**Customer-Oriented Reports:** These reports are all produced on preprinted forms. The sample forms shown in the documentation may be ordered through SSD.

Account statements are printed monthly. One of the five service charge options or free checking must be assigned to each account. The bank

### S/34 Financial Institutions Customer Acctng Sys. (cont'd)

may offer each customer either the standard statement or a 'combined' statement. The combined statement includes the status of selected customer savings or installment loan accounts, if they exist on an installed Savings Accounting Program (5726-F13) or Installment Loan Accounting Program (5726-F14).

The NSF Notice is a combination form which is used to notify the customer either of checks drawn on insufficient funds, or of an overdraft loan advance:

Auditor Confirmation Notices are generated on request, based on a multiple start point systematic sample technique. The random start points can be selected by the auditor.

**Internal Reports:** The reports produced for use within the bank include:

- Transaction Entry and Edit Reports
- Trial Balance and Activity Journal
- Unposted Items Report
- Service Charge Journal
- Overdrawn and Drawing Against Uncollected Funds Report
- Significant Balance Change Report
- Inactive and Dormant Accounts List
- Inactive and Dormant Account Activity Report
- Account Status Change Report
- Stopped Items List
- Closed and Zero Balance Accounts List
- Short Lists
- Overdraft Banking Trial Balance Report
- AFT Debits List and AFT Credits List
- AFT Journal
- Stop/Hold Journal

#### SAVINGS ACCOUNTING (5726-F13)

The Savings Accounting licensed program provides daily transaction processing and reporting for regular savings accounts and time deposit open accounts.

The Customer Information File (5726-F11), which provides the data base and file maintenance functions, is a prerequisite for this licensed program.

**Standard Functions:** Transactions may be entered from the operator console, a diskette created on a 3740 Data Entry System or a 1255 Magnetic Character Reader. If Demand Deposit Accounting (5726-F12) is installed, Automatic Funds Transfers (AFT) to savings accounts will be merged by the system into the daily transactions and automatically credited to the designated accounts.

A hold for any amount may be specified against an account, all withdrawals may be stopped, or the account may be frozen - in which case all transactions against it will be rejected.

Up to eight different account plans, based on combinations of the interest calculation techniques, and the compounding and crediting options discussed below, may be offered at one time.

**Interest Calculation Techniques:** The licensed program supports both regular savings deposits and time deposit open accounts. The Low Reference Balance and the Day of Deposit to Day of Withdrawal (DOD-DOW) interest calculation techniques may be selected for savings deposit account plans. Time deposit open account plans may be based on either, (1) a requirement that the funds be on deposit for at least one complete interest period, or, (2) a requirement that they be on deposit for at least ninety consecutive calendar days.

For Low Reference Balance accounts, interest is calculated and compounded either quarterly or semiannually. Grace periods at the beginning of each month and end of the period may be defined, and either the LIFO or FIFO posting option must be selected for each plan.

For all except Low Reference Balance accounts, interest is accrued daily, and the bank may elect to compound interest continuously, daily, quarterly or semi-annually.

The bank may elect to credit interest to the account (add it to the account balance) either quarterly or semiannually.

**Customer-Oriented Reports:** For both regular savings deposit and time deposit open accounts, the bank may choose to provide pass-books, periodic statements, or may do both. The system records and reports 'no-book' transactions against a passbook account.

Interest earned during the preceding year may be reported to the customer each January on 1099 forms.

Auditor Confirmation Notices are generated on request, based on a multiple start point systematic sample technique. The random start points can be selected by the auditor.

**Internal Reports:** The reports produced for internal use within the bank include:

- Transaction Entry and Edit Reports
- Trial Balance
- Activity Journal
- Unposted Items Report
- Special Activity Report
- Earnings Journal
- Inactive and Dormant Accounts
- Closed Accounts
- No Book Transactions List
- Transaction History Report
- Accrual Report
- Account Status Change Report
- Stop/Hold Journal

#### INSTALLMENT LOAN ACCOUNTING (5726-F14)

The Installment Loan Accounting licensed program provides daily transaction processing for installment loan accounts for a commercial bank. The application includes broad support for the handling of the common interest calculation types, accrual and refund methods, and provides a variety of other features.

The Customer Information File (5726-F11), which provides the data base and file maintenance functions, is a prerequisite for this licensed program.

**Standard Functions:** Transactions may be entered from the operator console, a diskette created on a 3740 Data Entry System, or a 1255 Magnetic Character Reader. If Demand Deposit Accounting (5726-F12) is installed, AFT payments to installment loan accounts will be merged by the system into the daily transactions and automatically applied to the designated accounts.

For simple interest loans, interest is accrued daily. For precomputed (add-on and discount) loans, interest is accrued monthly on the loan's anniversary day (the day of the month on which payment is scheduled), by either the rule of 78s or straight-line accrual methods, or on a cash basis. Payment schedules are monthly or quarterly.

Early payoff calculations for precomputed loans use either the rule of 78s or straight-line method. They are performed monthly on, or up to 15 days after, the anniversary day. These calculations are performed monthly for all loans including those on a quarterly payment schedule. A loan paid off prior to the first regular monthly accrual will earn either one full month's interest or interest computed at a daily rate for the number of days outstanding.

Credit life and accident and health insurance are supported. Earnings and collections on each type of insurance are maintained and reported separately. Early payoff calculations include insurance earnings.

Dealers can be associated with a loan and earn a portion of the interest. Dealers will earn by the same schedule and method that the bank earns. Bank earnings and dealer earnings are reported separately on a daily and monthly basis. The bank's recourse to dealer is identified.

The bank may choose to print reminder notices and late notices and to assess late charges for accounts missing a payment. A percentage of the payment may be allowed to fulfill the payment obligation and prevent late charges from being assessed.

Payments may be applied first to either past due amounts or to the current payment, based on a bank-selected option. Late charges are assessed only if the current payment has not been paid. The bank has the option to permit automatic deduction of late charges from a payment. The late charges will only be deducted after the current month's payment obligation is fulfilled, past due amount is satisfied, and full payments are applied to the loan balance. A separate late charge payment is also accepted.

Loan extensions may be granted, thereby deferring payments for some number of months. The bank may require a fee for extensions.

Notices of Interest can be produced on request for all or selected accounts. These notices are also produced automatically at the end of each month for accounts closed during the month.

Payment notices can be printed for simple interest loans, advising customers of payments due.

Auditor confirmation notices are generated on request based on a multiple start point systematic sample technique. The random start points can be selected by the auditor.

**S/34 Financial Institutions Customer Actng Sys. (cont'd)**

**Internal Reports:** The reports produced for use within the bank include:

- Transaction Entry and Edit Reports
- Trial Balance
- Update Totals
- Earnings Update Summary
- Transaction Journal
- Unposted Items Report
- Suspected Closed Report
- Special Activity Report
- Exception Report
- New Loans Report
- Late Charge Assessments Report
- Collection Report
- History Merge
- Monthly Earnings Report
- Dealers Monthly Earnings Report
- Monthly Insurance Company Report
- Closed Loans Report
- Transaction History Report
- Aged Delinquency Report
- Dealers Trial Balance
- Loan Class Report
- Loan Plan Report
- Collateral Insurance Expiration Report

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Each of these IBM System/34 licensed programs is compiled assuming a minimum 48K system and will execute on all models of the IBM System/34 in single program mode equipped with a minimum of 48K of memory. Because of volume and time constraints, there may be a requirement for offline keying on an IBM 3740 Data Entry System and/or transaction entry through the IBM 1255 Magnetic Character Reader. If an IBM 3741 is to be used, it must have Feature Group A (#4002). If an IBM 3742 is to be used, it must have 128-character feature (#5455) and Feature Group A (#4004). In addition, the Proof Keyboard Feature (#5901 or #5902) is desirable, but is not required.

All models of the IBM 1255 Magnetic Character Reader (MCR) that can be attached to the IBM System/34 are supported by these licensed programs. The Dash Symbol Transmission Feature (#3215) cannot, however, be installed if the customer wishes to use the MCR data capture programs supplied with the programs. Consult the sales manual for ordering instructions and any restrictions that pertain to attachment of the 1255 MCR to the System/34.

The four applications are closely interrelated. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other licensed program or user-written programs may co-reside unless stringent coding requirements for these programs are met to insure compatibility with the Financial Institutions Customer Accounting System. The application logic manual discusses in detail the coding conventions that are used.

**SOFTWARE REQUIREMENTS**

The IBM System/34 feature licensed programs are compiled in System/34 RPG II programming language and executed under control of the IBM System/34 System Support Program (5726-SS1). IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility and Work Station Utility is required. Only the Sort Utility, however, is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary. The

Customer Information File (5726-F11) is a prerequisite for Demand Deposit Accounting (5726-F12), Savings Accounting (5726-F13), and Installment Loan Accounting (5726-F14).

**DOCUMENTATION**  
(available from Mechanicsburg)

*Customer Information File: Installation Guide (SB30-0238) ... Reference Manual (SB30-0239) ... Runbook (SB30-0240) ... Demand Deposit Accounting Reference Manual (SB30-0242) ... Runbook (SB30-0243) ... Savings Accounting: Reference Manual (SB30-0245) ... Runbook (SB30-0246) ... Installment Loan Accounting Reference Manual (SB30-0248) ... Runbook (SB30-0249) ... Customer Information File Logic Manual (LB30-0241) ... Demand Deposit Accounting Logic Manual (LB30-0244) ... Savings Accounting Logic Manual (LB30-0247) ... Installment Loan Accounting Logic Manual (LB30-0250)*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/34 MANAGEMENT SYSTEM FOR LAW FIRMS  
5726-F52**

[No longer available, effective June, 1983.]

**PURPOSE**

The IBM System/34 Management System for Law Firms licensed application program offers the partners in a law firm a practical, convenient means of capturing time and disbursement data, and organizing that data into meaningful working documents and management reports.

The application program is designed for the small to medium sized law firm. It is a complete set of programs designed to assist the law firm in time and disbursement accounting, billing and accounts receivable. These programs capture and store data which is then organized into reports to aid law partners in effectively controlling and managing the firm's business functions. In addition, it can be utilized with the MMAS General Ledger System licensed application program (5726-M37) to provide traditional general ledger functions such as balance sheet, income statement and other reports describing the financial status of the firm.

The System/34 Management System for Law Firms includes the components necessary for a controlled flow of daily time entries, disbursement entries (made on behalf of a client) and billing information, from data capture to final reports. Other entries, such as time or disbursements transfers, cash receipts, accounts receivable journal entries, file maintenance, and accounts receivable writeoffs, are supported. A series of comprehensive reports, with frequency of many of the reports being user-determined, is provided to the law firm.

**HIGHLIGHTS**

- Provides Missing Time Report which flags individuals who have reported less time than the firm standard
- Provides a turnaround document for billing information on demand or periodically with all of the necessary information to make billing decisions and update computer stored records.
- Provides disbursement-only billing information memos on demand or periodically
- Prints client bills in a variety of formats
- Calculates the variance between the firm investment of time for a bill and the actual amount received on the bill
- Provides aged accounts receivable reports
- Prepares aged reports of unbilled time and disbursements
- Analyzes billed and unbilled time
- Provides a file sizing program to create file sizes based on individual user needs
- Provides system tailoring procedures for user to select functions
- Designed to be used with the General Ledger licensed program.
- Provides initial file loading, record addition, and data entry capabilities through keyboard entry or 3740 Data Entry System.
- Provides data entry for daily transactions through keyboard or 3740 Data Entry System
- Provides file maintenance on existing master file records which use DFU (keyboard only)

**DESCRIPTION****TIME and DISBURSEMENT ACCOUNTING**

The Time and Disbursement Accounting application controls recorded unbilled time and disbursement entries made by the firm on behalf of a client, and provides a broad range of management reports. The major Time and Disbursement Accounting features are:

- Additional time recording steps are not required of the professional staff.
- Aged unbilled time and disbursement reporting triggers billing activity and should help improve cash flow.
- Time and disbursement information is maintained in detail with totals accumulated at the matter and client levels.
- One of two billing rates can be selected per individual.
- Time and client disbursement description codes are user-defined.
- Narrative can be included or omitted as required.
- References to an individual can be suppressed on selected reports.
- A single disbursement journal handles both firm and client disbursements.
- All or selected time or client disbursement records can be transferred from client-to-client, matter-to-matter, attorney-to-attorney, or date-to-date.

- All information is automatically adjusted and all transfers are listed for control and auditing purposes.
- Nonbillable time can be tracked for management analysis.
- Billing Proofs can be used to verify billing attorney instructions.
- A broad range of time and disbursements reports is provided:
  - Weekly Time Report
  - Missing Time Report
  - Individual Time Summary
  - Individual Unbilled Time Summary
  - Disbursements Journal
  - Billing Journal
  - Unbilled Time and Disbursements

The billing information function of the application processes time and client disbursement records to provide billing information to assist in the billing process. Features of the billing information function are:

- Produces Billing Information Memos on demand showing all reported activity performed by the firm for a client. This report is used by the billing attorney as a turnaround document to record decisions on actual amounts billed and/or written off.
- Enables the billing attorney to bill without relieving time entries (payment on account), by relieving time and client disbursement entries, or by relieving client disbursements only.
- Prints client bills in a variety of formats
- Produces Matter Billing Summary reports showing billing analysis for the billing attorney, the matter, or the client.
- Shows billing variance (the dollar difference between time value and fees billed) and billing realization (the ratio, expressed as a percentage, between fees billed and the value of the individual's reported and billed time).
- Prepares retainer lists showing billable retainer amounts.

**ACCOUNTS RECEIVABLE**

The Accounts Receivable application offers a systematic procedure of recording and reporting client fee and disbursement bills, receipts and write-offs as well as the firm's cash receipts. Features of the Accounts Receivable application are:

- Aging of client accounts
- Allocation of fees and write-off amounts
- Summary or detail printing of the Aged Receivables Report
- Advance payments for fees and disbursements
- Allows entry of billing information into Accounts Receivable without any supporting time or client disbursement entries
- Cash Receipts/Write-off Journal
- Paid Open Bill and Write-off Report
- Inactive Client/Matter List

**Features:** Included as part of this application program are several features designed to enhance day-to-day operation.

File maintenance is a part of every application within the program. Maintenance may be performed on descriptive data in all major files but not on auditable totals and dollar amounts.

Checking procedures guide the correct sequence of operations to maintain data integrity. When an operation is not successfully completed due to missing or incorrect information, or due to an attempt to perform an operation out of sequence, the operator is notified that corrective action must be taken. The operator can then correct problems before running subsequent tasks, which are dependent upon the accuracy of prior input for proper reporting.

Backup and recovery routines maintain a dynamic tracking history which records previously executed tasks. If recovery is necessary, the recovery routines guide the user in recovering required data developed since the last data back-up point.

Reprint options are available for most reports. Reports can be reprinted to provide extra copies. If recovery is needed to recreate data files, report printing is bypassed, thus saving time.

Selective printing allows the operator to specify various options to control the content and level of detail contained in reports.

Printing options include:

- Range printing. For example, the operator may specify client identifiers as limits so that information is printed only for the group of clients whose identifiers fall between those specified.
- Selection of specific data. For example, the operator may select to print only matters whose unbilled disbursement totals exceed a specified amount.

**S/34 Management System for Law Firms (cont'd)**

- Selection of detail level. For example, the operator may optionally request a detailed report or a summary report.  
Users may modify information that is subject to change, such as report selection criteria and aging periods.
- Individual security codes for time and disbursement accounting, accounts receivable and maintenance are user-assigned at installation time. These codes may be periodically changed as authorization changes dictate.
- File sizes, which are determined at installation time, may be resized in the future to accommodate the firm's growth.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 application programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration requirement is an IBM System/34 with:

- 32K bytes of main storage
- 8.6 megabytes of disk storage
- 40 characters per second matrix printer
- IBM 5251 mdl 11 Information Display Station

Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features 128-character (#5455) and feature group A (#4004).

**SOFTWARE REQUIREMENTS**

IBM System/34 System Support licensed program (5725-SS1 Version 1), and System/34 Utilities licensed program (5726-UT1).

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/34 PUBLIC BUDGETING AND ACCOUNTING SYSTEM (PBA)  
5726-G21**

**PURPOSE**

The IBM System/34 Public Budgeting and Accounting System (PBA) provides a workstation-oriented financial control, planning and accounting system for public institutions. It assists users in meeting financial reporting requirements, preparing budgets through online budget preparation and tracking, and controlling expenditures through management reports. The system also provides periodic reporting of expenditure and revenue accounts, and preparation of Balance Sheet and General Ledger as well as year-end closing statements.

**HIGHLIGHTS**

- The System/34 hardware and software functions (spooling, inquiry, multiprogramming) are integral parts of the PBA application design.
- Workstation data entry is designed for simplicity and ease of use. Screen displays provide guidance for entering data. Error messages are displayed. The incorrect data can then be corrected by the operator.
- Interactive data entry, concurrent edit, and correction from multiple workstations with batch programs operating from the job queue.
- Data entered into the multiple workstations is immediately edited for errors.
- Journal entry, cash receipt, purchase order, voucher, cash disbursement, and labor distribution transactions are posted to revenue, expenditure, labor distribution, and general journals.
- Audit trails for transactions from entry to period-end closing are provided by a journal reference numbering system.
- Accounting year is established by choice of first fiscal month or period. Yearly cycle can be 12 months or 13 periods.
- As an option, encumbrance accounting is performed. Liquidation occurs through the processing of an outstanding encumbered purchase order file.
- Labor and material costs can be accumulated by project.
- Budget reports are printed containing the previous two years' actuals and present projected amounts.
- Percent of budget spent is tracked both for current month and for year-to-date.
- A trial balance for balance sheet, revenue, and expenditure accounts by fund is produced to ensure fund integrity prior to printing final reports.
- Reports can be produced periodically or on demand.
- Single fund general ledger as well as fund trial balance are produced.
- Accounts payable checks are produced on demand.
- An expenditure approval listing is produced identifying expenditures by item.
- Multiple payments to a vendor are accumulated, totaled, and printed on a single check.
- Current chart of accounts is printed.
- Outstanding payable checks are tracked and reports of outstanding checks are printed after check reconciliation.
- Inquiry into master files concurrent with data entry and batch programs.
- System tailoring procedure permits the user to select optional functions and determine the size of files used by the application. Functions and file sizes may be modified as the environment changes by re-executing the tailoring procedure.
- Source code, ready-to-execute procedures, and object code provided. No additional systems design, programming, or compiling is required.
- File load programs for all master files are provided. Data can be entered from diskette during file load.
- Online file maintenance of master files with direct file updating and printed registers for control and auditing.
- Master file backup to diskettes and optional transaction file backup to diskettes.
- Password security helps deter authorized use of application functions.
- Documentation for PBA includes an application installation guide, an application reference manual, runbooks, and an application logic manual.

- Self-study instructional materials are also available for operator education.

**DESCRIPTION**

Special functions and features of the PBA application are:

- Budget preparation and tracking
  - Online direct entry and edit
  - Direct file updating through workstations
  - Printed worksheet with previous year's figures
  - Estimated expenditure and revenue reports
  - Final budget report for publication
- Revenue and expenditure accounting
  - Online data entry and edit
  - Inquiry provides up-to-date account balance information
  - Journals that provide complete audit trails for transaction processing
- General Ledger
  - Required month and year-end reports
  - Complete audit trail
- Purchase order encumbering/Accounts Payable
  - Encumbrance accounting as an option
- Purchase Orders are checked against account balance
  - Check approval listing, check registers, and check writing are provided
  - Complete audit trail is provided
  - Inquiry provides review of outstanding purchase orders

PBA is a set of ready-to-execute application programs for public institutions and schools. The application has certain required records within an application control file which contain questionnaire responses. File sizes and functions can be selected to suit the user's needs. The questionnaire responses are entered during initial installation and may be changed as needed.

The System Tailoring Procedure allows these responses to be entered or modified. It provides the following:

- Tailors the application and Operator Control Language (OCL) on-site at installation time
- Allows the user to activate and deactivate provided functions as the user's business changes
- All functions are included in the application programs, but only required functions are executed
- Allows changes to file sizes as needed by rerunning the System Tailoring Procedure.

The application installation guide for PBA provides detailed step-by-step instructions for use in preinstallation, installation and postinstallation activities in order to achieve productive operation. These instructions include sample account numbering structure, sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures.

The application reference manual is provided to enable the user to understand the application from a functional and operational standpoint. It contains information for the installation manager to supervise the system console operator, and to run the application from a total systems viewpoint. It also provides the user department manager with information needed to supervise the workstation operator and to understand the application at a detailed level.

Runbooks are provided for the systems console operator and for the workstation operator. These runbooks contain detailed instructions for the application procedures, an overview of the system and application flow, system consideration, hints for troubleshooting, and all of the error messages that can be generated.

An application logic manual is provided, as licensed material, for use by the self-sufficient customer and the systems engineer for maintaining and modifying PBA. Information on architecture, naming conventions, controls, program functions and specifications, relationships among files, and other information applicable to the application is presented.

Instructional support is provided to facilitate installation and operation. The Installation Planning self-study material provides guidance in the use of the application installation guide and the application reference manual. Instructional material for self-study is provided for the systems console operator and the application workstation operator to instruct them in the use of the runbook.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI Section, in the installation of



PROGRAM PRODUCTS

**S/34 PBA (cont'd)**

IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer. Installation of the System/34 is also a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

This licensed program will execute on all models of the IBM System/34 with a minimum of 48K bytes of main storage. The PBA Survey Guide provides the necessary information and questions for determining the prospect's qualification and application fit. Areas covered are function, storage capacity, and justification.

Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Design features have been incorporated into the PBA application to allow for co-residency of other applications and/or user-written programs with minimum restrictions. Consult the PBA application logic manual for further explanation of these restrictions.

**SOFTWARE REQUIREMENTS**

The IBM System/34 application programs are written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support licensed program, 5726-SS1. The IBM System/34 Utilities licensed program, 5726-UT1, which includes Sort and Work Station Utility, is required for execution of the programs. The IBM System/34 RPG II licensed program, 5726-RG1 is required if modifications to the source code are desired.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (GH30-0435) ... Reference Manual (SB30-0323) ... Runbook (SB30-0324) ... Installation Guide (SB30-0332) ... Logic Manual (LB30-0325).*

**TERMS and CONDITIONS:** See PP Index

## HOSPITAL FINANCIAL MANAGEMENT SYSTEM (HFMS) FOR SYSTEM/34 (Single Program Mode)

PATIENT BILLING ... 5726-H11  
 ACCOUNTS RECEIVABLE ... 5726-H12  
 PAYROLL ... 5726-H13  
 GENERAL LEDGER/ACCOUNTS PAYABLE ... 5726-H14

### PURPOSE

The IBM Hospital Financial Management System offers the small hospital a disk data-based system comprised of a series of programs and procedures that perform the accounting, management reporting and statistical functions for patient billing, accounts receivable, payroll and general ledger/accounts payable.

Presentation of timely information enables management to observe trends and deviations from the hospital's planned financial position. This enables Hospital Management to quickly spot problems and initiate corrective action. More important, it provides a basis upon which to institute plans to improve the financial position. The accuracy of the accounting information is mandatory because of reporting requirements placed upon the hospital by regulatory agencies.

Completeness of hospital operating information provides the basis for review, analysis, and cause and effect relation studies of such things as rate setting, reimbursement analysis, patient mix, and services performed. A comprehensive information base provides the justification for decisions regarding future operations and services.

Five applications are supported by HFMS. They are patient billing, accounts receivable, payroll, and general ledger/accounts payable. General ledger and accounts payable are marketed together as one offering. Each of the other applications is a separate offering. Each application may be installed and operated independently or as an integrated system.

### HIGHLIGHTS

- An integrated series of offerings that can be installed in any sequence for standalone or integrated operation
- The HFMS offering consists of:
  - Source Code and Object Code
  - Ready-to-Execute Procedures
  - Predefined File Sizes
  - Installation Guides
  - Operator Runbooks
  - Installation Supervision Self-Study Instructions
  - Operator Self-Study Courses With Machine Exercises (System/32 only)
  - Hospital Application-Oriented Specifications for Data Entry and Control Forms
  - Technical Documentation for problem determination
- Simplicity of operation characterized by application-oriented commands, prompting, responses, and messages
- Complete hospital disk data base
- Complete file load and maintenance programs
- Backup/recovery procedures imbedded in the application flow
- Comprehensive data entry editing with errors explained to facilitate correction
- Inquiry facility for Patient Billing and Accounts Receivable
- Optional entry of batch transaction input through diskettes prepared on the 3740 Data Entry System
- Comprehensive accounting controls through a defined audit trail
- User-defined system control file entries for adapting HFMS to customer requirements

The System/34 programs make available the Hospital Financial Management System in single program mode. They support one workstation, no spooling, no multiprogramming, and no file sharing.

### DESCRIPTION

#### PATIENT BILLING (5726-H11)

The system provides for accurate and timely posting of inpatient and outpatient charges to produce patient bills and provides the basis for the revenue statistics needed for third-party reporting, cost reimbursement, internal rate setting, and revenue analysis.

The offering has five logical subsystems: Census, posting, billing, revenue usage, and statistics.

The census subsystem tracks the location of inpatients and processes all outpatient activity. Census reports are produced in various sequences which serve the needs of different users in the hospital. The census reports and the daily recap are used to verify the accuracy of the reported day's activity. The generation of the final census triggers the automatic generation of room charges to the posting subsystem.

The posting subsystem enters all routine and ancillary charges including room charges from the census subsystem into the inpatient and outpatient billing files. Charges can be automatically priced by the system or overridden by keyboard entry. It produces reports necessary to verify the accuracy of the information, automatically prepares the daily revenue entries for the General Ledger (5726-H14) and updates the detail revenue file records.

All detail posted charges are saved by the system on an accumulated charges file, which is used by the billing subsystem to prepare detail patient bills. Accounts Receivable (5726-H12) will post payments against accounts not yet final billed into the accumulated charges file.

The billing subsystem uses the information in the inpatient and outpatient billing files and the accumulated charges file to print patient bills. The detail bills for both inpatients and outpatients include a complete chronological detail of charges and a 'summary of charges' at the end of the bill. Inpatients' final detail bills are automatically produced after discharge. Outpatient emergency (one-time visit) detail final bills are automatically produced after the patient visit, while recurring outpatient final detail bills are produced when requested by the hospital. After the detail final bill is produced, the billing record is deleted. Prior to this deletion, it is transferred to the accounts receivable file if Accounts Receivable (5726-H12) is installed.

Detail cycle bills can also be requested for any current inpatient account. This bill shows the balance as of the last cycle bill and a detailed summary of current charges. Requesting cycle bills does not alter the processing or format of the detail final bill which will eventually be produced.

Summary bills can be printed on demand (inquiry) for any inpatient or outpatient account not yet final billed. The bill is in summary format containing all charges as of the last posting period.

The revenue usage subsystem is driven by the inpatient and outpatient charges from the posting subsystem. Daily and monthly revenue reports are produced in detail or in summary by departments, showing usage of individual services within the current period and year-to-date. The statistics subsystem maintains and reports patient statistics by medical service and patient category for both inpatients and outpatients, ancillary utilization statistics by department for all inpatients and for five outpatient categories, and departmental revenues by six financial classes.

#### ACCOUNTS RECEIVABLE (5726-H12)

Managing the hospital's Accounts Receivable has become an increasingly complex task. Required interaction with patients and many third parties (including private and public insurance companies and various governmental agencies) has created an explosion in clerical tasks. This has resulted in a difficult control problem in the hospital business office. The offering has three logical subsystems to aid in the collection of accounts receivable and in controlling the large volume of data involved. They are daily posting, statement writing, and reporting.

The posting subsystem creates receivable accounts either through keyboard entry or by accepting transferred inpatient and outpatient accounts which have been final billed from the Patient Billing offering (5726-H11). The subsystem accepts a full range of transactions such as payments, adjustments, late charges, and bad debt recoveries. If Patient Billing (5726-H11) is installed, payments can be accepted against active billing accounts and posted as credit charges. Controls, procedures, edit and audit reports assist the accounts receivable department in making sure transactions are posted to the correct accounts. This automated posting procedure eliminates many clerical tasks and frees business office personnel to concentrate the majority of their time analyzing and pursuing collection of open accounts.

The posting subsystem maintains a separate account for each patient for each hospital visit. However, the ability to assign a guarantor number (family number) is provided. The facility enables the system to group all accounts for one family together for statement writing and accounts receivable reporting. The system has further facilities to handle both active and bad debt accounts with separate controls, to transfer from patient to insurance and from insurance to patient, and to generate entries for the General Ledger (5726-H14).

The Statement Writing Subsystem generates balance-forward statements and includes a number of options that allow users to operate the system to meet their unique requirements. Statements can be written on a weekly, biweekly, or monthly cycle to smooth the business office workload. Statements can be written for all financial classes or only selected financial classes (financial class denotes primary method of payment, such as self-pay, Medicare, Blue Cross, Welfare, etc.). Finance charges can be assessed at the option of the user. Statements can be either family statements or individual account statements.

The Reporting Subsystem provides the user with a flexible information system to be used in handling the unique patient and third-party collection problems encountered in a hospital receivables system. Aged receivables reports can be produced in varying sequences or as various exception reports to help hospital personnel zero-in on specific

**S/34 HFMS (cont'd)**

collection problems or to satisfy specific information needs. The age of accounts can be calculated based on discharge date, date of last payment, or date insurance was filed. Reports can be produced for all open accounts or selected accounts based on financial class, range of dollar balances, and age since discharge date, last payment date, or date insurance was filed. If patient number is assigned to all accounts, the aging reports can be printed for all accounts for a patient alphabetically by patient name.

A selective Detail Status Report facility is provided in the system for the user to retrieve reports showing all detail transactions for any specific account or group of accounts, based on financial class or patient number.

The system handles the processing for both Active and Bad Debt Accounts. A report showing all accounts that have been transferred to bad debt can be run at any time.

An Account Balance Inquiry can be requested at any time to be displayed on the System/34 or printed or both. This allows the business office to retrieve the most current information regarding any account when it is required.

The Patient Account record and all Detail Transactions for an account are maintained in the system until a user-specified number of days after the account zero balances or until the account is deleted from the system as an uncollectable bad debt. At the time an account is deleted from the system, a one page report is printed showing all the detailed information for the account. This report is then filed for reference purposes.

**PAYROLL (5726-H13)**

Within the hospital, personnel represents the most valuable and the most expensive resource. While an efficient mechanism for prompt employee payment and bookkeeping is essential, the emphasis today is necessarily on astute management - planning, scheduling, and monitoring - to ensure the most productive use of this valuable and costly personnel resource. The offering addresses these needs through four logical subsystems: Payroll Processing, Labor Distribution, Benefits Analysis, and Personnel Reporting.

The biweekly Payroll Processing subsystem calculates hourly and salaried employee earnings, calculates statutory and voluntary deductions, accrues vacation and sick leave, accumulates quarter and year-to-date totals needed for 941-A and W-2 reports, and prints the employee's check. It also provides necessary reports to show a complete audit trail of each payroll run and to perform check reconciliation. The system calculates and deducts tax-sheltered annuities, federal withholding taxes, and Federal Insurance Compensation Act (FICA) withholding. Rates are supplied to the programs from a system control file to avoid program recompilation as rates change. The data fields needed to calculate existing state, county, or city withholding taxes are included in the date base and an exit point is provided in the program for the inclusion of a user-written subroutine to calculate these taxes. However, the earnings statement and reports have provisions to print only one non-federal withholding tax.

The ability to process voided checks as a separate run is provided. Batches are created of the checks to be voided and the data is entered in a manner similar to normal time card entry. The void check run follows the same sequence of events as normal payroll run except that checks are not written.

Vacation and sick leave hours are accrued based on actual hours worked and a hospital-defined accrual rate that can vary by employee.

The system will handle up to 10 types of voluntary deductions that can vary among employees regarding the frequency and method of calculation. These hospital-defined voluntary deductions are calculated, deducted, and reported each pay period on both a current period and year-to-date basis.

The labor distribution subsystem produces current and year-to-date reports each pay period by using the extended employee time records and budgeted and year-to-date balances from the position control file. These reports show hours and dollars (actual, budget, and variance) categorized by productive and non-productive time. This subsystem produces the departmental expense entries for the General Ledger application (5726-H14).

The benefits analysis subsystem produces reports for both included and contributory benefits each pay period. Included benefits are generally those that are completely paid by the hospital, such as vacation, sick leave and holidays. Contributory benefits are generally those that are partly paid by the hospital and partly by the employee, such as life insurance and health insurance.

The Included Benefits Report shows vacation and sick leave hours carried over, accrued, taken and remaining for each employee and department. Holidays taken are also noted on this report. The Contributory Benefits Report provides an analysis of the amount paid by the hospital for life and health insurance on a total cost basis and cost-per-hour basis for each employee, position classification, and department.

The personnel reporting subsystem provides reports to assist the personnel department in effectively using the people resource of the hospital.

An up-to-date Employee Status Report for each employee in the hospital is produced by the system whenever a change is made on an employee's record. All additions, changes, or deletions of employee information are thoroughly edited by the system and printed on Maintenance Reports. An Employee Personnel Profile is produced for employee verification of pertinent data. It serves as a turnaround document for entering changes into the system.

Employee listings by name and number are printed for reference purposes. An Annual Employee Benefits Report is produced for each employee showing total earnings, included benefits and contributory benefits. The Turnover Report provides an analysis of employee terminations by department showing the reason for each termination. Union Listings by employee within union can be produced when required.

**GENERAL LEDGER/ACCOUNTS PAYABLE (5726-H14)**

**GENERAL LEDGER**

In order to provide increased patient care, hospitals must work from a sound financial base. In order to develop that base, the hospital executive must have detailed hospital operating information that is accurate, timely, and complete. The hospital must establish a plan, and since they are controlled to cost-dependent prices, they must work within that plan. The general ledger application provides the information that is key to more effective management through three logical subsystems: Daily processing, accounting period-end updating, and accounting period-end financial reporting.

The daily processing subsystem produces a journal of the day's valid transactions and adds them to the accumulated transaction file. Transaction validity is established through the use of the batch proof report. All transactions can be entered as miscellaneous journal entries. However, other offerings of the Hospital Financial Management System automatically provide journal entries from Patient Billing (5726-H11), Accounts Receivable (5726-H12), Payroll (5726-H13) and General Ledger/Accounts Payable (5726-H14) which will substantially reduce keying time. All transactions from whatever source are thoroughly edited by the system.

The accounting period-end updating subsystem provides the detail and summary trail balances. They are produced at the close of each accounting period. The system is designed to handle either 12 or 13 accounting periods per fiscal year. The trial balances can be run as many times as necessary to insure that all closing and correcting entries for that accounting period have been processed and the ledger is in balance. The system then updates the General Ledger Accounts file by extracting all entries for the accounting period (from the Accumulated Transaction File and summing these entries with the balance as the end of the last accounting period) to obtain the new year-to-date balance of each account in the General Ledger Accounts File. The updated General Ledger Accounts File is then used to produce the Financial and Management reports by the accounting period-end reporting subsystem.

Comparative schedules of Patient Revenue, Miscellaneous Revenue, Deductions from Revenue, and Expenses are produced showing variances on a current month and year-to-date basis for either this year versus last year or this year versus budget or both.

The format of the Balance Sheet, Income Statement, Pre-Cost Allocation Schedule, Per Diem Revenue Report, and Per Diem Expense Report can be tailored to the user's requirements through the use of the Report Description Master file. This file contains a record for each physical line that appears on each of the reports. By adding, changing or deleting records in this file, characteristics of the reports such as the number of lines, levels of total, and line and total descriptions, can be changed to meet the needs of the user. This feature, along with the ability to define the chart of accounts desired, provides a flexible financial information system that can be defined by the user to produce financial reports to assist in creating and maintaining financial stability for the hospital.

**ACCOUNTS PAYABLE**

Inflation has caused a rapid increase in the cost of supplies in all departments of the hospital. An accurate, efficient Accounts Payable system has become a requirement. It is one of the basic tools needed by hospital management to assist in reducing and controlling the cost of providing health care because most of the hospital's supplies expense originates through Accounts Payable. Approved vendor invoices must be accurately recorded, efficiently analyzed, and accurately distributed to affected cost centers.

The key element of expense control can only be obtained if the proper departments are given the information they need. For example, purchasing agents require information regarding standard vendor terms and business volume. The financial officer needs timely information regarding open Accounts Payable to analyze cash requirements. Available cash must be used effectively to take advantage of all discounts through prompt payment. The business office needs an

## PROGRAM PRODUCTS

**S/34 HFMS (cont'd)**

efficient method of recording items, reporting to management, and accurately distributing supplies expense to appropriate cost centers.

The Accounts Payable application meets these objectives and satisfies these needs through four logical subsystems: Transaction entry, check writing, expense distribution, and reporting.

The transaction entry subsystem performs an extensive edit on all approved invoices and credit memos. The required information is keyed into the system and a Proof Report is printed to balance to controls. Any errors are corrected prior to further processing. These transactions are accumulated with any prior unpaid items and a Cash Requirements Report is printed to provide a current listing of all unpaid items listed by invoice within vendor. The items to be paid are noted on the Cash Requirements report and control totals are developed. Items to be paid can be selected in either of two ways: All invoices for a vendor or only certain invoices within a vendor can be selected. The computer operator uses this report to enter a notification of items to be paid into the system. A Payment Journal is printed by the system showing all transactions selected to be paid. This report is used to balance to the control totals, and any keying errors are corrected prior to the writing of checks.

Further flexibility is provided by the system because a check for any items may be typed at any time and entered into the system with a different code to designate a demand check. The transactions for these demand checks flow through to the expense distribution, but no computer checks are prepared. This facility provides the hospital maximum flexibility for taking advantage of discounts and creating of special checks such as travel advances.

The checkwriting subsystem produces the Check Registers, Checks, and Remittance Advices for those items checked on the cash requirements report. The system allows for multiple check writing runs during the month which, in conjunction with the ability to handle demand checks, provides the flexibility needed to control the payment of outstanding accounts payable items. Check reconciliation reports are included to allow the user to control the reconciling of checks and produce an Aged Outstanding Check Register.

Once each accounting period, the Accumulated Transaction file is sorted by General Ledger number and the expense distribution subsystem is run. An Accounts Payable Distribution Report is produced and summary expense entries are created for entry into the General Ledger system.

The reporting subsystem provides analysis of year-to-date purchases and discounts taken based on information in the Vendor Master file. This file contains one record for each permanent or temporary vendor used by the system to obtain vendor name, address, and discount terms information. The amount of purchases, credit memos and discounts for each vendor are also maintained in this file and Vendor Analysis Reports can be printed whenever desired.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

These IBM System/34 programs will execute on all models of the IBM System/34 in single program mode.

Information regarding disk allocation and usage (master and transaction files) and recommended backup levels and diskettes requirements are available in the *HFMS Installation Guides*.

The OCL and file sizes, as distributed, will be fixed at the maximum capacity assuming all five applications are to be installed on a 8.6 megabyte file.

Any changes to file sizes other than those shown above should be carefully reviewed by the customer and IBM Systems Engineering to determine the necessity for more storage, estimate time required to convert OCL procedures, and estimate throughput performance.

**SOFTWARE REQUIREMENTS**

The IBM System/34 Application Programs are written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support Program (5726-SS1 Version 1). IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Workstation Utility is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Patient Billing Installation Guide* (SB30-0212) ... *Patient Billing Runbook* (SB30-0213) ... *Accounts Receivable Installation Guide* (SB30-0215) ... *Accounts Receivable Runbook* (SB30-0216) ... *Payroll Installation Guide* (SB30-0218) ... *Payroll Runbook* (SB30-0219) ... *General Ledger Installation Guide* (SB30-0221) ... *General Ledger Runbook* (SB30-0222) ... *Accounts Payable Installation Guide* (SB30-0224) ... *Accounts Payable Runbook* (SB30-0225) ... *Patient Billing Logic Manual* (LB30-0214) ... *Accounts Receivable Logic Manual* (LB30-0217) ... *Payroll Logic Manual* (LB30-0220) ... *General Ledger Logic Manual* (LB30-0223) ... *Accounts Payable Logic Manual* (LB30-0226).

**TERMS and CONDITIONS:** See PP Index



**MEDICAL GROUP MANAGEMENT SYSTEM  
5726-H15 (Single Program Mode)**

**PURPOSE**

The IBM Medical Group Management System is primarily intended for a group of up to 99 doctors using a single accounting system.

**HIGHLIGHTS**

- Wide variety of reports and report options included:
  - Management reporting is a byproduct of normal data entry
  - Detail or summary listings within a range of options is supported in many reports
- User recognized accounting techniques and terminology to provide a solid accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user oriented forms for data preparation, file creation, audit and control are provided.
  - Security code deters unauthorized execution of all programs in the application
  - A Reference Number may be used to supply an audit trail for any transaction entered into the system
- Designed to be installed without customer programming capability:
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures
  - Easy-to-use runbook
  - Step-by-step installation activity plan provided by the *Application Installation Guide*
  - User's installation and daily operating information supplied to the supervisor by the application reference manual

**DESCRIPTION**

The system combines two data entry approaches: Operator-oriented and batch-oriented. Support is provided for transaction entry through the System/34 keyboard or through diskette created on a 3740 Data Entry System.

The application has requirements records which contain Questionnaire responses stored in a Constants File. These records allow the system to select certain fields for editing, report formats, file sizes, and functions to suit each customer's needs. The Questionnaire responses are keyed in during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure uses the answers to a series of questions regarding a medical group's requirements to build the system. It provides the following:

- Tailoring the application and Operation Control Language (OCL) on-site at installation time.
- All provided functions are included in the programs but only required functions are executed.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- File sizes may be increased or decreased as needed by rerunning the System Tailoring Procedure.

An application installation guide provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. The application reference manual provides information on the day-to-day use of the application.

The runbook provides the operator with a detailed and easy-to-use set of instructions stating all the activities necessary to run the programs on a System/34. The procedure reference summary is provided for the operator as a reminder of the major operational instructions for each procedure. It is intended to be used once the operator is thoroughly trained in the application.

An application logic manual is provided for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

The System/34 licensed program makes available the Medical Group Management System on System/34 in single program mode. The System/34 supports one workstation, no spooling, no multiprogramming and no file sharing.

The application is ready-to-execute. It includes source code, object code, execution procedures, and the application logic manual as basic material.

**Features**

- Designed to fit business requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed

- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline data entry through the System/34 keyboard or by means of diskettes created on a 3740 Data Entry System.
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Some report printing can be deferred to a more convenient time
- Selective printing options are available for many report functions
- Cash accounting by doctor
- History transactions kept on the disk for the number of months specified

The Medical Group Management System licensed program is intended to provide a balance forward accounts receivable system for a group of up to 99 doctors using a single accounting system.

The licensed program provides the ability to bill patients on a monthly basis. Third parties (insurance companies) can be billed as required. It provides accounts receivable information including status reports and aged trial balances in order to control accounts receivable.

An optional Daily Charge Slip system is provided to print an appointment list showing patient appointment information and patient charge slips for recording patient charges, diagnoses and procedures. The charge slips can then be used as turnaround documents for input into A/R.

A practice analysis system is also optional and provides statistical reports for each doctor on a calendar year basis.

Inquiry is provided allowing the user to locate a guarantor record by keying either the guarantor's last name and first initial or the guarantor's account number.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

This licensed program will execute on all models of the IBM System/34. The programs are compiled assuming a 32K minimum system. Because of volume and time constraints, there may be a requirement for providing offline key entry on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-Character Record feature (#5455) and Feature Group A (#4004).

Many functions have been included to protect the integrity of the master files, programs, procedures and libraries. Because of this, no other licensed program or user-written programs may co-reside unless stringent coding requirements for these programs are met to insure compatibility with the Medical Group Management System. The *Application Logic Manual* discusses in detail the coding conventions used for the development of the Medical Group Management System.

**SOFTWARE REQUIREMENTS**

The IBM System/34 licensed programs are written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support licensed program (5726-SS1). IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Workstation Utility, is required for execution of the program. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary.

**DOCUMENTATION**

(available from Mechanicsburg)

*Installation Guide* (SB30-0227) ... *Reference Manual* (SB30-0228) ... *Runbook* (SB30-0229) ... *Logic Manual* (LB30-0230).

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/34 MEDICAL GROUP MANAGEMENT SYSTEM II  
5726-H16****PURPOSE**

The IBM System/34 Medical Group Management System II is designed to provide an accounts receivable and third-party claims system for doctors, groups of doctors, or clinics. The basic system is derived from the System/32 Medical Group Management System IAP. For System/32 users, programs are provided to convert master files from the System/32 to the System/34 format.

**HIGHLIGHTS**

- The System/34 hardware and software functions - spooling, inquiry, and multiprogramming - are integral parts of the application design.
- Workstation data entry is designed for simplicity and ease-of-use. Screen displays provide guidance for entering data.
- Data entry for multiple work stations with batch programs operating from the job queue.
- Inquiry into master files concurrent with data entry and batch programs.
- System tailoring procedure permits the user to select optional functions and determine the size of files used by the application. Functions and file sizes may be modified as the environment changes by reexecuting the tailoring procedure.
- Source code, ready-to-execute procedures, and object code provided. No additional systems design, programming, or compiling is required.
- File load programs for all master files are provided. Data can be entered from the workstation or diskette.
- File maintenance of master files and printed registers for control and auditing.
- Optional master file backup to diskettes and transaction file backup to diskettes.
- Password security to deter unauthorized use of application procedures.
- Documentation for the Medical Group Management System II includes an application installation guide, an application reference manual, a runbook, and an application logic manual. Self-study instructional materials are also available for operator education.
- Extensive control features and documents are included to assist in establishing audit trails.

**DESCRIPTION**

The Medical Group Management System II is a set of ready-to-execute application programs for groups of doctors. The application has certain required records within an application control file which contain questionnaire responses. Users can select file sizes and functions to suit their needs. The questionnaire responses are entered during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered or modified. It provides the following:

- Tailors the application and Operator Control Language (OCL) on-site at installation time.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- All functions are included in the application programs, but only required functions are executed.
- Allows changes to file sizes as needed by rerunning the System Tailoring Procedure.

The application installation guide for the Medical Group Management System II provides detailed step-by-step instructions for use in preinstallation, installation and postinstallation activities in order to achieve productive operation. These instructions include sample numbering systems, sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures.

The application reference manual is provided to enable the user to understand the application from a functional and operational standpoint. It contains information for the installation manager to supervise the system console operator, and to run the application from a total systems viewpoint. It also provides the user department manager with information needed to supervise the workstation operator, and to understand the application at a detailed level.

A runbook is provided for the systems console operator and for the workstation operator. This runbook contains detailed instructions for the application procedures, an overview of the system and application flow, system considerations, hints for troubleshooting, and all of the error messages that can be generated.

An application logic manual is provided, as licensed material, for use by the self-sufficient customer and the systems engineer for maintaining and modifying the Medical Group Management System II. Information on architecture, naming conventions, controls, program functions and

specifications, relationships among files, and other information applicable to the application is presented.

Instructional support is provided to facilitate installation and operation. The Installation Planning Self-Study material provides guidance in the use of the installation guide and the application reference manual. Instructional material for self-study is provided for the systems console operator and the application workstation operator to instruct them in the use of the runbook.

**Functions and Features**

- Support designed as 'family' billing system
- User-defined fiscal year-ending month
- Preprinted charge slips
- Sequential charge slip reference numbers
- Charge slip reconciliation
- Supplemental statements used by patients to file major medical claims or for income tax purposes
- Supplemental claims used for rebilling insurance
- Third-party claims printed at any time during the month
- Four different claim formats
- Superbill statements
- Reference number optional on all accounting entries for ease of auditing
- Selective aging reports
- Selective printing of collection messages on patient statements
- Finance charge applied to selected accounts
- Revenue report by doctor comparing current year to past
- Analysis for each doctor of procedures and diagnoses on a calendar year basis
- Cash accounting by doctor
- History transactions kept on disk for the number of months specified

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified environment:

**HARDWARE REQUIREMENTS**

This IBM licensed program will execute on all models of the IBM System/34 with a minimum of 48K bytes of main storage.

Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Design features have been incorporated into the application to allow for co-residency of other applications and/or user-written programs with minimum restrictions. Consult the application logic manual for further explanation of these restrictions.

**SOFTWARE REQUIREMENTS**

The IBM System/34 licensed programs are written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support licensed program (5726-SS1). The IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Workstation Utility, is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are desired.

**DOCUMENTATION**

(available from Mechanicsburg)

*Application General Information Manual (GH30-0228) ... Licensed Program Specifications (GH30-0426) ... Reference Manual (SB30-0326) ... Runbook (SB30-0327) ... Installation Guide (SB30-0334) ... Logic Manual (LB30-0328).*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/34 IDEOGRAPHIC GENERATOR/SORT  
5726-IG1****PURPOSE**

This IBM System/34 program consists of two utilities that provide users with the capability of designing ideographic characters and of arranging ideographic records according to various sequences.

**DESCRIPTION****IDEOGRAPHIC SORT**

The Ideographic Sort utility arranges records in an output file according to the user's specifications and the data in each record of the original file.

Sort selects records from the original file and places them in an output file in the order you have defined (ascending, descending, or special sequence). The sorted output file can contain all or some of the records from the original file. The sorted file can also contain all or some of the fields from each record of the original file.

The user has the ability to select between five types of control fields for sorting the ideographic fields in the records.

1. Stroke/Radical/Tie-Breaker
2. Radical/Stroke/Tie-Breaker
3. Single Pronunciation/Stroke/Radical/Tie-Breaker
4. Single Pronunciation/Radical/Stroke/Tie-Breaker
5. Character Type

Sort tables are provided, addressed by an ideographic hexadecimal value, which contain as entries the 2-byte sequence numbers for each of the five types of control fields. One or more of the five tables are utilized to sort the fields by one of the above five rules. Sei-on or alphameric pronunciation control fields may optionally be selected by the user.

This method allows the user to define his own sorting sequence, and with equal ease, support the more common sequences like:

- Single Pronunciation
- Japanese Word Dictionary
- Telephone Book
- Word Index Type (A) and (B)
- Kanji Dictionary Type (A) and (B)

The customer may optionally include additional field(s) in the record which gives the pronunciation(s) of the field being sorted.

The fields in the original file can be all ideographic fields, all alphameric fields, or a combination of ideographic and alphameric fields. One can select and sort on any type of field.

The Ideographic Sort program can be used with DFU to generate a file of the locations (addresses) of the records in the original file so you can process and print the records in a different sequence without changing their order on disk and without creating another file with the same data.

The Ideographic Sort program also provides the following functions contained in the regular System/34 sort:

- Multiple record types
- Record selection based on field contents
- ADDROUT (tag) sort
- Tagalong sort
- Summary tagalong sort
- Automatically allocated work file
- Ascending, descending, or user-defined sequence
- Dynamically adjusts to region size available
- Reformatting of records in a file

**IDEOGRAPHIC CHARACTER GENERATOR**

The Ideographic Character Generator utility can be used by System/34 operators and programmers to graphically create, change, and delete user-defined characters. Up to 4,370 user-generated ideographic characters can be added and maintained in addition to the 7,190 characters in the preprogrammed character set.

The ideographic character generator allows the interactive creation and change of characters. Thus, the user can review the appearance of a new or changed character before writing it into the user-defined character file. A printout of the new character in a large format as well as the actual size can be requested to update a user directory of characters.

The character generator also allows the entry of sort information to update the sort master table for characters created, changed and deleted in the user-created character file. In addition, the single

pronunciation files for a portion of the preprogrammed characters in the sort master table can be changed.

This utility also prints all or portions of the user-defined, user-generated characters in convenient formats for documentation.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM System/34 Ideographic Generator/Sort licensed program runs on all models of the System/34 equipped with Work Station Control Expansion C (#4902).

**SOFTWARE REQUIREMENTS**

The current version of the IBM System/34 Ideographic Generator/Sort licensed program (5726-IG1, #9143 or #9149) operates under control of the current version of the IBM System/34 System Support Program (5726-SS1, #9143 or #9149).

**Educational Allowance:** The IBM System/34 Ideographic Generator/Sort licensed program qualifies for the IBM Educational Allowance Plan. See Announcement Letter GS79-110.

**Program Use During Customer Preinstallation Testing:** The IBM System/34 Ideographic Generator/Sort licensed program (5726-IG1, #9143 or #9149) is available to customers for preinstallation testing on IBM Test Center systems in accordance with the IBM Program Testing Policy.

RPOs ACCEPTED: No

Ordering Information: Contact IBM.



PROGRAM PRODUCTS

**SYSTEM/34 IDEOGRAPHIC CHARACTER GENERATOR  
SUBSET (5726-IG2)**

**PURPOSE**

This IBM System/34 program consists of a utility that provides users with the capacity of designing additional ideographic characters.

**DESCRIPTION**

The Ideographic Character Generator utility can be used by System/34 operators and programmers to graphically create, list, change, and delete user-defined characters. Up to 4,370 user-generated ideographic characters can be added and maintained in addition to the 7,190 characters in the preprogrammed character set.

The Ideographic Character Generator utility allows an interactive graphic creation and change of a new or changed character before writing it into the user-defined character file. A printout of the new character in a large format, as well as the actual size, can be requested to update a user directory of characters.

This utility also prints all or some of the user-defined characters in convenient formats for documentation.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM System/34 Ideographic Character Generator Subset runs on all models of the System/34 equipped with Work Station Control Expansion C (#4902).

**SOFTWARE REQUIREMENTS**

The current version of the IBM System/34 Ideographic Character Generator Subset (5726-IG2) operates under control of the current version of the IBM System/34 System Support Program (5726-SS2).

**Program Use During Customer Preinstallation Testing:** The IBM System/34 Ideographic Character Generator Subset (5726-IG2) is available to customers for preinstallation testing on IBM Test Center systems in accordance with the IBM Program Testing Policy.

**Educational Allowance:** The IBM System/34 Ideographic Character Generator Subset (5726-IG2) qualifies for the IBM Educational Allowance Plan. See Announcement Letter GS79-122, dated October 25, 1979.

## MEMBERSHIP AND MAILING LIST SYSTEM FOR SYSTEM/34 (Single Program Mode) 5726-K11

### PURPOSE

Associations are constituted to serve their memberships. Their prime functions are information retrieval and dissemination, establishment of standards and ethics, research, and representing their members to external agencies. Items of general interest are disseminated through association publications sent through the postal service. However, the need often exists to make specialized mailings to selected members with specific characteristics. Information exchange also takes place at events sponsored by associations. Associations, then, have data processing needs characterized by large data bases which must be processed in total but with the ability to process individual records or groups of records on a selective or exception basis.

### HIGHLIGHTS

The Membership and Mailing List System provides an economical approach for the needs of business and professional associations. It addresses the following areas:

#### Data Base Management

- Interrelates up to 10 master files into a single data base
- Nonredundant data base (duplicate records eliminated)
- Can be installed as: Single file system (members are individuals); dual-file system (members are companies with mailing sent to and events attended by individuals). Usage of other master files is optional as needed.
- Full maintenance procedures.

#### Cash Accounting

- Invoices generated for dues and publications
- Balance forward accounts maintained for dues
- Cash application through file maintenance runs

#### Mailing Labels

- One-up or four-up
- Names and addresses vertically and horizontally aligned
- Produced from the data base on user-defined selection criteria
- Zip code changes noted and count shown

#### Membership and Association Services

- Membership cards
- 3" x 5" information cards
- Membership rosters, dynamic listings, and profiles
- Data file inquiry

#### Analyze Procedure

- Provides a means to select and sequence subsets from the data base
- Used for: Statistical profiles; input to all of the above runs; input to a preformatted dynamic listing program - for management review and analysis.
- Installation through a system control file which allows implementation of user options and printed descriptions without recompilation
- Inquiry capability to display or print individual member's records
- Comprehensive transaction editing prior to update
- Member identification codes can be chosen by the association (11 characters or less) - A suggested format is included.

### DESCRIPTION

The Membership and Mailing List System organizes the vital records of an association into a comprehensive data base. The data base is modular in design so that only those portions which are required for user-desired functions need to be implemented. For example, if the association does not maintain its membership in a chapter structure, the chapter file is not used. Similarly, if it has no interest in knowing who sponsored a member for membership, the sponsor file is not used. The basic decision to be reached regarding the optionality of files, however, concerns the manner in which the association structures its membership and what dues functions are required. A typical difference between business associations and professional organizations is that business associations tend to have companies as members, while professional organizations tend to have individuals as members. The Membership and Mailing List System accounts for this difference by separating the dues function from the mail function. Data required to implement these two functions is separated into two discrete files: The dues file and the mail file.

If your customer has company members with individuals within the company receiving mail, both files would be used (dual file system). If, however, the members of the association are individuals, either the dues file or the mail file, or both, may be used. If partial payments are to be accepted and the association has only one publication that it distributes, the dues file should be implemented. If the association has multiple publications with different payment rates and accepts full payment only, the mail file should be implemented. However, whichever file is implemented, the basic cash accounting and mailing functions are provided. The optional nature of the data base files is implemented through a Systems Control File without need for recompilation. Consult the *Membership and Mailing List System Installation Guide* for further information.

The following sections describe system highlights in three important functional areas: Accounting, mailing, and service.

#### Accounting Functions

**Invoicing:** Invoices are generated for both dues and publications. The dues invoice shows the balance brought forward, the current dues amount, and a new total owed. An optional special charge amount (such as an initiation fee) can also be included. First dues billing for new members can be prorated. Publication invoices can handle amounts for two separate publications (mail file). Both types of invoices as well as follow-up notices are prepared on user-defined billing cycles and frequencies.

**Cash Application:** Cash can be applied to dues on a partial payment basis (dues file only) or on a full payment required basis. Payments for publication subscription can be applied in even increments of the base subscription rate with automatic calculation of the 'paid to' date. Cash receipts can also be applied for registration fees for association-sponsored events.

#### Mailing Functions

**Mailing Labels:** Mailing labels are prepared for user-defined subsets of the data base. The selection is dynamic. User defined parameters for inclusion/exclusion and sequencing are keyed prior to the label run. The labels can be printed one-up or four-up with names and addresses horizontally and vertically aligned. Changes in zip code (if the labels are sequenced by zip code) can be highlighted to facilitate mailing bundling. Mailing type is noted, that is sample publications.

**Circulation Reports:** This report recaps totals by state, zip code, or type of mailing for each mailing. It can be used for advertising ratesetting by showing circulation demographics.

#### Membership/Association Service Functions

**Membership Cards:** Membership identification cards can be prepared showing member's name and current membership period.

**3" x 5" Information Cards:** These cards can be prepared with user-defined inclusion/exclusion and sequencing criteria. They are useful for such functions as convention registration, direct sales follow-up, etc.

**Rosters:** Periodic alphabetic listings of the membership, mailing lists, or event participation can be prepared for reference.

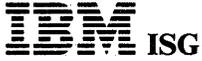
**Membership Profile:** Profiles of all information regarding members can be printed and sent for review and correction. Therefore, it can serve as a turnaround document to maintain the accuracy of the data base.

**Additional Features:** The Membership and Mailing List System is designed to meet the needs of associations by producing standard printouts of selected input. Input inclusion/exclusion and sequencing criteria are entered through a simple ANALYZE command. This feature provides great flexibility to your customer. For example, the system does not arbitrarily send follow-up notices for dues or publication invoices after a fixed period. Your customer can implement a 30 or 60 day follow-up policy by simply entering the appropriate 30 or 60 day parameter into the ANALYZE command prior to running the follow-up procedure. Analysis report formats have been established for each major file. The use of the ANALYZE command in conjunction with these report programs gives the user a dynamic listing capability to answer needs as they occur. The ANALYZE command can also be used without a subsequent report to develop statistical profiles (demographic analysis) of the membership.

The optional files are implemented and descriptions are supplied to the programs by answering a questionnaire. The responses are then entered into a systems control file. Other options addressed on the questionnaire include such policy matters as invoicing frequency and dues proration for new members.

An inquiry capability is provided through the Data File Utilities (DFU) to indicate individual records on the System/34 display screen or to print the records.

The System/34 licensed program makes available the Membership and Mailing List System on System/34 in single program mode. The System/34 supports one workstation, no spooling, no multiprogramming and no file sharing.



PROGRAM PRODUCTS

**S/34 Membership and Mailing List System (cont'd)**

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

This licensed program will execute on all models of the IBM System/34.

Information regarding disk allocation and usage (master and transaction files) and recommended backup levels and diskette requirements will be available in the *Installation Guide* (LB30-0235).

The OCL and file sizes, as distributed, will be fixed at the maximum capacity and normal distribution for utilizing 5 megabytes of disk.

Any changes to file sizes should be carefully reviewed by the customer and IBM Systems Engineering to determine the necessity for more storage, estimate the time required to convert OCL procedures, and estimate throughput performance.

**SOFTWARE REQUIREMENTS**

The Membership and Mailing List System programs for the IBM System/34 are written in IBM System/32 RPG II and operate under control of IBM System/34 System Support Program (5726-SS1). In addition, the IBM System/34 Utilities licensed program (5726-UT1) must be available for sorting of data (Sort), entering transactions with the Data File Utilities (DFU) and for making source program corrections with Source Entry Utility (SEU). If compilation of the RPG II Source Programs is required, the IBM System/34 RPG II Compiler (5726-RG1) and Source Entry Utility (SEU), for making RPG II program corrections, must be available.

**CONVERSION**

The Membership and Mailing List System requires loading of a large volume of data. This may make use of the System/34 keyboard inadvisable for conversion input. Programs are supplied to load the files from diskettes produced by the IBM 3740 Data Entry System. Discussing conversion approaches and schedules with your customer or prospect will be a key element in your installation planning process.

**DOCUMENTATION**

(available from Mechanicsburg)

*Installation Guide* (SB30-0235) ... *Runbook* (SB30-0236) ... *Reference Manual* (LB30-0237)

**TERMS and CONDITIONS:** See PP Index

## 5230 DATA COLLECTION SYSTEM SUPPORT FOR SYSTEM/34 (5726-M3A)

### PURPOSE

The IBM 5230 Data Collection System Support for System/34 provides the manufacturer with a convenient, practical means of preparing shop floor data for processing by the Manufacturing Management Accounting System (MMAS) application programs. Data collected by the IBM 5230 Data Collection System is edited, consolidated, and formatted for processing by the MMAS Payroll, Inventory Management, and Production Status and Costing IAPs, or for user-written manufacturing management systems (with appropriate changes to the output modules).

### HIGHLIGHTS

- Interrelated to MMAS applications:
  - Elapsed time calculation for Payroll
  - Material receipt and issue data for Inventory Management
  - Job time for Production Status and Costing
- Management reports generated as a byproduct of data entry
  - Option to print or not print all reports except error reports and audit summaries
  - Labor report by foreman for checking
  - Attendance and absentee reports
- Provides internal cross-checking and editing
  - Jobs started checked against jobs stopped
  - Employee time on jobs checked against time and attendance record
  - Transaction records checked for complete and accurate entry
- Provides automatic generation of machine-readable editing
  - Reduces transcription errors
  - Eliminates time keeper calculation of elapsed time
  - Supports up to 40 different shifts to provide added flexibility for special starting times, lunch and other break times, and unique weekend schedules
- Can be installed without customer programming capability
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures
  - Easy-to-use runbook
  - Step-by-step installation activity plan provided by the *Application Reference Manual*
  - User's information supplied to the supervisor by the *Application Reference Manual*

### DESCRIPTION

The 5230 Data Collection System Support for System/34 licensed program provides two phases of operations: 5230 personalization phase and a data conversion phase.

The 5230 personalization provides a menu of actions from which users select those that best fit their operation. Using the menu selections and loop definitions for up to three 5231 Controllers with up to four loops each, this phase creates the personalization records required to personalize the 5230 Data Collection System.

The data conversion phase prepares the data received from the 5230 Data Collections System for processing by the MMAS applications. The data can be accepted through the data communications facilities, or the diskette offered as output options by the 5230 Data Collection System.

Both material transactions and labor transactions are prepared by the application program. The material transactions are edited, listed, formatted, and stored for later use by the Inventory Management and Production Status and Costing applications. Labor transactions are expanded, edited, checked for accuracy, and adjusted for break and lunch times. They are also adjusted for lunch and shift start-stop time variances. The elapsed time for time and attendance and job time is calculated, and job time applied to overlapping jobs is apportioned to the jobs. Time and attendance totals are checked against job time totals with warning messages printed for differences that exceed user-prescribed limits. A correction procedure is included to allow for changing incorrect labor transactions. The results of the labor transaction processing are stored for later use by the Payroll and Production Status and Costing applications.

Reports are printed, at the user's option, for material transactions and for labor transactions. The material transactions report is a single listing. Labor transaction reports provide labor-related information suitable for management review, and checking by foremen for correctness. Attendance and absentee reports are also printed.

This program augments the MMAS cross-application Constants File with its own questionnaire responses. These records allow the application to select certain options for the procedures to be used. The questionnaire responses are keyed during initial installation and may be changed as needed.

An application reference manual provides a step-by-step installation activity plan including sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. This manual also provides information on the day-to-day use of the application.

The runbook provides the operator with a detailed and easy-to-use set of instructions showing all the activities.

An application logic manual is provided for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of the program.

Data Collection System Support for System/34 executes on System/34 in single program mode. The System/34 feature supports one workstation, no spooling, no multiprogramming and no file sharing.

Applications Description - The 5230 Data Collection System Support for System/34 is a ready-to-execute program. The application program includes source code, object code, execution procedures, and the application logic manual.

### CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The IBM 5230 Data Collection Support for System/34 will execute on all models of the IBM System/34 with a minimum of 48K of main storage with a 64-character print set (specify codes #9496 or #9498). The programs are compiled assuming a 48K system and operate in single program mode. If data communications features are to be used, the Binary Synchronous Communications Adapter feature (#2074) must be installed in the IBM 5230 System Unit.

#### SOFTWARE REQUIREMENTS

The IBM System/34 feature application programs are written in System/34 RPG II programming language and executed under control of the IBM System/34 System Support Program (5726-SS1). IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Workstation Utility is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary.

#### DOCUMENTATION

(available from Mechanicsburg)

*Reference Manual* (SB30-0186) ... *Runbook* (SB30-0187) ... *Logic Manual* (LB30-018).

**TERMS and CONDITIONS:** See PP Index

## MANUFACTURING MANAGEMENT ACCOUNTING SYSTEM (MMAS) FOR SYSTEM/34

PRODUCTION STATUS AND COSTING ... 5726-M31  
 PAYROLL ... 5726-M32  
 ACCOUNTS PAYABLE ... 5726-M33  
 ACCOUNTS RECEIVABLE ... 5726-M34  
 INVENTORY MANAGEMENT ... 5726-M35  
 PRODUCT DEFINITION AND COSTING ... 5726-M36  
 GENERAL LEDGER ... 5726-M37  
 SALES ANALYSIS ... 5726-M38  
 ORDER ENTRY AND INVOICING ... 5728-M39

### PURPOSE

The IBM Manufacturing Management Accounting System (MMAS) provides the manufacturer with a powerful aid in managing the business.

MMAS offers flexible applications specifically designed for the manufacturing industry. MMAS provides key reports to help management direct and control their business effectively.

### HIGHLIGHTS

- Independent or interrelated applications approach:
  - Modular design facilitates sequential application installation
  - Single data entry results in multiple application updates
  - Modular design allows users to choose the applications that address problem areas
- Wide variety of reports and report options included:
  - Management reporting is a byproduct of normal data entry
  - Certain reports (Statements, 941-As, and W-2s) can be saved on diskette for later printing
  - Detail or summary listings within a range of keys is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided
  - Security code deters unauthorized inquiry or execution of key programs in each application
  - A Journal Reference Numbering System supplies audit trail for any application that automatically generates transactions into the General Ledger
- Provides manufacturers with an easy-to-use method for organizing and using manufacturing information such as bills-of-material, product cost, and shop order or job cost.
- MMAS can be installed without customer programming capability:
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures
  - Easy-to-use runbook
  - Step-by-step installation activity plan provided by the *Application Installation Guide*
  - User's information supplied to the supervisor by the application reference manuals

### DESCRIPTION

The Manufacturing Management Accounting System consists of nine full-function, ready-to-execute applications. MMAS includes source code, object code, execution procedures, and application logic manual.

There are some general features which all applications have:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding programs have been completely and successfully executed
- Compatible online/offline data entry through the system console or by means of diskettes created on a 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions, and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Some report printing can be deferred to a more convenient time
- Selective printing options are available for many report functions

### PRODUCTION STATUS AND COSTING (5726-M31)

This application provides management information on Jobs or Shop Orders from the point of release to the shop floor through the closing process. Also, it provides a means to build and maintain a job select file for retaining and releasing repetitive or standard jobs. This file contains information at an operation and material level.

Jobs or Shop Orders may be released from the job select file and/or manually based on individual requirements. During the release function, the shop data base is created to provide for editing of feedback from the shop floor and for management reports. In addition to the creation of a shop data base, the release function creates a job worksheet to move with the work, and a group of labor tickets for labor reporting.

The report function provides a variety of production and accounting reports such as Job Status, Work List, and exception reporting for quantity variance or cost variance. These reports reflect variance from projection on both production and accounting information and may be obtained in summary or detailed format.

The updating function records information from the shop floor to the shop data base at the operation and material detail level. Updates to the shop data base occur via labor, move, material issue, miscellaneous, outside operations and material receipts transactions. These transactions reflect the activity (hours and cost) and movement (quantity) of Jobs or Shop Orders as they progress through the manufacturing facility. Transactions may be entered either manually or from other applications (Payroll, Inventory Management, and Accounts Payable) via the application interface.

Upon completion of a job, the closeout function produces closeout reports in both production and accounting formats to allow the analysis of labor and cost projections against actual. After producing these reports, the closed Jobs or Shop Orders are removed from the shop data base.

### PAYROLL (5726-M32)

This hourly/salary/executive payroll provides for regular, overtime, premium, vacation, and sick pay. It may be run weekly, biweekly, semimonthly, monthly. Hours may be entered daily or by pay period; if selected, balancing time worked to attendance may be accomplished daily or weekly. Exception hours provide time and one-half, double time, and triple time capabilities. Rates may be selected from the Employee Master Record or keyed in as an override. Shift differential capabilities are provided for second and third shift. The differential may be defined as a percentage of the rate or cents to be added to the rate.

Vacation/Holiday pay may be part of a regular pay check or on a separate check. A bonus payment is paid on a separate check with a flat percentage of income tax deducted. Sick pay may be fully nontaxable or only liable for income tax. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined.

The ability to handle taxable or nontaxable adjustments, pay advances, and employer-paid union benefits (taxable and nontaxable) is also provided. Once the gross earnings is calculated, deductions will be taken to reach net pay. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Miscellaneous deductions may be taken by percent, fixed amount, hourly rate, upper limit, or cyclic within a user-specified frequency. Union deductions may be taken by percent, hourly rate, or fixed amount within a user-specified frequency.

Handwritten paychecks and paychecks never cashed (reversals) are also supported by the application. Once the payroll register and checks are printed, many analysis reports are produced: Labor Distribution, Job Distribution, Miscellaneous Deductions, Union Deductions, YTD/QTD Earnings, Workmen's Compensation Worksheet, and Payroll Journal. W-2 and 941-A reports are also provided.

The capability is provided to pass transactions to the General Ledger application, if installed. These transactions will be applied towards company one only. Payroll may be on either a cash or accrual basis. If the cash basis is selected, no transactions are passed to the General Ledger.

### ACCOUNTS PAYABLE (5726-M33)

The Accounts Payable application provides an open payables and cash disbursements function on either an accrual or cash basis. Invoices and credit memos entered may be multi-lined and distributed by job, item number, cost type and General Ledger account number. Entries may be for standard or one-time vendors and may be open or prepaid. Credit memos may be entered manually or initiated automatically based upon a previously entered open invoice.

A Purchase Journal provides the audit trail for cost transactions entering into the General Ledger system and into the open payables file. An Open Payables Report is provided in due date or vendor sequence. This turnaround document provides a mechanism to indicate payment

**MMAS for S/34 (cont'd)**

by date, vendor, or invoice, including partial payments, for Cash Disbursements. Invoices may be entered or placed in hold status to prevent inadvertent payment of invoices in question.

A Cash Requirements Report is used to assist the controller in insuring sufficient funds are available and proper invoice selection was made before the checkwriting procedure begins. The Cash Disbursements Journal provides an audit trail for its transactions entering the General Ledger application, and acts as the Check Register. Checkwriting and reconciliation are also provided.

A Vendor Analysis Report indicates key business volumes and discounts lost and taken for previous year and current year.

**ACCOUNTS RECEIVABLE (5726-M34)**

The Accounts Receivable application supports a combination of both open-item and balance-forward customers. Billing transactions are directly keyed, or accepted from Open Entry and Invoicing, if that application is installed.

All transactions (that is, invoices, cash receipts, adjustments, and credit memos) are retained in an Open-Item File. This file may be purged daily or monthly at the user's request. An Aged Trial Balance with current plus four past periods is provided. It has multiple printing options (summary, detail, selected line, within limits). Delinquency Notices may also be printed. Late charges can be calculated for balance forward customers.

Two optional formats are provided for the customer statements which are printed at month end. The capability is provided to delay the printing of the statements until a more convenient time without affecting the closing of the books. An account status inquiry feature is also provided.

**INVENTORY MANAGEMENT (5726-M35)**

The Inventory application maintains a perpetual inventory and on-order status for each item. It calculates and prints on demand numerous management figures including: Economic order quantity, dollar profit and percent of profit, average monthly usage, turnover rate and reorder point. Management reports are also provided: ABC Analysis Report, two types of Stock Status, Inventory Analysis Report, Physical Inventory Checklist, On-order Status Reports, Inventory Valuation and Variance Report, and Inventory Reorder Report. It can also interface with Order Entry and Invoicing, Sales Analysis, Product Definition and Costing, and Production Status and Costing.

**PRODUCT DEFINITION AND COSTING (5726-M36)**

Product Definition and Costing provides manufacturers with an easy-to-use method of organizing bills-of-material and item information, and calculating product costs using bills-of-material. Costs are built from raw material up to the finished end-item. Assembly costs may be recalculated when there is a change in the bill-of-material or in the assembly labor or material costs or burden. The user can simulate the effect of proposed cost changes in end-item costs due to changes in labor, material or burden cost.

For all product costs the total cost of purchased parts is maintained separately as material cost. These costs are calculated and maintained level by level, and make it possible for the user to identify the added value (labor, burden) for products and assemblies for tax purposes.

Management reports can be produced when required since the cost information is stored in the Product Definition and Costing data base. These reports include costed bills-of-material, cost reports reflecting either real or potential cost changes and variances (simulations), and special vendor where-used and final assembly where-used lists. The basic formats used for parts lists and where-used lists are single level, indented and summarized.

**GENERAL LEDGER (5726-M37)**

This application combines all the transactions affecting the financial status of the company during the month. They may be entered directly as a General Journal Entry or may have been previously entered through interface with Accounts Payable or Payroll. At month-end closing time, Audit Registers and the Financial Statement Worksheet are provided to help verify that the user is still in balance before proceeding into the actual closing. The reports will also aid in generation of any necessary closing entries.

An Income Statement and Balance Sheet are standard report outputs. The user can define these reports with an easy-to-use format description procedure. The financial reports can illustrate current financial data as compared to budget or historical information.

Users may define their own Chart of Accounts or use a suggested account structure provided with the application.

The fiscal year start month is user-defined. Multiple company support for up to ten companies is included. Any transactions passed from Payroll or Accounts Payable are applied to the first company only.

**SALES ANALYSIS (5726-M38)**

Sales Analysis reports summarize the activity and highlight the performance of items, customers, and/or salespersons. Selected

reports may be printed in detail or summary, depending on the option selected at printing time. Since all data used in Sales Analysis can be entered through Order Entry and Invoicing, it should be installed to obtain full benefit of the Sales Analysis application. If Sales Analysis is installed with Accounts Receivable alone, only Salesperson and Customer Sales Analysis can be obtained; or with Inventory Management alone, only Item Sales Analysis can be obtained.

**ORDER ENTRY AND INVOICING (5726-M39)**

This postbilling application includes order entry and edit, invoicing, and preparation of an Invoice Register and Price Lists. The Order Acknowledgement will show warehouse location, while the Picking List is printed in warehouse sequence. Pricing options include selection of the actual selling price, a discount percent from a list price, operator-entered price, or a contract price by customer. Up to six user-assigned discount percentages by item and up to three tax percentages are provided. Quantity break prices can be established optionally by item.

Order status and backorder status is provided by item, customer, or due date. Support is also provided for partial shipments and back ordering or cancellation of the balance of the order. This application provides data for input into Inventory Management, Accounts Receivable, and Sales Analysis.

Two invoice formats are available. Picking List is optional and can be run either at order entry time or just prior to billing. Order Acknowledgements are optional and may optionally be printed with prices.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continuing day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Each of these licensed programs will execute on all models of the IBM System/34 with a minimum of 48K of main storage. The programs are compiled assuming a 48K minimum system. It is not intended that any one customer install all nine applications on one IBM System/34. Because of volumes and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features [128-character (#5455) and feature group A (#4004)].

The Manufacturing Management Accounting System is intended to be an independent yet interrelated set of applications. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other application program or user-written program may co-reside with any MMAS application unless stringent coding requirements for these programs are met to insure compatibility with the MMAS applications.

**SOFTWARE REQUIREMENTS**

The IBM System/34 application programs are written in System/32 RPG II programming language and executed under control of the IBM System/34 System Support Program (5726-SS1 Version 1). IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Workstation Utility is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary.

**DOCUMENTATION**

(available from Mechanicsburg)

*Product Status and Costing: Installation Guide (SB30-0150) ... Reference Manual (SB30-0151) ... Runbook (SB30-0152) ... Payroll: Installation Guide (SB30-0154) ... Reference Manual (SB30-0155) ... Runbook (SB30-0156) ... Accounts Payable: Installation Guide (SB30-0158) ... Reference Manual (SB30-0159) ... Runbook (SB30-0160) ... Accounts Receivable: Installation Guide (SB30-0162) ... Reference Manual (SB30-0163) ... Runbook (SB30-0164) ... Inventory Management: Installation Guide (SB30-0166) ... Reference Manual (SB30-0167) ... Runbook (SB30-0168) ... Product Definition and Costing: Installation Guide (SB30-0170) ... Reference Manual (SB30-0171) ... Runbook (SB30-0172) ... General Ledger: Installation Guide (SB30-0174) ... Reference Manual (SB30-0175) ... Runbook (SB30-0176) ... Sales Analysis: Installation Guide (SB30-0178) ... Reference Manual (SB30-0179) ... Runbook (SB30-0180) ... Order Entry and Invoicing: Installation Guide (SB30-0182) ... Reference Manual (SB30-0183) ... Runbook (SB30-0184) ... Product Status and Costing Logic Manual (LB30-0153) ... Payroll Logic Manual (LB30-0157) ... Accounts Payable Logic Manual (LB30-0161) ... Accounts*



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PP 5726-M31.3

May 83

Major Revision

PROGRAM PRODUCTS

**MMAS for S/34 (cont'd)**

*Receivable Logic Manual (LB30-0165) ... Inventory Management Logic Manual (LB30-0169) ... Product Definition and Costing Logic Manual (LB30-0173) ... General Ledger Logic Manual (LB30-0177) ... Sales Analysis Logic Manual (LB30-0181) ... Order Entry and Invoicing Logic Manual (LB30-0388)*

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**SYSTEM/34 MANUFACTURING ACCOUNTING AND  
PRODUCTION INFORMATION CONTROL SYSTEM  
MAPICS**

PRODUCTION CONTROL AND COSTING ... 5726-M41  
PAYROLL ... 5726-M42  
ACCOUNTS PAYABLE ... 5726-M43  
ACCOUNTS RECEIVABLE ... 5726-M44  
INVENTORY MANAGEMENT ... 5726-M45  
PRODUCT DATA MANAGEMENT ... 5726-M46  
GENERAL LEDGER ... 5726-M47  
SALES ANALYSIS ... 5726-M48  
ORDER ENTRY AND INVOICING ... 5726-M49  
DATA COLLECTION SYSTEM SUPPORT ... 5726-M4A  
MATERIAL REQUIREMENTS PLANNING ... 5726-M4B  
CAPACITY REQUIREMENTS PLANNING ... 5726-M4G

**PURPOSE**

The IBM System/34 Manufacturing Accounting and Production Information Control System (MAPICS) provides an integrated and comprehensive workstation-oriented accounting, financial, and manufacturing control system for the small-to-medium manufacturer and some of the like process industries. The Accounts Payable, General Ledger, and Payroll applications are designed to meet the needs of both the manufacturer and the distributor. These three applications are included in the twelve applications of MAPICS, and are also marketed as Distribution Financial Accounting System II (DFAS II) to the distribution industries.

**HIGHLIGHTS**

- The System/34 hardware and system software functions - spooling, inquiry, multiprogramming - are integral parts of the MAPICS application design.
- Workstation data entry is designed for simplicity and ease-of-use. Screen displays provide guidance for mandatory input and for fields that may be overridden. Error messages signal errors which can then be corrected interactively by the operator.
- Interactive data entry, concurrent edit and correction for multiple applications through multiple workstations while batch programs operate in the background.
- Inquiry into master files concurrent with data entry.
- System tailoring procedures permit the user to select optional functions and reports, and to determine the sizes of all files used by the applications. Functions and file sizing may be modified as the customer environment changes by reexecuting the tailoring procedures.
- Source code ready-to-execute procedures, and object code are provided. Although no additional systems design, programming, or compiling is required, the system design incorporates features to assist the user in the modification of source code.
- File load programs for master files are provided, as well as file conversion programs for System/32 MMAS and DFAS files, System/34 MMAS and DFAS files, and System/3 and System/32 DCSS files to the System/34 format.
- Online file maintenance of most master files with optional file maintenance reports.
- Optional system procedures for master file backup and restart.
- Password security helps deter unauthorized use of applications and functions within applications. A higher level of security helps protect selected master file data.
- Documentation for each application includes a reference manual, a runbook, and a logic manual. From an overall MAPICS system perspective, an installation guide, a reference manual, a runbook, and a logic manual are provided. Self-study instructional materials are also available for operator education.
- Sample documents are provided for both data collection and data entry.
- Control features and documents are included to assist in establishing audit trails.

**DESCRIPTION**

MAPICS is a set of twelve independent, but interrelated, ready-to-execute applications for the small to medium-sized manufacturer:

- Order Processing and Accounting Applications
  - Order Entry and Invoicing
  - Inventory Management
  - Accounts Receivable
  - Sales Analysis
- Financial Applications

- General Ledger
- Accounts Payable
- Payroll
- Manufacturing Applications
  - Product Data Management
  - Material Requirements Planning
  - Production Control and Costing
  - Capacity Requirements Planning
- Data Collection
  - Data Collection System Support

These applications are designed for marketing in any combination and installing in any sequence, with the following exceptions:

- Sales Analysis requires at least one of the other Order Processing and Accounting applications.
- Material Requirements Planning requires both Inventory Management and Product Data Management.
- Production Control and Costing requires the Inventory Management application. (Although Product Data Management is not an absolute requirement, its use is highly recommended.)
- Capacity Requirements Planning always requires the Inventory Management application and either Product Data Management or Production Control and Costing.

Each application has certain required records within a cross-application control file which contain questionnaire responses. These records allow the users to select report formats, file sizes, and functions to suit their needs. The questionnaire responses are entered during initial installation and may be changed as needed. The System Tailoring Procedures allow these responses to be entered or modified. It provides the following:

- All functions are included in the application programs but only required functions are actually executed.
- Allows the user to activate and deactivate provided functions as the user's business changes
- Tailors the Operator Control Language (OCL) on-site at installation time
- File sizes may be expanded or contracted as needed by rerunning the system tailoring procedure

The *MAPICS Installation Guide* provides instructions for planning the installation of one or more MAPICS applications. One installation guide is provided for the twelve MAPICS applications.

Reference manuals provide an explanation of the system to enable the user to understand the applications from a functional and operational standpoint. Manuals are provided at two levels. A reference manual for MAPICS operations gives guidance to the installation supervisor on managing and running the applications from a total-system viewpoint. One management operations manual is provided for MAPICS operations covering all twelve applications.

Individual reference manuals for each application instruct the workstation manager on how to conduct day-to-day operations of the application.

Similarly, one runbook is provided for the system console operator and individual application runbooks for the workstation operators. The console operations runbook contains detailed step-by-step instructions for operating MAPICS at the console. Included are an overview of the system and application flow, system considerations, hints on troubleshooting, and all of the error messages that can be generated by any of the applications in the offering.

The individual application runbooks provide a summary of the application and workstation operations, application and screen flow, application messages, and a detailed description of how to run each procedure in the application.

The MAPICS system logic manual is provided as licensed material for use by the self-sufficient customer, and for the systems engineer in maintaining and modifying MAPICS. Information on system architecture, naming conventions, system controls, system program functions, and specifications, relationship among system files, and other information applicable to all applications is presented in this system manual.

In addition, logic manuals for maintaining and modifying each application are available. Information relevant only to the subject application, such as program descriptions, cross-reference lists, and data dictionary, is presented.

Instructional support is provided to facilitate installation and operation. The Installation Planning Self-Study material provides guidance in the use of the installation guide and the reference manual. Other self-study

**S/34 MAPICS (cont'd)**

instructional material is provided for the systems console operator and for the application workstation operator to train them in the use of the runbooks. Only one copy of each manual is needed per customer no matter how many applications are to be installed.

Modular Application and Systems Training (MAST) is available to help identify and quantify benefits for top executives. MAST aids the customer in planning an effective implementation and includes techniques to assure top priority and the commitment of all the necessary resources. To assist in determining Management function and fit, there is a MAPICS features course for all MAPICS applications. In addition, for Inventory Management, Product Data Management, Production Control and Costing, and Material Requirements Planning, there are concepts, implementation, and using-the-system courses to make the customer more self-sufficient and reduce the effort and time required to install these applications.

**PRODUCTION CONTROL AND COSTING (5726-M41)**

The Production Control and Costing application provides for shop packet creation and for the tracking and costing of an ordered item as it is manufactured; it also measures work center utilization and efficiency plus queue analysis and control functions, similar to the IPICS FDPs. The application also creates, maintains, and updates the operation and miscellaneous charge information associated with jobs within the user's shop. It requires the installation of Inventory Management and has optional interfaces with Accounts Payable, Payroll, and Product Data Management as well as accepting data from Data Collection System Support (Product Data Management is highly recommended). Open operation information may also be passed on to Capacity Requirements Planning.

This application uses information which Inventory Management creates and maintains in conjunction with its own information to produce all necessary reports to track and cost an order. In addition, it produces a prioritized worklist by work center to assist production control in moving work through the shop in the most efficient manner.

The capability of accepting transactions via the workstation and/or diskette is provided in order to support Data Collection System Support diskette output. The transactions passed via the Data Collection System Support interface are labor, (operations) moves, and machine times. The labor transaction depends on the user's request of a Payroll interface. If the Payroll interface has been requested, the labor transactions are passed through Payroll to Production Control and Costing.

Additional functions include inquiry of order status, item status, and work center status, as well as report printing of order status and open order exceptions.

IBM System/34 MAPICS Production Control and Costing requires the use of the MAPICS Inventory Management (5726-M45) application.

**PAYROLL (5726-M42)**

The Payroll application starts with the basic employee time record as input and handles the calculation of wages, taxes, deductions, checkwriting, and file updating for both salaried and hourly pay plans. Employee time data may be entered from a workstation or can be passed from the Data Collection System Support application. Payroll can interface with both the General Ledger and Production Control and Costing applications. Transactions may be passed to General Ledger on either a cash or accrual basis during printing of the payroll distribution journal. Relative to MMAS, the accrued procedures have been modified to precisely relate pay periods to accounting periods. Job-related data for both hourly and salaried employees can be passed to the Production Control and Costing application.

Current payroll data is entered from time cards or job reports either daily or weekly, and is edited to validate employee and job information. A user with an incentive payroll must manually calculate gross pay and then enter it into the system. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deduction also uses a standard algorithm based upon customer-provided data. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined. Deduction programs compute voluntary deductions for a specific pay period as well as one-time and union deductions. All necessary reports are furnished including payroll register, deduction reports, checks, Federal 941-A reports, and W-2 reports.

Support for up to 20 companies, a manual payroll check procedure, and the ability to handle an employee working in multiple states, counties, cities, unions, jobs, or shifts on the same day are provided to give the user wide flexibility. Labor distribution of payroll hours and dollars is done in the same detail as the basic employee time record, that is, department, work center, job number, operation.

Several other reports are printed:

- Vacation, holiday, and sick pay register
- Year-to-date and quarter-to-date earnings register

- State and local tax register
- Check reconciliation register
- Workmen's compensation worksheet
- Union deduction register
- Paychecks (with option to print employee address)
- Governmental reports Federal 941-A, W-2 (and associated registers)

**ACCOUNTS PAYABLE (5726-M43)**

The Accounts Payable application keeps accurate and detailed records of vendor invoices and credit memos from the time they are entered into the system until they are paid and the check reconciled. Although Accounts Payable can be installed on a standalone basis, it is frequently used with the General Ledger application to which it can distribute the dollar amounts spent against the proper account numbers. There also exists an interface to Production Control and Costing by which Accounts Payable can pass job-related purchase information.

Transaction auditing is aided by a journal referencing scheme which causes every transaction affecting General Ledger to refer to a particular journal and line number within that journal. A double-entry bookkeeping method keeps transactions in balance.

Procedures for handling manual checks, petty cash, and check reversals are provided, as well as online selection of invoices for payment selection including partial payments, selection by date, and selection by vendor and invoice. Credit memos can be automatically generated, allowing the user to reverse a previously entered invoice without having to rekey all the invoice's indicative information and distribution.

Support is provided for up to 20 companies. Key reports include a new aged payables report, two vendor analysis reports, plus normal accounts payable audit trails such as purchase journal, cash requirements reports, and cash disbursements journal. When checks are printed, options are available to make the checks payable to 'assignees' (due to factoring by the vendor) and to print remittance advice 'overflow' data on a separate remittance advice form.

**ACCOUNTS RECEIVABLE (5726-M44)**

The Accounts Receivable application keeps detailed records of customer charges, cash payments, credit and debit memos, and other adjusting entries from the time they are entered into the system until they are paid or otherwise applied. The application allows for a combination of open item and balance-forward handling of individual customer accounts. Interfaces with Order Entry and Invoicing, Sales Analysis, and General Ledger are provided.

Invoices and credit memos can be entered directly and/or received from the Order Entry and Invoicing application. Cash receipts and adjustments are entered into the system directly, update the accounts receivable immediately, and can generate General Ledger transactions via an interface. The application provides optional late charges by customer for both open-item and balance forward accounting and support for up to 20 companies.

As required, the user can generate account status reports for a single customer or a group of customers as well as an aged trial balance in any of the following forms:

- Summary or detail
- Past-due accounts only
- Delinquent accounts only
- Minimum balance
- Aging based on current status
- Aging based on date of next statement
- Future aging of invoices

Additionally, statements and delinquency notices can be printed at user-determined frequency. The following features are provided:

- Option to age unapplied cash/adjustment
- Ability to identify credit memo by a unique number, but still relate the credit memo back to a specific invoice number
- Ability to apply cash, without knowing specific invoice numbers

**INVENTORY MANAGEMENT (5726-M45)**

The Inventory Management application processes all transactions affecting the status of the inventory balances. It is a central application which can interface with Order Entry and Invoicing, Sales Analysis, Product Data Management, and Data Collection System Support applications. Inventory Management is a prerequisite for installing either Material Requirements Planning, Production Control and Costing, or Capacity Requirements Planning.

The basic functions of this application provide the 'in's and out's' of inventory accounting plus the ability to cycle count the physical

**S/34 MAPICS (cont'd)**

inventory. The reporting functions include calculating current inventory investment and the annual inventory turns, as well as valuation techniques for tax reporting. Finally, you have the ability to release purchase and manufacturing orders and track their progress until each order is closed out.

The application provides for inventory valuation based on average, last, or standard costs as well as LIFO and FIFO options. Physical inventory checklists can be generated for multiple or selected warehouses, with or without cycle count options. In addition to printing a stock transaction register for audit control, a stock status report can be printed for all items or on an exception basis, and a stock status review can be had by item or by item within vendor.

A component 'availability check' is performed during the release phase, and items and orders with shortages are identified on special exception reports. At order release time, component allocation for manufacturing orders can be done to ensure that component inventory needs are accounted for between order release time and the actual withdrawal from stock.

Transactions can be entered from diskette or workstation. Transactions entered from diskette go through batch edit and batch update; transactions entered through a workstation are edited immediately and can update balances either immediately or later, in accordance with a System Tailoring option. In either case, an audit trail of all transactions is produced.

**PRODUCT DATA MANAGEMENT (5726-M46)**

The Product Data Management application maintains bills of material, product options, routing, and work center data bases and provides for costed retrievals and cost simulation. In interfacing with Inventory Management, Material Requirements Planning, Production Control and Costing, and Capacity Requirements Planning, this application is an information point for bills of material and routings. Order Entry and Invoicing also require Product Data Management in order to enter end items with standard options.

The ability to perform inquiry into the product structure and routing files is provided. Application highlights include the capability for multiple screen displays, mass replace, mass delete, and 'same-as-except' functions which facilitate maintenance to the product structure file. In addition to option handling techniques, use of engineering effectivity date simplifies engineering change control procedures. Labor and overhead rate tables can be used for costing in lieu of routing and work center files.

Several reports can be printed:

- Listings of item master, feature/option table and work center master
- Retrievals of product structures and routings
- Cost reports including management cost summary and cost variations

**GENERAL LEDGER (5726-M47)**

The General Ledger application is the terminal point of all accounting entries; it integrates completely with Accounts Payable and Payroll and accepts cash receipts and adjustment entries from Accounts Receivable. Though it can be installed apart from the other applications, a large number of ledger entries result from the distribution of expenses incurred through Accounts Payable. Therefore, most General Ledger users will likely install Accounts Payable and/or Payroll.

Each transaction entered is assigned a journal number and a unique line number within that journal. This journal reference number is kept with the transaction until it is posted to the master record during period-end closing. Transactions coming from other interfacing applications also use this reference numbering scheme. This makes auditability easier throughout the application. Thorough editing of all data at entry time, plus the fact that a double-entry bookkeeping system is used ensures that all credit entries are offset by an equal value of debit entries, and provides for smooth period closings. Diskettes can be used for processing recurring entries. The application gives the user support for up to 20 companies and choice of either a 12-month or 13-period fiscal year. The general ledger listing displays (by account number) transaction original journal reference numbers, to provide a clear and easily used audit trail of all transactions.

The balance sheet and income statement can be formatted to the user's particular requirements by use of a format file which permits special spacing, user-specified columnar printing, user-specified totaling, and up to 73 accounts to be totaled and printed with one line of description. By exploiting the capabilities of the format file, the user can produce departmentalized and/or combined (not consolidated) statements for multiple companies. Both the balance sheet and income statement can be comparative to last year and the income statement can also be comparative to budget figures.

**SALES ANALYSIS (5726-M48)**

The Sales Analysis application consolidates all sales and credit memo transactions affecting customers, salespersons, and items that have

been entered into the system. Input can come from Order Entry and Invoicing, Inventory Management, or Accounts Receivable; at least one of these applications must be installed as a prerequisite.

Data is passed to Sales Analysis via interface files as shown:

Customer-related data can come from	Salesperson-related data can come from	Item-related data can come from
OE&I A/R	OE&I A/R	OE&I IM

Either 12-month or 13-period reporting may be selected by the user. These transactions are posted to summary files which provide a historical data base for management reports. Summary files may also be corrected by file maintenance with an entry list providing an audit control.

Provision has been made for multicompany support for up to 20 companies for customer summary analysis, for flagging specific items for inclusion in sales analysis, and for inquiry into the summary files from the workstation. The reports included in the application are sales by customer, salesperson, and item with the option to display comparative data as well.

The System/34 MAPICS Sales Analysis application requires the use of at least one of the following MAPICS applications:

- Order Entry and Invoicing (5726-M49)
- Accounts Receivable (5726-M44)
- Inventory Management (5726-M45)

**ORDER ENTRY AND INVOICING (5726-M49)**

The order entry function is a key starting point for activity in a manufacturing organization. For make-to-order products, this function describes the item to be manufactured and when the item is required. For products to be shipped from inventory, it streamlines the order processing so items can be shipped promptly. It interfaces with Inventory Management by directly updating quantity on hand data, with Accounts Receivable by providing invoice summary information, and with Sales Analysis by providing item, customer and salesperson data. The data stored in the open order files can also be analyzed by Material Requirements Planning. Customer open orders can be passed to Capacity Requirements Planning.

As orders are entered, customer data is validated and, if accounts receivable is installed, a credit check is performed. Initial ship dates may be established on the basis of inventory availability or manufacturing orders, and item pricing data is checked for validity and completeness. The term 'orders' includes regular and blanket orders. A blanket order specifies a single item with multiple ship dates and specific quantities. Both order types may be entered in a similar manner. Invoicing may be accomplished by either direct entry or from orders previously entered into the system. Invoicing encompasses the computation of prices, taxes, and invoice totals. Pricing can be based on established contract prices, quantity breaks, markup from cost, or discounting from list price. Order acknowledgments, picking lists, invoices, and bills of lading can be printed.

If Product Data Management is installed, orders can be entered for end items which have standard options associated with them. Since these options may be required, they are checked at entry time to make sure the data is sufficient.

As soon as the Open Order files have been updated, the user has immediate access to current information such as:

- All orders for a particular item
- All orders for a particular customer
- Details for a particular order
- Blanket order status
- Customer status

The application also handles credit memo printing and the posting of back orders to the open order files. Support for up to 20 companies is provided as well as the generation of worksheets for general ledger input, commission accounting, and taxing body reporting.

**DATA COLLECTION SYSTEM SUPPORT (5726-M4A)**

The Data Collection System Support application provides an interface between a 5230 Data Collection System and the Payroll, Inventory Management, and Production Control and Costing applications. Inventory and labor transactions can be entered at conveniently located terminals, so information can be entered as it occurs, thereby eliminating many manual steps before this data can be processed on the System/34. Therefore, it provides a link between shop floor reporting and the MAPICS applications, and is designed as an integrated labor-reporting, payroll, and production control system.

The Data Collection System Support Application allows customers to define unique shop floor actions which are suited to their requirements.

**S/34 MAPICS (cont'd)**

The output from this definition phase is used by the 5231 Controller. Programs are provided so that data from the shop floor can be transmitted to the System/34, or the diskette can be carried to the System/34. Elapsed time is then calculated (based on user options regarding shift start/stop times, lunch breaks, and other paid/unpaid breaks) and prepared for payroll processing as attendance records or job records. The application will also apportion the time of an employee who works on overlapping jobs.

The application produces attendance, absentee, and labor reports, which provide a complete audit trail. Labor transactions may also be entered on the 5251 Display Station, as well as 5230 stations, to utilize the elapsed time calculations for payroll processing prior to installing a 5230 system.

**MATERIAL REQUIREMENTS PLANNING (5726-M4B)**

The Material Requirements Planning application is divided into three parts: Master Production Scheduling Planning (MPSP), Material Requirements Planning (MRP), and Order Release Planning (ORP). This application interfaces with and requires installation of Inventory Management and Product Data Management. It also interfaces with Order Entry and Invoicing to the extent that it can compare a master production schedule against customer orders. Firm planned and planned orders can be passed to Capacity Requirements Planning. MPSP determines the production schedule for master-level items (designated by a code in the item master record). Master-level requirements can be compared to forecast and/or customer orders to evaluate the manufacturing plan. Typically, planning requirements for master-level items is an interactive process. This process is simplified by various reports and workstation inquiries. The Material Requirements Planning reports include requirements planning, purchase planning, order recommendation, and cash analysis reports. A shortage report can be generated in the order release cycle if the user chooses to do an availability check. In addition, order release/review and requirements by item inquiries are supported.

Material Requirements Planning will take the approved output of MPSP and generate a total material plan to meet this schedule. This new plan can either be rebuilt (generation) or it can consist of differences from a previous plan (net change). Order recommendations produced from MRP become input to order release. The planner can review changes and approve orders scheduled for release.

IBM System/34 MAPICS Material Requirements Planning requires the use of both the MAPICS Inventory Management (5726-M45) and MAPICS Product Data Management (5726-M46) applications.

**CAPACITY REQUIREMENTS PLANNING (5726-M4G)**

The Capacity Requirements Planning Application is designed to analyze a company's production plan in terms of its plant capacity. This is a very useful tool for a company that wishes to identify those work centers and time periods when overload or underload conditions may be expected to develop. The application allows the production manager to meet the short term overload or underload condition by entering a temporary increase or decrease in work center capacity for a specified time period in the future.

Medium term analysis using the capacity planning run can help a company distinguish between scheduling problems and capacity problems that require changes to the base capacity of a work center.

The production plan used by the application is based on capacity requirements from several sources: Open orders, firm planned orders, planned orders, and under some restrictions, customer orders. Accurate start dates and operation durations are imperative for each manufacturing operation whether these operations come from Production Control and Costing or from Product Data Management's standard routings.

When the production plan and plant capacity have both been defined, capacity planning is ready to schedule and accumulate the workload by user-defined time period. This process will produce analysis files for workstation inquiry or report printing, and may be repeated to help users tune their plant capacity to the current production plan.

Capacity Requirements Planning is a dependent application. It requires orders (customer, open, firm planned and/or planned) and specifications (routing and/or open operations). The minimum support for Capacity Requirements Planning is:

Inventory Management (5726-M45) and Product Data Management (5726-M46)

or

Inventory Management (5726-M45) and Production Control and Costing (5726-M41).

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training,

installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Each of these licensed programs will execute on all models of the IBM System/34 with a minimum of 48K of main memory - with the exception of the Manufacturing applications, which require 64K of main memory. A user area of 28K is required for all applications except the Manufacturing applications (Product Data Management, Material Requirements Planning, Capacity Requirements Planning, Production Control & Costing), which require a minimum user area of 42K.

MAPICS is intended to be an independent yet interrelated set of applications. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Design features have been incorporated into the MAPICS applications to allow for co-residency of other applications and/or user-written programs with minimum restrictions. (Consult the MAPICS logic manual for a fuller explanation of these restrictions.)

**SOFTWARE REQUIREMENTS**

The IBM System/34 MAPICS application programs are written in IBM System/34 RPG II programming language and execute under control of the IBM System/34 System Support Program (5726-SS1). The IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Work Station Utility, is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are desired. All programs must be release 6 or later.

The IBM System/34 MAPICS Material Requirements Planning, Capacity Requirements Planning, Production Control and Costing, and Sales Analysis applications require the use of other MAPICS applications as prerequisites. Refer to the descriptions of these four MAPICS applications for the specific requirements.

**DOCUMENTATION**

(available from Mechanicsburg)

**Unlicensed Publications**

*Data Collection System Support Reference Manual (SB30-0311) ... Data Collection System Support Runbook (SB30-0312) ... Material Requirements Planning Reference Manual (SB30-0314) ... Material Requirements Planning Runbook (SB30-0315) ... Production Control and Costing Reference Manual (SB30-0317) ... Production Control and Costing Runbook (SB30-0318) ... Payroll Reference Manual (SB30-0302) ... Payroll Runbook (SB30-0303) ... Accounts Payable Reference Manual (SB30-0305) ... Accounts Payable Runbook (SB30-0306) ... Accounts Receivable Reference Manual (SB30-0296) ... Accounts Receivable Runbook (SB30-0297) ... Inventory Management Reference Manual (SB30-0293) ... Inventory Management Runbook (SB30-0294) ... Product Data Management Reference Manual (SB30-0320) ... Product Data Management Runbook (SB30-0321) ... General Ledger Reference Manual (SB30-0308) ... General Ledger Runbook (SB30-0309) ... Sales Analysis Reference Manual (SB30-0299) ... Sales Analysis Runbook (SB30-0300) ... Order Entry and Invoicing Reference Manual (SB30-0290) ... Order Entry and Invoicing Runbook (SB30-0291)*

**Licensed Publications**

*Data Collection System Support Logic Manual (LB30-0313) ... Material Requirements Planning Logic Manual (LB30-0316) ... Production Control and Costing Logic Manual (LB30-0319) ... Payroll Logic Manual (LB30-0304) ... Accounts Payable Logic Manual (LB30-0307) ... Accounts Receivable Logic Manual (LB30-0298) ... Inventory Management Logic Manual (LB30-0295) ... Product Data Management Logic Manual (LB30-0322) ... General Ledger Logic Manual (LB30-0310) ... Sales Analysis Logic Manual (LB30-0301) ... Order Entry and Invoicing Logic Manual (LB30-0292).*

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/34 DISTRIBUTION FINANCIAL  
ACCOUNTING SYSTEM II (DFAS II)****PAYROLL ... 5726-M42  
ACCOUNTS PAYABLE ... 5726-M43  
GENERAL LEDGER ... 5726-M47****PURPOSE**

The IBM System/34 Distribution Financial Accounting System II (DFAS II) provides an integrated and comprehensive workstation-oriented financial control system for the small to medium-sized distributor. The Accounts Payable, General Ledger, and Payroll applications are designed to meet the needs of both the manufacturer and the distributor. These three applications are also included in the twelve applications of the IBM System/34 Manufacturing Accounting and Production Information Control System (MAPICS) and are also marketed collectively as DFAS II to the distribution industries.

**HIGHLIGHTS**

- The System/34 hardware and software functions - spooling, inquiry, multiprogramming - are integral parts of the DFAS II application design.
- Workstation data entry is designed for simplicity and ease-of-use. Screen displays provide guidance for mandatory input and for fields that may be overridden. Error messages signal errors which are then corrected interactively by the operator.
- Interactive data entry, concurrent edit, and correction for multiple applications, through multiple workstations while batch programs operate in the job queue.
- Inquiry into master files concurrent with data entry.
- Online file maintenance of all master files with optional file maintenance reports.
- Each application may be installed independently or in combination with other applications.
- System tailoring procedures permit the user to select optional functions and reports, and to determine the sizes of all files used by the applications. Functions and file sizing may be modified as the customer environment changes by reexecuting the tailoring procedures.
- Source code, ready-to-execute procedures, and object code are provided. Although no additional system design, programming, or compiling is required, the system design incorporates features to assist the user in the modification of source code.
- File load programs for master files are provided, as well as file conversion programs for System/32 DFAS files and System/34 Single Program Mode DFAS files to the System/34 DFAS II format.
- Password security helps deter unauthorized use of applications and functions within applications. A higher level of security helps protect selected master file data.
- Optional system procedures for master file save and restore.
- Documentation for each application includes a reference manual, a runbook, and a logic manual. From an overall DFAS II system perspective, an installation guide, a reference manual, a runbook, and a logic manual are provided. Self-study instructional materials are also available for operator education.
- Sample documents are provided for both data collection and data entry.
- Control features and documents are included to assist in establishing audit trails.
- DFAS II can co-reside with DMAS II.

**DESCRIPTION**

The Distribution Financial Accounting System II (DFAS II) is a set of three independent, yet interrelated, ready-to-execute applications for the small to medium-sized distributor.

These applications are designed for marketing in any combination and installing in any sequence.

Each application has certain required records within a cross-application control file which contain questionnaire responses. These records allow the user to select report formats, file sizes, and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered or modified. It provides the following:

- Tailors the application and Operator Control Language (OCL) on site at installation time
- All functions are included in the application programs, but only required functions are executed

- Allows changes to file sizes as needed by rerunning the System Tailoring Procedure

The installation guide for DFAS provides instruction for planning the installation of one or more DFAS II applications. One installation guide is provided for all three applications of DFAS II.

Reference manuals are provided to enable the user to understand the applications from a functional and operational standpoint. Manuals are provided at two levels. A reference manual for DFAS II operations contains information for the installation manager to supervise the system console operator, and to run the applications from a total systems viewpoint. One such manual for DFAS II operations covers all three applications. Individual reference manuals for each of the three applications provide the user department manager with information needed to supervise the workstation operator and to understand the application at a detailed level.

Separate runbooks are provided for the systems console operator and for the workstation operator. The DFAS II system runbook for console operation contains detailed instructions for the application procedures, an overview of the system and application flow, system considerations, hints for troubleshooting, and all of the error messages that can be generated by any of the applications in the offering. One systems runbook is provided for DFAS II.

Runbooks for the workstation operator are provided for each application and include a summary of the application and workstation operations, application and screen flow, application messages, and a detailed description of how to run each procedure associated with the application.

Logic manuals are provided, as licensed material, for use by the self-sufficient customer and for the systems engineer. An application logic manual, for maintaining and modifying DFAS II, presents information on system architecture, naming conventions, system controls, system program functions and specifications, relationship among system files, and other information applicable to all applications.

In addition, logic manuals for maintaining and modifying each application are available. Information relevant only to the application, such as program descriptions, cross-reference lists, data dictionary, etc., is presented.

Instructional support is provided to facilitate installation and operation. The Installation Planning Self-Study material provides guidance in the use of the installation guide and the reference manual. Instructional material for self-study is provided for the systems console operator and for the application workstation operator to instruct them in the use of the runbooks. Only one copy of each is needed per customer no matter how many applications are to be installed.

**PAYROLL (5726-M42)**

The Payroll application starts with the basic employee time record as input and handles the calculation of wages, taxes, deductions, checkwriting, and file updating for both salaried and hourly pay plans. Payroll can interface with the General Ledger application. Transactions may be passed to General Ledger on either a cash or accrual basis during the printing of the payroll distribution journal.

Current payroll data is entered from time cards or job reports either daily or weekly, and is edited to validate employee and job information. A user with an incentive payroll must manually calculate gross pay and then enter it into the system. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deduction also uses a standard algorithm based upon customer-provided data. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined. Deduction programs compute voluntary deductions for a specific pay period as well as one-time and union deductions. All necessary reports are furnished including payroll register, deduction reports, checks, 941-A reports, and W-2 reports.

Support for up to 20 companies, a manual payroll check procedure, and the ability to handle an employee working in multiple states, counties, cities, unions, jobs, or shifts on the same day are provided to give the user wide flexibility. Labor distribution of payroll hours and dollars is done in the same detail as the basic employee time record; that is, department, work center, job number, operation.

Several other reports are printed:

- Vacation, holiday and sick pay register
- Year-to-date and quarter-to-date earnings register
- State, county and local tax register
- Check reconciliation register
- Workmen's compensation worksheets
- Union deduction register
- Paychecks (with option to print employee address)
- Government reports 941-A, W-2 (and associated registers)

**ACCOUNTS PAYABLE (5726-M43)**

**S/34 DFAS II (cont'd)**

The Accounts Payable application keeps accurate and detailed records of vendor invoices and credit memos from the time they are entered into the system until they are paid and the check reconciled. Although it can be installed on a standalone basis, it is frequently used with General Ledger to which it can distribute the dollar amounts spent against the proper account numbers while printing the purchase journal and the cash disbursements journal.

Transaction auditing is aided by a journal referencing scheme which causes every transaction affecting General Ledger to refer to a particular journal and line number within that journal. A double-entry bookkeeping method keeps transactions in balance.

Procedures for handling manual checks, petty cash, and check reversals are provided as well as online invoice entry and payment selection which includes partial payments, selection by date, and selection by vendor and invoice. Credit memos can be automatically generated, allowing the user to reverse a previously entered invoice without having to rekey all the invoice's indicative information and distribution.

Support is provided for up to 20 companies. Key reports include a new aged payables report, two vendor analysis reports, plus normal accounts payable audit trails such as purchase journal, cash requirements reports, and a cash disbursements journal. When checks are printed, options are available to make the checks payable to 'assignees' (due to factoring by the vendor) and to print remittance advice 'overflow' data on a separate remittance advice form.

**GENERAL LEDGER (5726-M47)**

The General Ledger application is the terminal point of all accounting entries integrated completely with Accounts Payable and Payroll. Though integrated, it can be installed apart from the other applications. Since a larger number of ledger entries result from the distribution of expenses incurred through Accounts Payable, a majority of General Ledger users will likely install Accounts Payable.

Each transaction entered is assigned a journal number and a line number within that journal. This journal reference number is kept with the transaction until it is posted to the master record during period-end closing. Transactions coming from other interfacing applications also use this reference numbering scheme. This makes auditability easier throughout the application. Thorough editing of all data at entry time plus the fact that a double-entry bookkeeping system is used ensures that all credit entries are offset by an equal value of debit entries, and provides for smooth period closings. Diskettes can be used for processing recurring entries. The application gives the user support for up to 20 companies and a choice of either a 12-month or 13-period fiscal year. The general ledger listing displays the transaction original journal reference number, providing a clear and easily used audit trail of all transactions.

The balance sheet and income statement can be formatted to the user's particular requirements by use of a format file which permits special spacing, user-specified columnar printing, user-specified totaling, and up to 73 accounts to be totaled and printed with one line of description. Through the capabilities of the format file, the user can produce departmentalized and/or combined (not consolidated) statements for multiple companies. Both the balance sheet and income statement can be comparative to last year and the income statement can also be comparative to budget figures.

**AUTOMATED INSTALLATION AID**

Available at no additional charge, the DFAS II Self-Install feature (#7443) should be ordered with the first DFAS II application. It is an interactive installation method consisting of a workbook and diskette, enabling customers to install any of the existing DFAS II applications with little or no SE assistance. These applications include Payroll, Accounts Payable, General Ledger. They may be installed in any sequence. DFAS II Self-Install is designed for the novice who is installing an application for the first time. It is also intended for the experienced DFAS II user who wishes to add a new DFAS II application. DFAS II Self-Install consists of:

- An installation workbook that guides the user step-by-step through the planning and installation of a DFAS II application. File sizing and run time options are explained and then entered by the user in the workbook. The workbook should be ordered through Mechanicsburg so the customer can use it prior to installing the application.
- Data forms for all application master files are included along with lists of descriptions for the information fields in all the forms.
- A set of programs, invoked by one command, that prompts for workbook responses, calculates disk/diskette requirements, initializes required diskettes, loads programs to DFAS II libraries, and backs up all files and libraries. These programs are included with the application code shipped from PID when feature #7443 is specified.

The *DFAS II Self-Install Installation Workbook* (SH30-0653) should be ordered by form number from Mechanicsburg when feature #7443 is ordered.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, and continued day-to-day operation lies solely with the customer. Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Each of these licensed programs will execute on all models of the IBM System/34 with a minimum of 48K of main memory.

DFAS II is intended to be an independent yet interrelated set of applications. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Design features have been incorporated into the DFAS II applications to allow for co-residency of other applications and/or user-written programs with minimum restrictions. Consult the DFAS II logic manual for further explanation of these restrictions.

Although nothing inherent in the design of the DFAS II applications prevents the use of the minimum system configurations stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size, and operating requirements.

**SOFTWARE REQUIREMENTS**

The IBM System/34 application programs are written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support Program (5726-SS1). The IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Work Station Utility, is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are desired. Release 2 or any later release of these licensed programs is required.

**DOCUMENTATION**

(available from Mechanicsburg)

**Unlicensed Application Publications**

*Payroll Reference Manual* (SB30-0302) ... *Payroll Runbook* (SB30-0303) ... *Accounts Payable Reference Manual* (SB30-0305) ... *Accounts Payable Runbook* (SB30-0306) ... *General Ledger Reference Manual* (SB30-0308) ... *General Ledger Runbook* (SB30-0309).

**Licensed Application Publications**

*Payroll Logic Manual* (LB30-0304) ... *Accounts Payable Logic Manual* (LB30-0307) ... *General Ledger Logic Manual* (LB30-0310).

**TERMS and CONDITIONS:** See PP Index

**CONSTRUCTION MANAGEMENT and  
ACCOUNTING SYSTEM for the SYSTEM/34  
CMAS/34**

**JOB COSTING ... 5726-M66  
GENERAL LEDGER ... 5726-M67  
ACCOUNTS PAYABLE ... 5726-M68  
PAYROLL AND LABOR COSTING ... 5726-M69  
REVENUE ACCOUNTING ... 5726-M6A**

**PURPOSE**

The IBM Construction Management and Accounting System for the System/34 (CMAS/34) provides an integrated and comprehensive workstation-oriented accounting and financial control system for the small-to-medium size construction firm and related project-oriented business. The Payroll and Labor Costing, Accounts Payable, Job Costing, Revenue Accounting, and General Ledger applications are designed to meet the needs of the construction industry.

**HIGHLIGHTS**

- The System/34 hardware and system software functions - spooling, inquiry, multiprogramming - are integral parts of the CMAS/34 application design.
- Workstation data entry is designed for simplicity and ease-of-use. Screen displays provide guidance for mandatory input and for fields that may be overridden. Messages signal errors which can be corrected interactively by the operator.
- Interactive data entry allows concurrent edit and correction for multiple applications and multiple workstations while batch programs operate in the background.
- Offline input of transactions from diskettes prepared on a 3740 Data Entry System is supported except for the Revenue Accounting application and the Committed Cost/Cost History feature. Diskette support does *not* include file loading and maintenance transactions to any master files.
- Special inquiries are provided for the job cost, labor cost, open payable, subcontract status, contract status, and open receivables files.
- System tailoring procedures permit the user to select optional functions and reports and to determine the sizes of all files used by the applications. Functions and file sizing may be modified as the customer environment changes by re-executing the tailoring procedures.
- All object programs and procedures are resident with the exception of System/32 CMAS file conversion programs, system tailoring programs, security file change programs, and file sizing programs.
- Source code, ready-to-execute procedures, and object code are provided. Although no additional systems design, programming, or compiling is required, the application design incorporates features to assist the user in the modification of source code. These features include user interface branches in procedures, reserved user space in master file records, and detailed program documentation.
- Provides the file maintenance of all master files with audit reports.
- Procedure documentation reflects restart/no-restart capability of each of the main line procedures.
- Password security helps deter unauthorized use of workstations, applications, and functions within applications.
- Sample input forms are provided for data entry.
- Control features and sample control documents are included to assist in establishing audit trails.
- Multiple company support for up to 99 companies.

**DESCRIPTION**

CMAS/34 is a set of five interrelated, ready-to-execute applications for small-to-medium size contractors. Four of the applications (Payroll and Labor Costing, Accounts Payable, Job Costing, and General Ledger) are independent and can be marketed in any combination and installed in any sequence.

Revenue Accounting is a dependent application. The Job Costing application *must* be installed prior to installing Revenue Accounting.

**JOB COSTING (5726-M66)**

Costing journal entries with cost distribution may be entered with distribution by company, job, pay item, cost code, and cost type. Job Costing passes transactions to the General Ledger, if installed. General Ledger is then updated on a monthly basis. Job Costing is automatically updated by the Accounts Payable and Revenue Accounting applications if installed. Payroll and Revenue Accounting reports, when used with the Job Cost reports provide a total perspective of job status.

Job Cost management reports are provided with unit costs, budget comparison, and projected profit or loss based on field reporting of percent complete or quantity 'put-in-place.' Income reporting with

distribution provides the basis for cash flow reports by company and by job. If the Committed Cost/Cost History feature (#6021) of the Accounts Payable application (5726-M68) is installed, Job Cost Management reports are available which optionally can include committed cost. Also, a cost history report is available which optionally can include all detail cost and income records for a project. You can select which projects to accumulate cost history when you establish a record in the Job Name file. Special inquiry into the job cost and labor cost (if available) files provides immediate access to job cost information.

Special emphasis is given to providing a complete audit of transactions affecting the job costing file and general ledger. A job cost detail transaction register (optional) highlights items posted to the general ledger by cost distribution for the accounting month close.

Jobs indicated as Time-and-Material jobs (jobs without estimates) will be processed without cost projections. Without this feature, these jobs would always project cost overages equal to actual costs incurred, which is inaccurate. Change orders and revised estimates can be accounted for via an optional change order file which is processed against the original estimates. Up to 99 change orders per cost distribution record may be maintained. The costing reports will show change order detail or optionally net the change orders against the original estimate and print a revised estimate summary line per cost item.

A standard master job costing file enables users to store frequently used cost items which can be duplicated into the job cost file when those cost items are used on a new job. This is especially useful to a home builder for storing the cost descriptions and estimates for a standard house plan and copying that plan to the costing file without having to retype all the details.

**GENERAL LEDGER (5726-M67)**

The General Ledger application is the terminal point of all accounting entries; it interfaces with Payroll and Labor Costing, Revenue Accounting, and Accounts Payable, and accepts journal entries from Job Costing. Though it can be installed apart from the other applications, a large number of ledger entries result from the distribution of expenses incurred through Accounts Payable and Payroll and Labor Costing. Therefore, a majority of General Ledger users will likely install Accounts Payable and/or Payroll and Labor Costing.

Each transaction entered is assigned a journal number and a unique line number within that journal. This journal reference number is kept with the transaction until it is posted to the master record during period-end closing. Transactions coming from other interfacing applications also use this reference numbering scheme. This makes auditability easier throughout the application. Thorough editing of all data at entry time plus the fact that a double-entry bookkeeping system is used, ensures that all credit entries are offset by an equal value of debit entries and provides for smooth month-end closing. The application gives the user support for up to 99 companies and supports a 12-month fiscal year. The general ledger listing displays (by account number) transaction original journal reference numbers, providing a clear and easily used audit trail of all transactions.

The balance sheet and income statement can be formatted to the user's particular requirements by use of a format file which permits special spacing, user-specified columnar printing, user-specified totaling, and up to 118 accounts to be totaled and printed with one line of description. By exploiting the capabilities of the format file, the user can produce combined statements for multiple companies. Both the balance sheet and income statement can be comparative to last year and both can also be comparative to budget figures.

**ACCOUNTS PAYABLE (5726-M68)**

The Accounts Payable application keeps accurate and detailed records of vendor invoices and credit memos from the time they are entered into the system until they are paid and the check reconciled. Although Accounts Payable can be installed on a standalone basis, it is frequently used with the General Ledger application to which it can distribute the dollar amounts spent against the proper account numbers. There also exists an interface to Job Costing by which Accounts Payable can pass subcontract or material purchase costs to specific jobs. In addition, equipment repair parts or services processed through Accounts Payable can be distributed to the equipment cost file in the Payroll and Labor Costing application, if installed. Job expenses, disbursements, and subcontract retention are passed to Revenue Accounting, if installed.

Transaction auditing is aided by a journal referencing scheme which causes every transaction affecting General Ledger to refer to a particular journal and line number within that journal. A double-entry bookkeeping method keeps transactions in balance.

Procedures for handling manual checks (partial as well as fully prepaid), petty cash, and check reversals are provided. Selection of invoices for payment includes partial payments, selection by date, and selection by vendor and invoice. Credit memos can be automatically generated,

**CMAS/34 (cont'd)**

allowing the user to reverse a previously entered open invoice without having to retype all the invoice's indicative information and distribution.

Support is provided for up to 99 companies. Key reports include an aged payables report, vendor analysis report, plus normal accounts payable audit trails such as purchase journal, cash requirements report, and cash disbursements journal. When checks are printed, options are available for reconciliation and to print remittance advice 'overflow' data on a separate remittance advice form.

Subcontract accounting is a subsystem within the Accounts Payable application. It provides for automatic movement and accountability of retainage and taxes. Subcontracts can be maintained on either a balance forward or open item basis. Subcontract status reports by job and by vendor specify the contract amounts, change orders and/or revisions, billed amounts to date (by date, if open item), payment amount to date (by date, if open item), retention and taxes. Controls help insure that the subcontract status file remains in balance with the job costing file if the Job Costing application is installed.

**Committed Cost/Cost History Feature (#6021)**

The optional Committed Cost/Cost History feature to Accounts Payable adds the capability to enter and track purchase order activity and pass the information to the Accounts Payable data entry function when the invoice is received. It provides an analysis of future cash requirements for committed purchase orders. Inquiries can be made into the Open Purchase Order file to check the status of any purchase order line item. Reports can be run in Purchase Order, Vendor, or Job sequence. Committed Costs can be optionally included on applicable Job Costing reports if the Job Costing application (5726-M66) is installed. This feature does not support data entry.

**PAYROLL AND LABOR COSTING (5726-M69)**

The Payroll application starts with the basic employee time record as input and handles the calculation of wages, taxes, direct burden, deductions, checkwriting, and file updating for both salaried and hourly pay plans. Employee time data may be entered from a workstation or can be entered via diskettes on a 3740 Data Entry System. Payroll can interface with both the CMAS/34 General Ledger, Job Costing, and Revenue Accounting applications. Transactions may be passed on to General Ledger during printing of the payroll distribution journal. Job-related data for both hourly and salaried employees can be passed to the Job Costing application. Labor costs are used by the Revenue Accounting application.

Current payroll data is entered from time cards or job reports either daily or weekly, and is edited to validate employee and job information.

In addition to calculating present federal income and FICA taxes, a standard tax algorithm is provided to calculate most present state income taxes based upon customer-provided data. Local income taxes may also fit the standard tax algorithm provided.

The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Wages subject to Federal Unemployment Tax Act (FUTA) and State Unemployment Tax Act (SUTA) are also determined.

Deduction programs compute voluntary deductions for a specific pay period as well as one-time and union deductions. Included at customer option are employer-paid union fringes, workmen's compensation, Federal Unemployment Tax Act (FUTA), and State Unemployment Tax Act (SUTA). Employer-paid direct burden (FICA, FUTA, SUTA, workmen's compensation, and union benefits) is calculated automatically and optionally costed to jobs based on several methods which are tailored at install. The calculated burden may be distributed to a standard cost code selected by the contractor or distributed to each individual labor cost record. The appropriate accounts in the General Ledger are also updated if the General Ledger application is installed. Any additional burden required for local codes can be calculated by a user-written program and interfaced to the system via procedure interface and an 'other burden' field in the current hours record.

Support for up to 99 companies, a manual payoff check procedure, and the ability to handle an employee working in multiple states, localities, unions, jobs, at different rates on the same day are provided to give the user wide flexibility. Labor distribution of payroll hours and dollars is done in the same detail as the basic employee time record; that is, job number, pay item, cost code, cost type, and job class by company.

Reports furnished include payroll register, deduction reports, monthly union reports, certified payroll register, checks, 941-A reports, and W-2 reports.

Several other reports are printed:

- Year-to-date and quarter-to-date earnings register
- State and local tax register
- Check reconciliation register
- Workmen's compensation earnings worksheet
- Workmen's compensation premium worksheet
- Workmen's compensation and insurance report

- Union calculation register
- Union stamp report
- Paycheck formats are provided in the original System/32 CMAS format and a new CMAS/34 format. This new CMAS/34 format provides options to print employee address and the amount of the check printed in words. It also provides a free form check stub which shows deduction detail and hours worked at each rate of pay.

**REVENUE ACCOUNTING (5726-M6A)**

The Revenue Accounting application performs normal accounts receivable functions such as entry of invoice and cash receipts information, posting to open receivables and Temporary General Ledger Work File (TEMGEN), printing statements and delinquency notices, printing management reports, calculating late charges, and allowing discounts for prompt payment. Job Costing (5726-M66) is a prerequisite application.

In addition, Revenue Accounting has added functions specifically addressing the requirements of the construction industry. These functions are:

- Entry of detail line items for job invoices so that Job Costing income records are updated.
- Defining eight invoice types (Job, Retention, Work Order, Equipment, Employee, Material, Standard, and Cash), each one with associated General Ledger account numbers, to reduce coding requirements for source documents.
- Cash can be applied by customer, job, or invoice, so manual coding of cash receipts is minimized.
- The ability to process statements 'as of' a certain date so that priority work can proceed without interruption; for example, payroll processing.
- The ability to request Open Receivables Analysis reports by customer, job, or non-job to aid in managing receivables.
- Capturing retention information in invoice processing to aid in managing retention accounts receivable.
- Printing of a Retention Due listing to aid in tracking and billing of retention.
- A Progress Billing subsystem that includes interactive review and change as an aid to determining billable amounts for completed work.
- Conforming to all CMAS/34 conventions with one exception - diskette data entry is not supported.
- Interfacing with Job Costing, Accounts Payable, Payroll and Labor Costing, and General Ledger, if these applications are installed.

A significant feature of this application is Progress Billing. Progress Billing assists the contractor in preparing monthly invoices. It accumulates costs from the Job Cost file and calculates the preliminary billable amount based on job progress. The contractor can adjust the billable amounts at the workstation before printing a final report. The format of the final report is similar to that of the American Institute of Architect's (AIA) billing form.

The functions of the interfaces are:

Revenue Accounting requires job billing and cost information from the Job Costing file for the Progress Billing subsystem, and for verification of job billings. Job billing detail from invoicing updates Job Costing via the TEMGEN file.

While Job Costing is the only prerequisite application, Revenue Accounting also interfaces with the other CMAS/34 applications.

Without Accounts Payable, data must be manually entered and maintained for job expenses incurred, disbursements made, and subcontract retention, if the financial position report is used.

Without Payroll and Labor Costing, labor costs must be kept in Job Costing, if the financial position report is used.

Without General Ledger, accounting entries produced by Revenue Accounting Invoice, Cash Receipt, and Late Charge journals must be manually posted. Therefore, it is recommended that all five CMAS/34 applications be installed.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.



## PROGRAM PRODUCTS

## CMAS/34 (cont'd)

## SPECIFIED OPERATING ENVIRONMENT

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

## HARDWARE REQUIREMENTS

The minimum system configuration for any *single* CMAS/34 application is an IBM System/34 with:

- IBM 5340 System Unit with Diskette 1 Drive, 8.6 Mb of disk storage and 48K (Mdl B11).
- One system printer, either line printing at 160 lines per minute, or serial printing at 40 characters per second.
- One application per IBM 5251 Display Station (mdl 11)

Although there is nothing inherent in the design of the CMAS/34 applications which prevents the use of the minimum system configuration stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size, and operating requirements.

The amount of disk storage required is influenced by the:

- Number of workstations attached
- Library sizes (number of applications installed - all programs resident)
- Number of records in the required master files
- System tailoring options taken
- Volume of daily transactions

Installation of more than one CMAS/34 application concurrently will require more disk capacity than the minimum disk configuration of 8.6 megabytes.

**Disk File Requirement:** CMAS/34 requires substantially more library and file space than CMAS on System/32. Failure to use the CMAS/34 File Sizer to determine disk space requirements could result in a system configuration that is insufficient to meet customer requirements.

**Remote Data Entry Performance:** If data entry programs are to be used with remote workstations, consideration should be given to the impact on performance (time between pressing the enter key and the return of the next display) caused by the much slower data transfer rates inherent with teleprocessing communication facilities. Customers should be made aware of the performance differences between locally attached workstations (1,000,000 bps) and remote workstations communicating at rates of 1200, 2400, 4800, or 9600 bps. Refer to the *IBM System/34 Concepts and Design Guide* (SC21-7742) for additional performance considerations.

## SOFTWARE REQUIREMENTS

CMAS/34 application programs are written in IBM System/34 RPG II and System/34 Work Station Utility (WSU) and execute under control of the System/34 System Support Program (5726-SS1), Release 7 or later, and System/34 Utilities (5726-UT1), Release 7 or later, which includes Sort, Data File Utility, Source Entry Utility, and Work Station Utility. Sort and WSU are required for execution of the programs. The System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are desired.

The CMAS/34 Job Costing application (5726-M66) is a prerequisite application to installing CMAS/34 Revenue Accounting (5726-M6A).

The CMAS/34 Accounts Payable application (5726-M68) is a prerequisite application to installing the Committed Cost/Cost History feature (#6021). In addition, if the following licensed programs are installed, they must be at or above the specified modification level and PTF level before installing the Committed Cost/Cost History feature:

- Job Costing (5726-M66) V1, Mod. 3
- General Ledger (5726-M67) V1, Mod. 2, PTF #0038
- Accounts Payable (5726-M68) V1, Mod. 4
- Payroll and Labor Costing (5726-M69) V1, Mod 9, PTF #0294
- Revenue Accounting (5726-M6A) V1, Mod. 0, PTF #0001
- Cross Application (#7043) V1, Mod. 4

**Educational Allowance:** The standard education allowance applies.

## DOCUMENTATION

(available from Mechanicsburg)

*Licensed Program Specifications:*

*Payroll and Labor Costing* (GH30-0441) ... *Accounts Payable* (GH30-0440) ... *Job Costing* (GH30-0439) ... *General Ledger* (GH30-0442) ... *Revenue Accounting* (GH30-0457).

*Application General Information Manual* (GH30-0707) ... *Construction Industry Flyer* (G580-0186) ... *Reports Brochure* (G280-0085).

## Education Courses

CMAS/34 Customer Education ... *CMAS/34 System Console Operator Instructions Self-Study* (SBOF-4061) ... *CMAS/34 Installation Planning Self-Study* (SBOF-4060) ... *CMAS/34 Work Station Operator Instructions Self-Study* (SBOF-4062).

**TERMS and CONDITIONS:** See PP Index

**Ordering Information:** Contact IBM



## PROGRAM PRODUCTS

**CONSTRUCTION MANAGEMENT ACCOUNTING SYSTEM  
(CMAS) FOR SYSTEM/34 (SINGLE PROGRAM MODE)**

JOB COSTING ... 5726-M61  
ACCOUNTS PAYABLE ... 5726-M62  
PAYROLL ... 5726-M63  
GENERAL LEDGER ... 5726-M64

**PURPOSE**

The IBM Construction Management Accounting System (CMAS) provides the construction industry with a complete, yet flexible, method for managing their Payroll, Accounts Payable, Job Costing, and General Ledger.

CMAS offers flexible applications specifically designed for the construction industry. CMAS key reports help construction management effectively direct and control their business.

**HIGHLIGHTS**

Independent or interrelated applications approach

- Modular design facilitates sequential application installation
- A journal reference numbering system ties the four applications together when multiple CMAS applications are installed
- Single data entry results in multiple application update

wide variety of reports and report options included

- Management reporting is a byproduct of normal data entry
- All applications provide for multicompany entries and reports
- Field reporting allows for projecting profit and loss by job

Uses recognized accounting techniques and terminology to provide a solid accounting system

- Clear audit trails and control techniques are provided
- Sample user-oriented forms for data preparation, file creation, and audit and control are provided
- Security code deters unauthorized inquiry or execution of key programs in each application

CMAS can be installed without customer programming capability

- System tailoring procedure on-site to facilitate account growth changes
- Display screen input prompting and output report formats are tailored to meet specific customer requirements
- Complete, system-controlled, operator-oriented input prompting
- Complete file maintenance and audit programs and procedures
- File sizing procedure to assist in relocating master and work files

**DESCRIPTION**

The Construction Management Accounting System is a set of four independent, interrelated, ready-to-execute applications for the small to medium-sized contractor/subcontractor. The system combines two approaches: Operator-oriented and batch reporting. This approach and programming system provides a sound accounting base by doing Payroll with Labor Distribution, Accounts Payable with Subcontract Accounting, Job Costing with Management Reporting and General Ledger with Financial Statements.

The four easy-to-operate applications may be installed in separate stages at different times and still be a totally interrelated system; that is, payroll data may be passed by the system directly to general ledger and job costing, etc.

Each application contains a requirements file with user questionnaire responses which allows the application to select input formats, report formats, and functions to suit each customer's needs. These responses are keyed in during initial installation and may be changed as customer needs change.

The systems tailoring procedure controls the prompting of input records and fields to be entered, the types of reports and fields on reports, and data files used for output.

Systems tailoring procedure is a procedure requesting the answers to a series of questions regarding a contractor's company requirements. Systems tailoring provides the following:

- Tailoring the system on-site at installation time
- Application reprogramming is not required as business changes because system tailoring parameters can be changed by the customer
- The programs contain all the announced functions, but only required functions are performed by the system
- Applications may be installed in any sequence

- System tailoring options include the following: Multiple companies or single; multiple status or single; multiple unions or no unions; custom formatting of Balance Sheets and Income Statements

An installation guide provides a step-by-step installation activity plan including suggested numbering systems, sample input and maintenance user data forms, control forms with suggested procedures, and other activities necessary for a successful installation.

The runbook provides the operator with activities necessary to effectively operate CMAS as an accounting system to provide accurate and timely management reports.

Two self-study guides lead the user through the installation guide, runbook, and associated materials to assist the self-sufficient customer.

These application programs make the Construction Management Accounting System available on a System/34 operating in single program mode. The programs support one workstation, no spooling, no multiprocessing and no file sharing.

**Application Description:** The Construction Management Accounting System consists of four full-function, ready-to-execute applications. CMAS includes source code, object code and execution procedures. The four applications have the following functions:

**JOB COSTING (5726-M61)**

General Journal entries with cost distribution may be entered with distribution by company, job, pay item, cost code, and cost type.

Job Costing automatically updates the General Ledger component, if available. General Ledger is then updated on a monthly basis.

Job Costing is automatically updated by the Accounts Payable application if installed. Payroll reports, when used with the Job Cost reports provide a total perspective of job status.

Job Cost management reports are provided with unit costs, budget comparison, and projected profit or loss based on field reporting of percent complete or quantity put in place. Income reporting with distribution provides the basis for cash flow reports by company and by job.

**ACCOUNTS PAYABLE (5726-M62)**

Invoices and credit memos entered may be multiline and distributed by company, job, pay item, cost code, and cost type. The entries may consist of vendor, miscellaneous, estimated or subcontract invoices. Prepaid invoices are permitted on all of the invoice types. Credit memos may be entered manually or initiated automatically based on a prior enter invoice. Partial payment is not supported.

Subcontract accounting provides for automatic movement and accountability of retainage and change orders. Subcontracts are maintained on either a balance forward or open item basis. Subcontract status reports by job and by vendor denote the contract amount, change orders, billed amount and date, payment amount and date, retention, and taxes.

An accrued accounting system provides for timely job cost information while a cash flow handling capability indicates job cash position through the general ledger.

The Accounts Payable application provides an Open Payable and Cash Disbursements function. An Open Payable report is provided in due date or vendor sequence. This turnaround document provides a mechanism to indicate payment by date, job, vendor, or invoice, including partial payments for Cash Disbursements.

Invoices may be entered or placed on hold status to prevent inadvertent payment of invoices in question.

A Cash Requirements report is used to assist the controller in ensuring funds are available and proper invoice selection was made before the check writing procedure begins.

Check writing and reconciliation are provided. The check format provided includes a user-indicated check stub length to adapt the size of the remittance advice. Stub overflow initiates a separate supplementary stub.

An Accounts Payable trial balance is available in job or vendor sequence.

A Vendor Analysis Report indicates key business volumes by quarter and year.

Diskette input for Accounts Payable invoices is provided.

**PAYROLL (5726-M63)**

This hourly/salary distributed payroll provides for regular, overtime, premium, vacation, sick, and travel pay. It may be run weekly, biweekly, semimonthly, or monthly. Exception hours provide time and one-half, double time, double time and one-half, and triple time capabilities. Rate selection may be standard, selected by craft, or keyed in as an exception overtime or premium rate.

PROGRAM PRODUCTS

**CMAS for S/34 (cont'd)**

Clear audit and accounting procedures aid in maintaining a Payroll system in balance.

Hand-written checks (payoffs, special, etc.) are easily handled.

Standard union deductions are used to prepare two standard union deduction reports. Multiple union reporting is supported.

Workmen's compensation calculations and a workmen's compensation worksheet report provide a mechanism for weekly tracking of insurance premiums.

A standard tax algorithm calculates Federal, FICA, and many state income taxes on the basis on customer-provided data. Local taxes may fit the standard tax algorithm provided.

Deductions by percent, fixed amount, upper limit, and miscellaneous deductions.

Taxable or non-taxable adjustments.

State Disability Insurance is calculated and reported.

Federal Unemployment Insurance and State Unemployment Insurance is calculated and reported.

Check writing and reconciliation are provided.

A payroll journal provides a clear audit trail of entries to the CMAS General Ledger application.

Labor cost management reports are provided with unit cost, budget comparison, and projected profit or loss based on field reporting of percent complete or quantity put in place. The reports are available with distribution by company, job, pay item, cost code, cost type, and job class.

941-A, W-2, and Certified Payroll reports are provided. Diskette input for payroll hours is supported.

**GENERAL LEDGER (5726-M64)**

General Journal entries may be entered for end-of-month closings or for out-of-balance conditions.

Journal entries identified by journal names and numbers are indicated on the Financial Statement Worksheet and Trial Balance Listing. These entries are automatically accepted from the Payroll, Accounts Payable, and Job Costing applications.

On an out-of-balance condition, a procedure is provided to rearrange the entries into journal reference number sequence and print out a selective audit listing. This listing can be compared with the monthly journals to quickly identify the out-of-balance entry.

An Income Statement and Balance Sheet are standard report outputs which provide the user with the flexibility of defining these reports with an easy-to-use format description procedure. This definition may be changed as needs vary. The user may carry over account transactions from one month to the next without performing a monthly close.

Financial reports can illustrate current financial data as compared to budget or historical information.

Users may define their own chart of accounts or use a suggested account structure provided with the application. The fiscal year start date is user-defined.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility. For customers who have modified their installed System/32 IAPs and who choose to have IBM make the same modifications on the new System/34 product, the reinstatement of the modifications on the new product will be at an additional charge under SES. It is the customer's responsibility to transfer their data files from one system to the other.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Each of these licensed programs will execute on all models of the IBM System/34 with a minimum of 48K of main storage in single program mode. The programs are compiled assuming a 48K minimum system.

Information regarding disk allocation and usage (master and transaction files) and recommended backup levels and diskette requirements is available in the CMAS logic manuals and installation guides.

The OCL and file sizes, as distributed, are fixed at the maximum capacity assuming all four applications are to be installed utilizing five megabytes of the file.

**Note:** When a customer's volumes require additional disk capacity, file allocations can be modified to meet requirements by utilizing the CMASFILE procedure. (See the information under "Distributed System for System/32" below.)

**SOFTWARE REQUIREMENTS**

The IBM System/34 licensed programs are written in IBM System/34 RPG II programming language and executed under control of the IBM System/34 System Support Program (5726-SS1 Version 1). The IBM System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Work Station Utility is required for execution of the programs. The System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary.

**Distributed System for System/32:**  
5 Megabyte file (1968 Blocks)

Files	Number or Blocks*
System Control Programming	239
SORT Executable Code	34
CMAS Executable Work Units	98

\* These block figures are for the System/32 feature only.

**Application Files (online all the time)**

**Payroll system - 250 Active Employees design** 476

- Payroll System File - 3 Records
- Employee Master - 250 inactive, 250 active employees
- Current Hours - 1400 Distributions/Pay Period
- Employee Deductions - 2000 Deductions for active or inactive
- Check Reconciliations - 1250 Outstanding Checks (250 checks x 5 weeks)
- Job Classifications - 65 Job Classes
- Distribution - 160 P/R Distribution Codes
- Active Labor Cost Distributions - 700 Weekly Distributions
- Union Master Deductions - 80 Union Deductions 10 Unions + (10 Unions x 7 deductions/union)
- Monthly Union Deductions - 3000 deductions
- Tax Tables Federal/State/Local - 30 tax brackets (Federal, single, weekly, 10 \$ Brackets)
- Employee State and Local Taxes - 2000 Deductions with additional withholding (2 states x 2 locals x 500 active/inactive employees)
- Insurance File - 155 Insurance company masters
- Insurance Summary - 1200 Employee Workmen's Compensation

**Accounts Payable - 1200 Checks design** 401

- Payables System File - 3 records
- Active Vendor Master - 900 name and address
- Checks Written - 1200 checks/month
- Open Payables Distribution - 1000 Outstanding Invoices with three distributions per invoice (3000 records)
- Active Subcontracts - 1000 Subcontracts
- Payables Work File - 1400 Invoices and distributions

**Job Costing - 100 Job Vouchers/Month Design** 117

- Job Costing Systems File - 3 records
- Job Work File - 400 Job Vouchers/Batch
- Job Name Master - 240 Active Jobs
- Job Cost Detail - 2100 Costing Entries (Active J/C Distributions + Income Distributions)

**General Ledger - 200 Journal Entries/Month** 389

- General Ledger Systems File - 3 records
- General Ledger Work File - 200 General Journal Entries



PROGRAM PRODUCTS

CMAS for S/34 (cont'd)

- General Ledger Chart of Accounts - 800 accounts
- Temporary General Ledger Account Transactions - 9200 entries
- General Ledger Format - 400 formatting records

Application Work Files Area (loaded by application)	208
Paidfor CMAS User	6
*Total Blocks	1968

\* The total blocks number is for the System/32 IAP only.

The OCL and file sizes, as distributed, have been fixed at the maximum capacity with normal distribution for the 5 megabyte file.

Any changes to file sizes, other than those shown above, should be carefully reviewed by the customer and the IBM Systems Engineer to: Determine the necessity for more storage, estimate the time required to convert OCL procedures, and evaluate throughput performance.

**System Backup:** The System/32 and System/34 disk is backed up by dumping the disk to multiple diskettes. IBM-supplied system programs are initially provided to the user on diskettes which should be retained by the user for backup. User-created application data files must also be backed up on diskette. The user is required to provide backup diskettes for CMAS procedures, programs, and data files.

**Number of User-Supplied Diskettes Required for Backing Up the System/32 Distributed System and Data Files**

	System/32 Back Up*	
	Single Level	Double Level
Payroll	18	36
Accounts Payable	12	24
Job Costing	8	16
General Ledger	13	26
All 4 Applications	38	76

\* Includes Backing Up: Daily Transactions; CMAS Machine-Readable Object Programs; Disk Resident Application files. It does not include System Control Program (5725-SC1), Utilities (5725-UT1), RPG II (5725-RG1) machine-readable materials or any other programs, procedures, data files, and spare diskettes to replace damaged or worn diskettes.

The System/32 user requires either the sum of the backup diskettes for each application installed or 38 diskettes, whichever is less.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Job Costing Installation Guide (SB30-0200) ... Job Costing Runbook (SB30-0201) ... Accounts Payable Installation Guide (SB30-0203) ... Accounts Payable Runbook (SB30-0204) ... Payroll Installation Guide (SB30-0206) ... Payroll Runbook (SB30-0207) ... General Ledger Installation Guide (SB30-0209) ... General Ledger Runbook (SB30-0210) ... Job Costing Logic Manual (LB30-0202) ... Accounts Payable Logic Manual (LB30-0205) ... Payroll Logic Manual (LB30-0208) ... General Ledger Logic Manual (LB30-0211).*

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**PERSONAL TEACHING AID/34 for the SYSTEM/34  
5726-PT1****PURPOSE**

The IBM System/34 Personal Teaching Aid/34 licensed program provides an author with an easy-to-use tool to write educational materials in the form of courses for presentation to a student on the System/34. The author using the System/34 presents text, asks questions, evaluates and responds to answers and, in general, guides the student through a learning experience. Also, the product can collect data on the student's answers and courses completed. When analyzed, this data can assist the user in determining the progress being made by the student.

**HIGHLIGHTS**

- Completely menu and prompt-driven for ease of operation by students, authors, and the supervisor.
- Supports multiple students on the same or different courses concurrently.
- Supports multiple authors on different courses concurrently.
- Written in BASIC and requires the BASIC program product (5726-BA1) for execution. Nevertheless, the user does not need to learn BASIC or know how to program.
- Operates concurrently with other System/34 programs and languages except FORTRAN (5726-F01) programs and programs using the Scientific Instruction Set (5726-SS1).
- The basic license (5726-PT1) may be ordered with an optional feature (#6025):
  - Basic license allows a student to take a course written by an author on a System/34 different from the one used by the student.
  - Feature allows an author to build a course on a System/34 for use by students on that system as well as other System/34 units.
- Provides answer matching so that appropriate text can be displayed for correct, incorrect, and unexpected answers.
- Provides for multiple correct and/or incorrect answer processing ('OR' logic).
- Course material sectioned for easy arrangement of concepts covered in course.
- Provides scoring capability with weighted question values.
- Provides capability for course to be taken by student in scoring mode or practice mode.
- Provides 'JUMP TO' function both unconditionally and conditionally on score or count of correct answers.
- Ability to chain to user-written BASIC programs for inclusion as course material.
- Ability to include external screens (\$\$FGR members) as course material.
- Permits author maintenance functions for existing courses.
- Includes security features to inhibit unauthorized access to course material, student answers, and student scores. This is in addition to the System/34 integrated security.

**DESCRIPTION**

The offering is a course writing *tool* which the course developer or author uses in preparing course material for students. Students can take courses at their own rate of speed and capabilities.

The product is used by the supervisor to register courses and students, and to maintain the application. The author uses the application to develop and maintain a course, while the student uses it to take a course.

The IBM Personal Teaching Aid/34 is made up of two parts. The feature (#6025) to the application is a *tool* which uses a set of BASIC programs for developing and maintaining courses. The basic license (5726-PT1) consists of a set of BASIC Programs which retrieve course material from disk and interact with the student. The supervisor maintains the application files and is responsible for allowing students to take the proper courses and authors to modify only their own courses. The supervisor also is responsible for printing student responses and scores when this data is needed.

The *Application Installation Guide/Reference Manual/Runbook* (User's Guide) provides the user with all the information necessary to install the product. This document also provides step-by-step instructions for operating the application as a student, an author, or the supervisor.

The *Application Installation Guide/Reference Manual/Runbook* provides execution instructions for the sample course shipped to the user of the basic license (5726-PT1) by PID as part of the machine-readable materials on diskette. This document provides course and

student registration instructions for the supervisor as well as execution instructions for the student.

The *Application Installation Guide/Reference Manual/Runbook* provides build instructions for creating a sample course. Following the instructions in this document, the user of the feature (#6025) builds a course which can be executed upon completion. Also, authors of courses are given a discussion of tips and techniques to help develop courses which are easy to change and maintain.

The basic license (5726-PT1) and the feature (#6025) each have a separate *Application Logic Manual*. These documents are provided as licensed documentation for use by the self-sufficient user in maintaining and modifying the product. Information on naming conventions, application program functions and specifications, file record layouts, and other information pertaining to the application is presented in these manuals.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of this System/34 licensed program is also a customer responsibility.

The customer must:

- Install the licensed program by following the instructions in the *User's Guide* (SB30-0473).
- Read the *User's Guide* carefully before executing the new licensed program menu options.
- Follow the *User's Guide* to execute the licensed program menu options.

**SPECIFIED OPERATING ENVIRONMENT**

Support, as described under Programming Services, will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration for this product is an IBM System/34 with:

- IBM 5340 System Unit mdl D11 (8.6 megabytes of disk storage and 96K bytes of main storage).
- One system printer, either a serial printer or a line printer with a 96-character print belt.
- One IBM 5251 Display Station (mdl 11 or mdl 12).

**SOFTWARE REQUIREMENTS**

Release 7 or later of the following licensed programs are required:

- System Support licensed program (5726-SS1)
- BASIC licensed program (5726-BA1)

**DOCUMENTATION**  
(available from Mechanicsburg)

*Promotional Flyer* (G580-0534)

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index



## PROGRAM PRODUCTS

**SYSTEM/34 RPG II  
5726-RG1****PURPOSE**

IBM System/34 RPG II provides the following capabilities:

- RPG II Language Level
- System/34 Device Support including WORKSTN (work station) device and Interactive Communications Feature (SSP-ICF)
- Auto-Report
- Binary Synchronous Communications (BSC)

**HIGHLIGHTS**

- The RPG II device names are DISK, PRINTER, CRT, CONSOLE, SPECIAL, KEYBOARD, BSCA and WORKSTN.
- The support for SSP-ICF using the WORKSTN file support.
- The user indicators (U1-U8) may be tested and turned on and off in the RPG II program. The status of these indicators may then be tested by OCL. The indicators can also be set on or off using OCL.
- The user program may access a work station local data area which provides program-to-program or program-to-OCL data interchange.
- Header specification entries have been added to specify the number of display formats associated with a WORKSTN file.
- Data Structures may be defined for the work station local data areas or to redefine other fields without allocating additional storage.
- A program using a WORKSTN file may support multiple work stations or communication sessions with specified unique data fields and indicators saved and restored automatically by work station or communication sessions.
- The TIME operation may be used to obtain time-of-day and date from the system.
- Field end position may be omitted and the compiler will calculate the end position within an output record.
- The user may control spacing and skipping of the compiler listing.
- OCL option to avoid halting for terminal errors found during compilation.
- Subroutine to retrieve message text from a message member.

**DESCRIPTION****SYSTEM/34 DEVICE SUPPORT**

All the devices available on the System/34 are supported by System/34 RPG II, except the diskette drive. Through the use of System/34 OCL, the diskette drive is supported as a transaction or master file and librarian Save/Restore device. The shared input/output access methods are also supported. The following expanded device support is provided:

- **WORKSTN File Support** - Language entries support one or more 5251 Display Stations and 5252 Dual Display Stations or SSP-ICF communication sessions as a primary or demand file. The 5252 represents two work stations. The WORKSTN device support allows the programmer to treat the display station or communication session as a sequential update file using the normal RPG II logic. Multiple display stations and/or multiple communications sessions may be attached to the WORKSTN file. The programmer need only be concerned with the single user (display station or communications session) logic. Data fields and indicators that are unique to each user are so indicated by the programmer and RPG II saves and restores those fields and indicators automatically. Display formats for use with the WORKSTN file must be created using the SSP Screen Format Generator Routine (SFGR). Printer output coding for work station printers is the same as that for the system printer and, furthermore, is reassignable at execution time using OCL.
- **CONSOLE File Support** - Through the use of normally coded File Description and Input Specifications, the CONSOLE File (5251 or 5252) is supported in a buffered interactive mode. The operator is prompted record-by-record with display formats generated by the compiler. Keying of one record is buffered and overlapped with processing of the previous record. The program is coded to process records as from any other sequential input device. The user must specify display size to be used.
- **KEYBOARD and CRT File Support** - The display formats used for these files will use six lines of forty characters each or twenty-four lines (twelve lines for the 960-character display) of seventy-nine characters each depending on the maximum record length specified in the program for the file. The KEYBOARD support includes support of 24 command functions.
- **PRINTER File Support** - Multiple printer files may be specified in a single program. The System/34 OCL is used to assign an RPG II

printer file to the system printer or a work station printer at execution.

- The SSP Data Management routines are not included in the generated object program since those routines are a sharable part of the SSP.

**AUTO-REPORT**

Auto-Report is included with the System/34 RPG II compiler and includes the following features:

**Copy** - Specifications may be cataloged in a library and included in any RPG II program via the COPY statement. It is especially useful for cataloging the File Description and Input Specifications for which overrides may be coded to specify such things as control levels. By using the COPY statement, only one description of the file need be cataloged and changed for all programs using the file.

**Page Headings** - Page headings can easily be specified on Output Specifications without the need for Output Indicators or end positions. The heading is centered over the report complete with page numbers and date.

**Simplified Report Specifications** - A report may be produced by listing on Output Specifications the fields desired in the order desired. On one Output Specification, the field, column heading, and an indication for column totals may be entered. The column headings, fields, and column totals are automatically generated.

**Auto-Report Function Modified to Prevent Program Name Duplication** - The Auto-Report function has been modified so that the program name in columns 75-80 of the Header Specification will no longer be propagated through the source program. This change prevents overlaying portions of comment records and retains existing data from the original program.

**BINARY SYNCHRONOUS COMMUNICATIONS (BSC)**

The Telecommunications Specification is supported in System/34 RPG II. Support of Binary Synchronous Communications will be provided by System/34 to communicate with:

- Another System/34 with RPG II or Basic Assembler
- System/32 with RPG II or Basic Assembler
- System/3 with ML/MP, CCP or RPG II
- System/7 with MSP/7
- System/360 with either of the following:

BTAM\*  
TCAM/NCP\*

- System/370 with any of the following:

BTAM\*  
TCAM/NCP\*  
VTAM/NCP\*  
CICS/VS\*  
IMS/VS\*

- 3741 mdl 2 or 4
- 3747
- 5231 mdl 2 (supported as 3741 mdl 2 or 4 in transmit mode only)
- 5280 Distributed Data System
- Series/1 (Supported as a System/3)
- 5110 (as a 3741)
- POWER/VS (as a 2780)

\* **Note:** The 3704/3705 Emulation Program (EP) or the Partitioned Emulation Program (PEP) extension to 3704/3705 NCP can be used to emulate the 2701.

Limited programming support is provided by System/34 RPG II Telecommunications Specifications for the following devices: (an approved RPQ (S40186) is required.)

- 6640 Document Writer
- Office Systems 6 Information Processor
- 6240 Magnetic Card Typewriter - Communicating
- 6670 Information Distributor
- Displaywriter System

The BSC host support for System/34 is generated on the host system as System/3 BSC.

## PROGRAM PRODUCTS

**S/34 RPG II (cont'd)****SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/34 RPG II licensed program runs on all models of System/34 and supports the Communications Adapters (#2500, #3500) in BSC mode.

**SOFTWARE REQUIREMENTS**

The current release of the IBM System/34 RPG II licensed program operates under control of the current release of the IBM System/34 System Support licensed program (5726-SS1).

**COMPATIBILITY**

**System/32 RPG II Considerations:** The RPG II language is supported as on the System/32. Overlays are automatically generated when necessary. Differences do exist due to different devices and SSP function. System/32 RPG II programs must be recompiled on System/34 with the following considerations.

- Object program size will differ due to the SSP Data Management and control block changes. The size may be larger or smaller depending on the particular logical files used in the user program and the overlay structure generated by the compiler.
- RPG II CONSOLE, KEYBOARD, and CRT files will display information differently because of the larger display screen. Keying will also be slightly different.
- If any subroutines are called via EXIT or SPECIAL files, those Basic Assembler subroutines must be reviewed and modified as required to execute correctly on System/34. IBM-written System/34 Basic Assembler subroutines SUBR01 and SUBR95 are supplied with the RPG II program product to support conversion of System/32 RPG II programs that include SUBR01 or SUBR95.

**Program Use During Customer Pre-Installation Testing:** The IBM System/34 RPG II Licensed Program (5726-RG1) is available to customers for pre-installation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/34 RPG II Licensed Program Specifications (GC21-7669) ...  
System/34 RPG II Reference Manual (SC21-7667).*

**TERMS and CONDITIONS:** See PP Index

**Ordering Information:** Contact IBM.

## SYSTEM/34 RPG II SUBSET 5726-RG2

### PURPOSE

This program is intended to support the Preconfigured System/34 System Support Program Subset (5726-SS2).

RPG II is a symbolic programming language that is commercially-oriented and specifically designed for writing application programs that meet common business data processing requirements. The System/34 RPG II Subset compiler translates programs written in RPG II subset into object programs that are executed under the Preconfigured System/34 System Support Program Subset.

### HIGHLIGHTS

- Display station support which allows an RPG II program to communicate with display stations by using the WORKSTN file facility. WORKSTN file support allows concurrent interaction of multiple display stations with the same program. Four calculation operation codes support the WORKSTN file:
  - ACQ acquires a display station for a program.
  - REL releases a display station from a program.
  - NEXT forces the next input to the RPG II program to come from a specified display station.
  - POST provides for the retrieval of status information for a specified display station attached to a WORKSTN file.
- Subroutines are provided to support multiple display stations in a WORKSTN file:
  - SUBR20 reads and updates the external indicators (U1-U8) for a specified display station.
  - SUBR21 reads and updates the display station local data area for a specified display station.
  - SUBR22 allows an RPG II program to read records from a transaction file that has been created by the Work Station Utility program.
- User exception/error handling capability for the WORKSTN file allows the user to control the program logic flow if exception/error conditions occur on an operation to a WORKSTN file.
- Data structures which allow the user to redefine the same data area multiple times using different data formats. Data structures enable a user to:
  - Specify subfields of a file (thereby reducing the number of MOVE and MOVEL operations needed)
  - Perform an operation on a portion of a field by referencing a subfield
  - Use the same internal storage area for multiple record types
- Expanded CONSOLE support which allows complete record prompting through use of screen formats. The RPG II format generator generates screen formats for the CONSOLE file from the RPG II input specifications (either 960- or 1920-character screens).
- Subroutine SUBR01 which allows data to follow a // RUN statement either in a procedure or from the keyboard.
- Subroutine SUBR23 which retrieves messages from a user message member.
- Calculation operation codes:
  - TIME gives the time-of-day and, optionally, the system date.
  - SHTDN tests whether the system operator has requested shutdown.
- Multiple printer support which allows up to eight printer files in a program.
- The specification of a primary file is optional. If there is no primary file, the RPG II programmer must set on the LR indicator to go to end of job.
- The cross-reference support which provides the ability to include a cross-reference listing of symbols used in an RPG program in the compiler listing.
- Delete-capable file support which allows records to be deleted from delete-capable files through the use of DEL on the output specifications.
- Addition of records to delete-capable files processed randomly by relative record number.
- The job queue support which allows the capability of placing RPG II compilation requests on the input job queue.
- NOSTOP/REPLACE procedure options which eliminate halts for terminal errors and duplicate library members.
- The storage index entry is allowed for files processed sequentially within limits.
- The SORTA operation code which allows the records in an array to be sorted into ascending or descending sequence.

- The figurative constants \*BLANK, \*BLANKS, \*ZERO, and \*ZEROS supported for the calculation specifications.
- The /TITLE statement which provides heading information at the top of each page of the compiler listing.
- Currency symbol support which allows you to specify a symbol other than the dollar sign (\$) as the currency symbol.
- Extended printer support which allows record lengths of up to 198 characters to be specified for the 5225 printer.
- Short form calculations

The following features of System/34 RPG (5726-RG1) are *not* supported:

- Auto-Report
- Telecommunications

### DESCRIPTION

#### RPG II SOURCE LANGUAGE SPECIFICATIONS

To use System/34 RPG II Subset, the programmer defines a program by coding combinations of the following source language specifications:

- Control specification which provides information about the program to be compiled and describes the system being used
- File description specifications which describe all of the program files
- Extension specifications which describe all tables, arrays, and record address files
- Line counter specifications which indicate the length of the forms used in the printer and specify the overflow line
- Input specifications which describe the records and fields in the input files and also describe data structures
- Calculation specifications which describe the calculations to be performed on data
- Output specifications which describe the records and fields in the output files and also specify the display screen format names for WORKSTN files

#### The RPG II SUBSET COMPILER

The RPG II Subset compiler is a program that translates an RPG II subset source language program into an executable object program. The RPG II Subset compiler produces:

- A source program listing
- Diagnostic messages
- A main storage map
- An object program stored in a library
- A cross-reference listing of symbols (on request)

#### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

This IBM System/34 RPG II Subset (5726-RG2) runs on all models of System/34.

#### SOFTWARE REQUIREMENTS

This IBM System/34 RPG II Subset (5726-RG2) operates under the control of the IBM Preconfigured System/34 System Support Program Subset (5726-SS2), or Release 7 of 5726-SS1 while it is available, or its equivalent.

The IBM System/34 RPG II Subset (5726-RG2) consists of parts of System/34 RPG II (5726-RG1) stabilized at Release 7. No release update or enhancements are planned.

#### COMPATIBILITY

System/34 RPG II Subset is highly source-compatible with System/32 RPG II (5725-RG1). System/32 RPG II programs can be recompiled using System/34 RPG II Subset with the following considerations:

- Object program size will differ due to System/34 System Support licensed program data management and control block changes.
- CONSOLE files will prompt for a record at a time rather than field by field.
- Any Assembler language subroutines called via EXIT or SPECIAL files should be reviewed and modified to execute on System/34.
- RPG II subset does not support Telecommunication Specifications or Auto-Report.



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PP 5726-RG2.2

May 83

Major Revision

PROGRAM PRODUCTS

**S/34 RPG II Subset (cont'd)**

**Program Use During Customer Pre-installation Testing:** The System/34 RPG II Subset (5726-RG2) is available to customers for pre-installation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

**DOCUMENTATION**  
(available from Mechanicsburg)

*System/34 RPG II Subset Licensed Program Specifications (GC21-9034) ... System/34 RPG II Reference Manual (SC21-7667).*

**TERMS and CONDITIONS:** See PP Index

**Ordering Information:** Contact IBM.

PROGRAM PRODUCTS

**SYSTEM/34 SYSTEM SUPPORT PROGRAM  
5726-SS1**

**HIGHLIGHTS**

IBM System/34 System Support Program (SSP) provides the following control program capabilities:

- Single Program/Multiple Program Modes
- Input Job Queue
- Main Storage Management
- Disk File Sharing
- Operation Control Language
- System Utilities
- Data Management
- System History Area
- Print Spooling
- User Access to Spool
- Interrupt/Resume
- Overlay Linkage Editor
- Synchronous Data Link Control (SDLC) as a part of Systems Network Architecture (SNA)
- SNA Remote Job Entry Utility Programs (SRJE and SRJE WITH MLU)
- Binary Synchronous Communications (BSC)
- Support for the Auto-Call Feature of the Multiline Communications Adapter (MLCA)
- MULTI-LEAVING Remote Job Entry System Utility Program (MRJE)
- Multiple User Library Support
- Operator ID and Password Security to the file/library level
- Support for the 1255 Magnetic Character Reader
- Control Program Support for Compilers and Utilities
- Support for directly attached and remote workstations (display stations and printers)
- Support for both 1,920- and 960-character displays
- Support for up to four communications lines
- System HELP Facility
- System Measurement Facility
- Interactive Communications Feature Support
- Support for 5250 Magnetic Stripe Reader
- Support for the Multinational Character Set
- Support for 5211, 5262 Translation Capability
- Expanded VTOC allows up to 2,008 user library/file entries
- Spool function
- Support for work station History File scroll capability
- ASSIGN/FREE support for systems using near maximum nucleus size
- ASSIGN/FREE allocation and use for temporary storage of a user's Local Data Area
- RELOAD/Release update support
- Support in Batch BSC for Assembler language users to receive variable length records
- Auto-Response Facility

**DESCRIPTION**

**Single Program/Multiple Program Modes:** The System/34 may be used in the single program mode which is very similar to the operation of a System/32. When the SSP is configured in the single program mode, one operator enters commands and OCL. The programs invoked by the OCL execute one at a time, in sequence, in a single region.

The Display Stations attached to a System/34 are designated at SSP configurations as either command- or data-capable. A command-capable station can be used to invoke procedures, control commands and OCL as well as being used for data input/output in user programs. A data-capable station may be used only for user-programmed data input/output and must be acquired by a user RPG II or Basic Assembler program which has been invoked from a command station. A command-capable station must be located near the System Unit for

use as the system console. In single program mode, there can be only one command-capable station.

The SSP can be configured to allow the System/34 to operate in the multiple program (multiprogramming) mode. Operators at multiple command-capable stations may concurrently invoke control commands, OCL and procedures. Multiple programs can execute concurrently.

**Input Job Queue:** Multiple program mode of the SSP provides an Input Job Queue facility. The input job queue contains a list of jobs that are to be executed in sequence concurrently with other batch or operator-interactive jobs. The jobs in the queue can be placed there by any command-capable station or OCL procedure. The station that places the job on the queue is released from that job and, therefore, becomes available for other work. Job queue priorities can be specified to control a job's position in the job queue.

**Main Storage Management:** The System/34 manages main storage as a pool of noncontiguous 2,048-byte segments and 'swaps' entire programs to and from disk as required to fit an active program into main storage (a program that is inactive might, for example, be waiting for data input or a message response from a display station).

System/34 main storage management allows the total main storage required by all active tasks to exceed actual user main storage. Performance considerations will dictate to what extent user main storage may be overcommitted.

The System/34 SSP occupies a minimum of 14K bytes of main storage. This value may be increased in 2K-byte increments to include printer Spool support, increase number of active tasks, or to optimize system performance. This resident nucleus area contains SSP functions such as data management for disk, printer and workstations; buffers for workstation I/O and printer spooling; and an SSP work area used for task control. When remote workstations are active, an additional area of main storage is reserved for line buffers and SDLC data management.

**Disk File Sharing:** Disk data files on System/34 may be accessed concurrently by multiple programs for input, update, or add operations. Protection of data against concurrent update by two programs is provided by locking the disk sector(s) until released by the accessing program. An OCL parameter is provided to allow or prevent the file sharing of a specified file.

**Operation Control Language (OCL):** System/34 OCL is compatible with System/3 OCL with the following exceptions:

- A command statement which has the capability to pass parameters to the indicated procedure is used in place of the System/3 CALL.
- Capability for specifying default values for missing OCL parameters.
- Logical IF statement provides for condition checking within procedures. It is possible to execute different steps based on tests performed in OCL.
- Other differences brought about by devices and system function.

System/34 OCL is compatible with System/32 OCL with exceptions such as the following:

- Additional commands, statements, and parameters have been incorporated into System/34 OCL.
- Some operator-entered commands do not invoke OCL procedures or utility programs on System/34. Therefore, a System/32 procedure using those commands will require change.
- Some utility functions such as COMPRESS must run dedicated, that is, cannot run in multiprogramming mode with other programs. Therefore, System/32 procedures using those commands must be changed.
- System/34 in multiprogramming mode, or either mode with printer spool, will not honor the System Log statement. Logging to the System History Area is still performed and messages are displayed to the operator's display screen but will not be printed as they are displayed in this mode.
- System/34 does not support offline multivolume diskette files except on the Diskette Magazine Drive.
- The disk file rebuild of the System/32 Utilities has been replaced by an automatic disk file integrity check at IPL (optional).

OCL procedure commands and control commands are provided to support the SSP facilities and the management of a multiprogramming system. Key functions in addition to those above include print spool queue and input job queue management, disk file sharing control, display station and printer assignment at execution time, region size, OCL-to-program communications (in a 256-byte local data area accessible and modifiable through OCL and user programs), reserve disk space for a job, add job names to the input queue, select communication line, branch to a specific point in a procedure, specify

### S/34 System Support Program (cont'd)

the next menu to be shown to the operator, display user formats for input data prompting and display station-to-system console station communications.

**Systems Utilities:** System/34 SSP also provides enhanced function for those utilities and new utility programs to allocate files, rename files, build display formats, build job menus and other common functions.

**Data Management:** This SSP provides data management support for the disk, the display, the keyboard and printers. The support for disk also allows the user to optionally specify space for more than 200 disk files, up to a maximum of 920 on mdls XX1 to XX3 and 984 for mdls XX4 and XX5. The display station data management supports multiple direct and remote units of the 5250 Information Display System, for both 1,920- and 960-character displays. This display station data management manages all input and output to the display stations including the retrieval of display formats from a disk library and merging program data prior to displaying the format on the display.

**Diskette -** The System/34 SSP includes utility programs to fully support the diskette unit and the Diskette Magazine drive as a Save/Restore device. The Diskette 1 in 128- or 512-byte sector formats are supported. In addition, the Diskette 2D (2-sided Double-density) is supported in 256 or 1,024-byte sector formats.

The Diskette Magazine support allows input/output operations to begin on any one of 23 specified diskettes and overflow automatically to the next diskette in the magazine, to the next magazine, or from one individual slot to the next.

**System History Area:** System/34 provides a history area on disk which contains all recently executed OCL statements and all messages issued to the log device. The messages and data may be retrieved and redisplayed on the display station or printed. Either all the OCL statements or only those originally displayed may be printed as a hard copy log of the activity of the system. Individual display station operators will only be able to display or print entries created from that display station.

Entries are time stamped and include the job identification generated by the SSP to assist in determining the sequence of activity on the system. A configuration option allows the user to prevent History File from being overwritten. This option, which can be overridden at IPL, allows the system to save the History File.

#### Print Spooling

Print spooling is supported by the SSP as an option in either single program or multiple program mode. When spooling is configured in the SSP and indicated at execution time, printer output requests are intercepted and stored on disk. Spool writers are used to retrieve the print records from disk for printing. A print queue is maintained of job names whose printer data is yet to be printed, or specified as 'Retained after Printing'. System console commands are provided to start/stop, restart (at a page number), cancel, hold/release, change priority of and display jobs in the print queue. Print spooling is supported for any and all printers attached to the system simultaneously. In addition, multiple logical print files, up to 8, from a single RPG II program may be directed to one printer or separate printers.

A specified display station can be configured to be the controlling station for a spooled workstation printer. The spool control commands and spool-issued messages are available to the display station operator to control the output directed to the printers associated with that display station.

The size of the primary spool disk file is specified when the SSP is configured. The spool intercept routine will allocate up to five additional extents if necessary. These extents will be freed up by the spool writer as they become empty.

**User Access to Spool:** A utility permits spooled data to be copied to a data file which may be saved on diskettes, restored for later use, and viewed on a display station. While viewing the output, the user can elect to print a copy of the information. The entire report or selected pages can be printed without re-executing the job.

**Interrupt/Resume:** The operator may interrupt a processing program, execute another job, such as inquiry into a file, and return to the processing program. Processing of the interrupted program will resume when the operator indicates the completion of interrupting activity.

**Overlay Linkage Editor:** The Overlay Linkage Editor facility converts relocatable object modules, produced by FORTRAN and the Basic Assembler program, to executable programs. Overlay structures may be created automatically or as designated by the user.

This facility is not required for Basic Assembler subroutines to be included in RPG II programs.

A System/34 SRJE (SNA Remote Job Entry) utility program is included with the SSP to provide data communications capability to the following System/370 remote job entry programs:

DOS/VSE/POWER/VS  
Remote Entry Services (RES)  
Job Entry Subsystem 2 (JES2)  
Job Entry Subsystem 3 (JES3)

**Synchronous Data Link Control (SDLC) as a Part of Systems Network Architecture (SNA):** The System/34 SSP provides an interface to support data communications with a host System/370 (4300, S/370 mdls 115 through 168, 303X, 308X) operating under DOS/VSE, OS/VS1, MVS, or any of these operating systems when running under VM/370. Attachment is through a 3704 or 3705 operating under NCP/VS.

System/34 SNA Remote Job Entry (SRJE) has been enhanced to support Multiple Logical Units (SRJE with MLU). This support is an incremental improvement to the current System/34 SRJE in the SSP. SRJE supports a single logical punch unit which may be a READER, a WRITER, or a PUNCH. The CONSOLE requires the current active device to pause to allow console messages. SRJE with MLU supports multiple logical units, up to 10, which may be three READERS, three PUNCHES, and a CONSOLE all active concurrently.

The following host subsystems are supported:

RES  
JES2  
JES3  
DOS/VSE/POWER/VSE

The attachment and operation has been tested to each of the above subsystems. These host subsystems currently support MLU on the 3770/3790. The host subsystems are not required to make any coding changes to support this attachment.

The following changes must be made by the IBM customer to use this support. On the host subsystem, the definition of the System/34 must be changed from a Single Logical Unit to MLU. On the System/34, the SRJE procedure has a new parameter - the number of sessions desired. SRJE with MLU does require an additional 2K of nonswappable memory in the System/34.

If a customer does not want to use SRJE with MLU, but just SRJE, then no changes should be made. There is no impact on memory and no changes to the SRJE procedure or to the host subsystems. The original SRJE support still exists.

This utility provides capabilities similar to the batch workstation utility program for RES, JES2 and POWER/VS that is available with the IBM System/32. This support includes the ability for SRJE to be initiated from a procedure from any workstation without operator intervention. When the auto-call feature of the MLCA is used, the initiation of SRJE will call a predetermined phone number without requiring operator intervention to place the call.

**Support for the Auto-Call Feature of the Multiline Communications Adapter (MLCA):** The support for the System/34 Auto-Call feature (of MLCA) allows the user to have the system automatically attempt phone calls on a switched line to another device or system. This support is provided external to the user programs in such a way that no changes to user source code are necessary. Phone numbers are referenced through new OCL parameters.

#### Highlights

- Ability to call multiple locations from a single batch BSC step (through an OCL loop) and retrieve/send data from/to each location without operator intervention
- Ability to define phone numbers or lists of phone numbers that can be referenced in OCL for communication on any line that is an auto-call line.
- Ability to specify a time interval to wait after the call has been placed before considering it incomplete.
- Automatic retry of incomplete calls a specified number of times before considering call a failure and logging an error message.
- Support for phone numbers of up to 22 characters to facilitate international calls.
- Support for a separator (SEP) character option to allow the system to wait for an additional dial tone when dialing through to another network.
- Support for an End of Number (EON) character option to allow users to signal their hardware when short numbers are used.
- Support for MRJE and SRJE to be executed and call a predetermined number, without operator intervention for placing the call.
- Auto-call support is provided when using batch (RPG or Assembler) MRJE, SRJE, SNA 3270 Device Emulation, and the following subsystems of SSP-ICF: BSCCL, CICS, CCP, SNA Upline Facility, SNA Peer.

**Binary Synchronous Communications:** The SSP provides Binary Synchronous Communications (BSC) data management for System/34

## S/34 System Support Program (cont'd)

RPG II and Basic Assembler and Macro Processor programs. For the devices supported, this BSC data management appears the same as the program support provided by the System/32 RPG II data communications support (an additional BSC capability on System/34 permits transmission of multiple data files to or from 3741 diskettes). A system utility is also provided to select certain communications characteristics at program execution time such as: Line type, terminal address, line speed, error retry count, etc. The Basic Assembler program product includes BSC macro support.

**MULTI-LEAVING Remote Job Entry System Utility Program (MRJE):** The MRJE System Utility program permits a System/34 to function as a remote job entry (RJE) workstation for submission of jobs to a central System/370. The central OS processing is performed under control of one of the following: HASP II, ASP, RES or JES2, JES3. The System/34 MRJE will also operate with VM/370 Remote Spooling Communications Subsystem (RSCS) as a HASP workstation. MRJE operates under control of the System/34 SSP and communicates with the central system over a point-to-point (switched or nonswitched) communication line via the Communications Adapter in BSC mode. Host System RJE programming support should be generated specifying System/3 as the supported terminal.

Highlights of the MRJE program are:

- Full MULTI-LEAVING support permits concurrent System/34 device operation.
- Card I/O operation is simulated by disk storage.
- Compression and expansion of blanks and duplicate characters may be performed for increased line utilization.
- At the user's option, the MRJE automatically selects a default for any MRJE message requiring an operator response.
- Disk storage is supported for jobstream input and output and for individual data set output.
- A print utility program is provided for printing 'punch' and printer data streams which were directed to disk storage during the RJE session.
- MRJE Utility control statements may be entered through the keyboard or a limited set may be entered from a file on disk storage.
- MRJE can be initiated from a procedure from any workstation.
- When the auto-call feature of the MLCA is used, the initiation MRJE will call a predetermined phone number without operator intervention.
- The initiating workstation functions as a console for operator communication.
- All MRJE Utility control statements and central system commands and all messages are logged in the System/34 History File.

**Note:** The diskette drive is not supported by the MRJE Utility.

**Multiple User Library Support:** The System/34 SSP provides for multiple user libraries. Parameters and OCL statements allow the user to specify a library name. If the library is not specified, the default is to the system library (#LIBRARY).

**Operator ID and Password Security to the File/Library Level:** Each operator who signs on to a System/34 display station is prompted for an identification and optionally a password. This data is then checked by the SSP before allowing the operator any further access to the system.

Also, files and program libraries can be restricted to authorized users. These users can be further classified by type of use. An additional option allows the creation of audit entries in the system history area for each use of a secured file/library.

Security permits the optional additional check of operator badge identification at sign-on, if the workstation has an attached 5250 Magnetic Stripe Reader.

**IBM 1255 Support:** The System/34 SSP includes subroutines (SUBR08 or SUBR25) which can be linked into a user-written RPG II, COBOL or Basic Assembler program to interface the program to the 1255 Attachment feature. SUBR08 and SUBR25 provide for the reading of data from documents (checks) and returning that data to the program when requested by program logic. It can also return to the program the stacker selection that was made, and indicators that tell field validity and document type.

**Control Program Support for Compilers and Utilities:** The SSP provides the control program services for RPG II, COBOL, FORTRAN, Basic Assembler and the Utility licensed programs. Included are disk data management, printer and spool support, program library maintenance, OCL and procedure support, and main storage allocation and management.

The language compilers and utilities function like user batch programs. In a multiprogramming environment, multiple copies of a compiler or utility may operate concurrently if necessary resources are available.

**Support for Directly Attached and Remote Display Stations and Printers:** The System/34 may be configured to support the 5251, 5252, 5291 and 5292 display stations and the 5219 D01 and D02, 5224, 5225, and 5256 printers attached to the System/34, and communicate with 5251 mdls 2 and 12 on one to four communication lines. Remote workstations may be used to perform most of the same functions as the directly attached stations.

Switched network backup and speed select modem features are not supported under program control when communicating with 5251 mdls 2 or 12.

Application programs and IBM program products which support directly-attached 5219 D01 and D02, 5224, 5225, 5251, 5252, 5256, 5291 and 5292 devices will also support the remotely-attached devices without change. However, the system console function may not be assigned to a remote display station.

**Support for Both 1,920- and 960-Character Displays:** The System/34 may be configured to support 1,920- and 960-character display stations. All SSP display formats will be supported on either display size. Some formats (such as message displays) will present fewer lines when output is directed to a 960-character display. Either size display can be assigned as the system console.

**Support for Up to Four Communication Lines:** The System/34 may be configured to support four communication lines, each in either BSC or SDLC protocol. Each can be either switched, leased, or leased with Switched Network Backup.

They are accessed via OCL (with the default being line 1). No user programming is required.

Switched network backup and speed select modem features are not supported under program control when communicating with 5251 mdls 2 or 12.

**HELP Facility:** The SSP includes a HELP facility to aid users in executing many of the functions of the System/34. HELP provides the user with the capability of displaying prompts which contain the syntax, default parameters, keywords, and general descriptions of procedure commands.

**System Measurement Facility:** System/34 includes System Measurement Facility (SMF) routines which, in conjunction with control storage routines, may be invoked to monitor system activity, system device, and SSP work area utilization, and record this data in a disk file. A report program is provided so that the file may be listed to provide information useful in analysis of system performance with the current application work load or in anticipation of added application work load.

**Expanded VTOC Allows up to 2,008 User Library/File Entries:** The disk Volume Table of Contents (VTOC) has been increased to allow entries for up to 2,008 user files and libraries resident on the system in addition to the system files. The previous maximum number of entries was 984.

**Spool Function:** The spool support treats each print file separately and allows any number of print files in a user program. This allows independence between print files created in the same program so that spool file space can be freed as each print file completes printing.

The maximum spool file size is 76,800 blocks. In addition, the maximum page number that can be supported in a RESTART command is 65,535.

A number of commands and the information they display to aid the operator in controlling spool files are:

### STATUS PRT Command

- An indication of print files being copied by the User Access to the Spool File Utility
- The page number currently being intercepted
- The page number currently being printed by the writer

### STATUS WRITER Command (new)

- The ID of the printer
- The ID of the subconsole that controls the printer
- An indication of whether the writer is stopped or started
- The spool ID and procedure name of the print file that the writer is currently printing
- The forms number that the writer is currently printing
- An indication of whether a spool writer message is pending
- Number of separator pages
- Residency and priority indications

**S/34 System Support Program (cont'd)**
**CHANGE Command**

- A parameter allows the operator to change the DEFER attribute (YES/NO) of a currently intercepted print file
- Parameters allow the operator to change the residency, priority, and separator page attributes of the writer for any individual printer

**Support for Work Station History File Scroll Capability:** A procedure, HISTCRT, facilitates problem determination by allowing the operator to easily view history file entries on the display. When the HISTCRT procedure is executed, the first screen shows the most current history entries. While viewing the entries, the user can:

- Use the Roll Up and Roll Down keys to scroll through the entries
- Use a command key to view the oldest or newest entry, or change the number of lines to be scrolled
- Use HELP to obtain an explanation of the command keys
- Enter scan characters to locate a specific entry
- Use command keys to choose selection criteria for the entries or parts of entries that are to be viewed

The use of scan characters assists the user in locating information. When an entry is found that contains the specified scan characters, the entry is displayed and the scan characters are highlighted and underlined. The operator can continue scanning, forward or backward, for more entries with the same characters, or scanning can be stopped by removing the scan characters. Up to 20 scan characters can be specified during each scan operation.

**ASSIGN/FREE Support for Systems Using Near Maximum Nucleus Size:** The ASSIGN/FREE support issues a message and performs STOP JOB,ALL and STOP SESSION control commands when the last 2K of storage is allocated to ASSIGN/FREE space. This action will be taken even if the system is configured with the maximum nucleus size. This causes the system to stop, allowing the operator to take appropriate action to reduce the load on the system by selectively restarting jobs. As ASSIGN/FREE space becomes available, the remaining jobs can be restarted by the operator.

**ASSIGN/FREE Allocation and Use for Temporary Storage of a User's Local Data Area:** The allocation of ASSIGN/FREE space provides more efficient usage. The allocation algorithm looks for space on a 'best fit' basis, which reduces fragmentation and improves utilization.

The users' Local Data Area (LDA) is placed in the system ASSIGN/FREE space during a job step initiation. Each LDA requires 256 bytes. The system allocates 256 bytes of ASSIGN/FREE space the first time a LOCAL OCL statement or LOCAL procedure control expression substitution is encountered in a job step. This space is freed when a // RUN statement is encountered. If the job step does not reference the LDA, no additional ASSIGN/FREE space is used. This may improve performance in job steps that have multiple OCL references to the LDA. This support does not affect statements placed after the // RUN statement.

**RELOAD/Release Update Support:** RELOAD preserves certain system names and parameters across the installation of a new release. The names and parameters that will not be reset are:

- Workstation Parameter Member Name
- Print Belt Image Name
- Startup Procedure Name
- Line Printer Translate Table Name
- SNA/SDLC Parameters

**Batch BSC Support for Assembler Language Users to Receive Variable Length Records:** Assembler language users have support in Batch BSC to receive variable length records. The data can be blocked or unblocked. The user must specify a parameter RECFMT=F (fixed) or RECFMT=V (variable) for this support. The record length is returned in the DTF field \$BSRCL. The maximum expected record length must be specified when the file is opened. Transparency, blank truncation, compression, and ITB mode cannot be used.

**Auto-Response Facility:** The System/34 Auto-Response Facility allows users to specify response options to be taken automatically when error messages are displayed at the system console. Normally, processing stops until the system console operator responds to a message with an option value. Auto-response allows a user to select messages to which the system will respond with an option value and then continue processing. The use of this facility is particularly valuable when a system must run without an operator in attendance.

Only messages sent to the system console can be answered by auto-response. The selected option value must be a value that is allowed for the message. Messages issued by the SSP, communications components, program products, and user-created programs can be responded to automatically.

The RESPONSE procedure allows users to specify the source member that contains the option values to be applied to the messages, and the name of the library that contains the source member. The RESPONSE procedure calls the \$ARSP utility, which reads the auto-response values and applies them to the appropriate messages.

Once the utility has been run, the system will respond automatically to all messages for which auto-response values exist. If the system is not to respond automatically to a message, the utility must be run again to remove the default values.

**Interactive Communications Feature Support:** The interactive communications feature includes support for program-to-program communications to other systems or devices using BSC and SNA/SDLC as well as communications between programs within the same system. The feature also allows programs on other systems to initiate System/34 procedures and allows System/34 programs to initiate programs or procedures on other systems without remote system operator intervention. To facilitate incoming procedure requests, the interactive communications support can maintain a connection on a communications line when no System/34 application program is active.

**Support for 5250 Magnetic Stripe Reader:** Provides the capability of reading numeric encoded information from a magnetic stripe on a wide range of credit cards, identification cards and documents. The magnetic stripe may be encoded with up to 128 ABA characters, including control characters. This feature enhances system data security by providing the ability to read an operator identification card without being displayed.

**Support for the Multinational Character Set:** Provides the capability of displaying the 188-character Multinational Character Set to facilitate the interchange of information between systems with different language groups. The keyboards do not include the additional characters of the Multinational Character Set. All characters may be entered via a single or multiple key sequence.

**Support for 5211 Translation Capability:** For users with translation capability, the IMAGE statement permits the specification of a translation table for each display station or job on the input job stream. This provides for character substitution when using a print belt on the 5211 which does not contain all the characters in the printer data stream.

**Configuration of the SSP:** Configuration of the SSP involves an interactive process of responding to displayed prompts to select options and specify buffer sizes and work area sizes. Configuration is typically performed immediately following initial installation of the SSP on the user's system but may be repeated later to change specified options or sizes.

The SSP provides default values for all variables and will adjust these defaults dynamically depending on the user system configuration. The values may also be altered at IPL to temporarily select or omit function or alter performance characteristics of the system.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/34 System Support Program runs on all models of System/34 and supports all features. The system configuration required to support the Communications Adapters (#2500,#3500) in SDLC mode via System/34 SSP (5726-SS1), requires a minimum of 48K bytes of main storage.

**SOFTWARE REQUIREMENTS**

All IBM licensed programs for System/34 are designed to operate in an environment that includes the System/34 System Support licensed program (5726-SS1) or its equivalent. The SSP order should be entered via AAS at the same time as the system order. IBM's ability to provide concurrent hardware maintenance is dependent upon functions provided by the SSP or its equivalent.

**Program Use During Customer Pre-Installation Testing:** The IBM System/34 System Support Program (5726-SS1) is available to customers for pre-installation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/34 System Support Licensed Program Specifications (GC21-7702) ... System/34 Introduction (GC21-5153) ... System/34 Planning Guide (GC21-5154) ... System/34 System Support Reference Manual (SC21-5155) ... System/34 Installation and Modification Reference Manual (SC21-7689) ... System/34 Overlay Linkage Editor Reference Manual (SC21-7707) ... System/34 Data Communications Reference Manual (SC21-7703) ... System/34 1255 Magnetic Character Reader Reference Manual (SC21-7740).*

**TERMS and CONDITIONS:** See PP Index



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PP 5726-SS1.5  
May 83

PROGRAM PRODUCTS

**S/34 System Support Program (cont'd)**

**Ordering Information:** Contact IBM.

PROGRAM PRODUCTS

**SYSTEM/34 SYSTEM SUPPORT PROGRAM (SSP)  
INTERACTIVE COMMUNICATIONS FEATURE (SSP-ICF)  
FEATURE #6000, #6001**

**PURPOSE**

Support is offered as a feature of the IBM System/34 System Support Program (SSP) (5726-SS1) and provides for Interactive Communication (BSC and SNA/SDLC), Remote Procedure Initiation on the System/34, and Communications Line Monitoring on a multipoint line (System/34 as a tributary station).

**DESCRIPTION**

System/34 SSP Interactive Communications feature (SSP-ICF) provides support for:

- Interactive communications between application programs
- Multiple concurrent communication sessions over the same data link
- Multiple concurrent user application programs which use communications
- An application program interface which is substantially independent of link protocol (BSC or SDLC)

Interactive communications differs conceptually from batch communication in that the sequence of messages is not necessarily predetermined. Either party in the communications session can logically start, alter or terminate the conversation. The logical communication path connecting two programs which are exchanging messages is called a session. SSP-ICF allows for multiple concurrent sessions to be used by one or more application programs in the System/34.

The application program access to SSP-ICF is available at two levels. Both are a logical extension of the System/34 workstation interface. The first is through special predefined screen format names that serve as operation codes to control evoking programs, sending data, and issuing special commands to SSP-ICF. The second is through assembler programming and supports all of the functions in the first level plus the added flexibility of supporting situations that may occur when communicating to systems which are not part of the standard SSP-ICF support.

This application program interface allows the user program to be shielded from most of the uniqueness of the communications protocols (BSC or SNA/SDLC) and the communications support for the remote systems (e.g., IMS/VS, CICS/VS, or CCP). For example, with proper design, users can develop programs for their current BSC network and then easily move to an SNA network without significant change to the communications interface within existing application programs.

With Release 8 modifications, evoked SRT programs perform output as the first operation. This removes a restriction that an evoked SRT program must perform input as the first operation. An SRT program initiated by EVOKE may perform input or output as the first operation. This capability applies only to SRT programs; the system restrictions for MRT processing still apply.

Included with SSP-ICF is support for languages, devices, and communications systems as listed below:

**Note:** System/34 link connections are either point-to-point or multipoint tributary only (except for connection to 5250 devices or another System/34 using SDLC).

- **BSC**
  - System/3 mdl 15 with CCP
  - System/370 with IMS/VS (version 1.1.4) via IRSS
  - System/370 with CICS/VS (version 1.3.0), OS/VS or DOS/VS with BTAM (System/34 as a System/3)
  - System/34 with SSP-ICF, RPG II, COBOL, or Basic Assembler\*
  - 5110 (as a 3741, point-to-point only)\*
  - System/7 with MSP/7 (System/7 as a System/3)\*
  - System/3 with RPG II T/P or ML/MP\*
  - System/32 with RPG II or Basic Assembler\*
  - 3741 mdl 2 and mdl 4 (no multiple file support, point to point only)\*
  - 3747 (point-to-point only)\*
  - 5231 mdl 2 (as a 3741)\*
  - 5280 Distributed Data System
  - Series/1 (as a System/3)\*
  - System/370 with: (System/34 as a System/3)
    - OS/VS, DOS/VS BTAM\*
    - OS/VS TCAM\*
- These devices are only supported for single communication sessions over a data link.
- **SNA/SDLC**
  - SDLC to System/34 using SSP-ICF
    - System/34 with SSP-ICF
  - SNA/SDLC to System/370 using NCP/VS and TCAM Direct (TCAM 10) or VTAM, or ACF/NCP/VS and ACF/TCAM or ACF/VTAM

- System/370 IMS/VS (version 1.1.4) using SLU Type P protocols
- System/370 CICS/VS (version 1.3.0) OS/VS (System/34 as a 3790)
- System/370 CICS/VS (version 1.3.0) DOS/VS (System/34 as a 3790)
- System/370 with user-written communications support using SNA protocol profiles TSP 3 or 4 and FMP 3 or 4.

**REMOTE PROCEDURE INITIATION**

The remote procedure initiation facility is available to help support distributed processing applications. With this enhancement, programs in another system can send a message to the System/34 which will cause a procedure to be evoked. The evoked procedure may use any of the procedure capabilities of the System/34. The program(s) within the procedure may or may not use SSP-ICF. Using this capability, an application program can communicate interactively with a program in the evoking system. If the evoked procedure is an executing MRT procedure, the session from the evoking program will be attached to the MRT program.

**DATA COMMUNICATIONS LINE MONITORING**

During the configuration procedure, interactive communications can be included in the system. If it is, specific questions will be asked to determine which communication subsystem types to include (for example, CICS or IMS/IRSS). Multiple subsystems may be configured, identified with a logical name, and associated with a specific data communications line connection. The configured subsystems may be activated (ENABLED) during the IPL procedure (auto-enable) or by the system operator after IPL. Once the connection is made, the System/34 SSP-ICF will maintain the connection to the communications link (until disabled), even though no user application program is active.

**Note:** This facility is a function of SSP-ICF and not available to other System/34 communication support (such as batch BSC, MRJE, or SRJE).

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section of these pages, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/34 Interactive Communication Feature (SSP-ICF) runs on all mdls of the System/34 with a minimum of 64K bytes of main storage. SSP-ICF support for communications between programs residing in the same System/34 does not require a communications adapter. Communication to another system or device requires a communications adapter on the System/34 (#2500 or #3500).

**SOFTWARE REQUIREMENTS**

The IBM System/34 Interactive Communications Feature (SSP-ICF) will operate under control of the current release of the System/34 System Support Program (5726-SS1).

**SYSTEM/34 COMMUNICATIONS SUPPORT COMPATIBILITY**

SSP-ICF communications support does not replace previously announced System/34 communication support. SSP-ICF communications support can coexist in a System/34 with other communications support (that is, programs using remote 5250s, batch BSC, MRJE, SRJE, or previously announced System/34 SNA Assembler macros). However, SSP-ICF communications support and other communications support cannot share a communications adapter concurrently.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/34 Data Communications Manual (SC21-7703) ... IBM System/34 Interactive Communications Feature Reference Manual (SC21-7751).*

**TERMS and CONDITIONS:** See PP Index

**Ordering Information:** Contact IBM.

## PROGRAM PRODUCTS

**SYSTEM/34 SYSTEM SUPPORT PROGRAM - SSP  
FINANCE SUBSYSTEM (Feature #6010, #6011)****PURPOSE**

The IBM System/34 System Support Program Finance Subsystem, operating with the Interactive Communications Feature (ICF), can communicate with the IBM 3601 Finance Communication Controller, 4701 Finance Communication Controller, and 3694 Document Processor.

**DESCRIPTION**

**3694 Document Processor:** Communications with the 3694 is in batch mode via SDLC. The Check Processing Executive (CHX/3694) licensed program (5748-F53) must be used in the 3694. User applications must be written for the System/34 to receive the Allitems File from the 3694 and to transmit the User Edit Routines, Statement Sort Tables and Cycle Sort Tables to the 3694. See the CHX/3694 page for a list of the manuals that will be necessary to write the System/34 application program to communicate to CHX/3694.

**3601/4701 Finance Communication Controller:** The Finance Subsystem allows a System/34 to communicate with 3601s and/or 4701s via SDLC. A controller application program (none provided as part of this subsystem) can send procedure start requests to the System/34. Once a program is loaded in the System/34, the Finance Subsystem allows program-to-program communication between the controller and the System/34. The 3601 or 4701 will provide control for the devices attached to it and they will appear as command-capable work stations to the System/34. See the M36XX and M47XX pages for the devices that are supported by these controllers.

The Finance Subsystem uses the workstation interface which ICF supports. This interface shields the user application from the System/34 and 3601/4701 communication protocol requirements. RPG II, COBOL, and Assembler languages can be used with the Finance Subsystem.

**Diskette Transfer Utility:** The Finance Subsystem includes a diskette transfer utility which is used to support 3601 installations. Application programs that reside in a 3601 will be generated on a System/370, 303X, or 4300 which has been configured to support the 3600 Finance Communication System. A set of service programs (included in the System/370, 303X, or 4300 support) will produce a file which can be loaded into the System/34 through existing utilities. The file can then be communicated to the 3601 through the diskette transfer utility. The 3601 uses the data to create an operational diskette for use when the 3601 is IPLed.

**DES Subroutine:** Data encryption/decryption capability is provided in the DES subroutine which can be used in an RPG II, COBOL, or Assembler program. The DES subroutine complies with the United States Federal Information Processing Data Encryption Standard (DES) algorithm. The DES subroutine is used in conjunction with an application program (such as 5798-RDP) to generate Personal Identification Numbers (PINs) for use with the 3624 Consumer Transaction Facility.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for installation and use of this licensed program and for providing the application program which resides in the 3601, 3694, or 4701.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/34 Finance Subsystem requires a minimum main storage size of 96K bytes. A communications adapter (#2500, #3500, or #4500) is required on the System/34.

**Note:** The IBM System/34 Finance Subsystem provides support for only a subset of the total IBM 3601/4701 communication protocols. The application program in the IBM 3601/4701 must conform to this subset.

The IBM 3601s, 3694s, and 4701s can be multidropped on the same communications line (16 devices maximum) and they may co-reside with remote IBM 5251 Display Stations and/or IBM System/34s that are configured as secondary SDLC devices.

**SOFTWARE REQUIREMENTS**

The IBM System/34 Finance Subsystem is an optional feature of the System/34 SSP. Prerequisite: SSP-ICF (#6000, or #6001) must also be installed for the Finance Subsystem to operate.

**Support Programs:** The following programs have been developed to support installations of the Finance Subsystem:

- IBM 3600 Online Terminal Support for System/34 FDP (5798-RAA).
- IBM 4700 Online Terminal Support for System/34 PRPQ (5799-BGB).

- IBM System/34 Application Support for the IBM 3624 Consumer Transaction Facility FDP (5798-RDP).
- IBM 3694 Check Processing Executive/General Support
  - Document Control Section Edit FDP (5798-RFL)
  - Table Preparation Facility FDP (5798-RFK)
  - Allitems File Translation Facility FDP (5798-RJF)

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM System/34 Interactive Communications Feature Reference Manual* (SC21-7751).

**TERMS and CONDITIONS:** See PP Index

**Ordering Information:** Contact IBM.

**PRECONFIGURED SYSTEM/34  
SYSTEM SUPPORT PROGRAM SUBSET  
5726-SS2**

**PURPOSE**

The Preconfigured IBM System/34 System Support Program Subset (SSP) provides the following Release 7 subset of the 5726-SS1 control program capabilities:

- Single Program/Multiple Program Modes
- Input Job Queue
- Main Storage Management
- Disk File Sharing for Input, Update, and Add
- Operation Control Language
- System Utilities
- Data Management
- System History Area
- Print Spooling
- User Access to Spool File
- Interrupt/Resume
- Multiple User Library Support
- Operator ID and Password Security to the File/Library Level
- Control Program Support for Compilers and Utilities
- Support for Directly Attached Display Stations and Printers (one to four displays and one or two 5256 Printers and one or two 5225 or 5224 Printers)
- Support for either 1920- or 960-Character Displays. These cannot be intermixed.

**DESCRIPTION**

**Single Program/Multiple Program Modes:** The System/34 may be used in the single program mode which is very similar to the operation of a System/32. When the SSP is in the single program mode, only one operator enters commands and OCL. The programs invoked by the OCL execute one at a time, in sequence, in a single region.

In order to use single program mode, the user must select this option during/at each Initial Program Load (IPL). When in single program mode, the user still has support for functions such as printer spooling, job menus, user libraries, and interrupt/resume.

The display stations attached to a System/34 are designated as command-capable. A command-capable station can be used to invoke procedures, control commands and OCL, as well as being used for data input/output in user programs. The mode of a command-display station can be changed to data mode.

A data-capable station may be used only for user-programmed data input/output, and must be acquired by a user RPG II program that has been invoked from a command station. In single program mode, there can be only one command display station.

This SSP is preconfigured to allow the System/34 to operate in the multiple program (multiprogramming) mode. Operators at multiple command-capable stations may concurrently invoke control commands, OCL, and procedures. Multiple programs can execute concurrently.

**Input Job Queue:** Multiple program mode of the SSP provides an input job queue facility. The input job queue contains a list of jobs that are to be executed in sequence concurrently with other batch or operator interactive jobs. The jobs in the queue can be placed there by any command-capable station operator or OCL procedure. The station that places the job on the queue is released from that job and, therefore, becomes available for other work.

**Main Storage Management:** The System/34 manages main storage as a pool of noncontiguous 2048-byte segments and 'swaps' programs to and from disk as required to fit an active program into main storage (a program that is inactive might, for example, be waiting for data input or a message response from a display station).

System/34 main storage management allows the total main storage required by all active tasks to exceed actual user main storage. Performance considerations will dictate to what extent user main storage may be overcommitted.

The preconfigured System/34 occupies 18K bytes of main storage. This value may be increased or decreased in 2K-byte increments by excluding spool support or changing the size of the system work area and buffers. (This system work area will automatically expand and contract to its specified size based on the system workload without user intervention.) This resident nucleus area contains SSP functions such as data management for disk, printer, and work stations; buffers for workstation I/O and printer spooling; and an SSP work area used for task control.

**Disk File Sharing:** Disk data files on System/34 may be accessed concurrently by multiple programs for input, update, or add operations. Protection of data against concurrent update by two programs is provided by locking the disk sector(s) until released by the first accessing program. An OCL parameter is provided to allow or prevent the file sharing of a specified file.

**Operation Control Language (OCL):** System/34 OCL is compatible with System/3 OCL with the following exceptions:

- A command statement which has the capability to pass parameters to the indicated procedure is used in place of the System/3 CALL.
- Capability for specifying default values for missing OCL parameters.
- Logical IF statement provides for intelligence within procedures. It is possible to execute different steps based on tests performed in OCL.
- Other differences brought about by devices and system function.

System/34 OCL is compatible with System/32 OCL with exceptions such as the following:

- Additional commands, statements, and parameters have been incorporated into System/34 OCL.
- Some operator-entered commands do not invoke OCL procedures or utility programs on System/34. Therefore, a System/32 procedure using those commands will require change.
- Some utility functions such as COMPRESS must run dedicated (that is, cannot run in multiprogramming mode with other programs). Therefore, System/32 procedures using those commands must be changed.
- System/34 in multiprogramming mode or either mode with printer spool, will not honor the System Log statement. Logging to the system history area is still performed, and messages are displayed to the operator's display screen but will not be printed as they are displayed in this mode.
- System/34 does not support offline, multivolume diskette files except on the diskette magazine drive.
- The disk file rebuild of the System/32 utilities has been replaced by an automatic disk file integrity check at IPL (optional).

OCL procedure commands and control commands are provided to support the SSP facilities and the management of a multiprogramming system. Key functions, in addition to those above, include print spool queue and input job queue management, disk file sharing control, display station and printer assignment at execution time, region size, OCL-to-program communications (in a 256-byte local data area, accessible and modifiable through OCL and user programs), reserve disk space for a job, add job names to the input queue, branch to a specific point in a procedure, specify the next menu to be shown to the operator, display user formats for input data prompting and display station to system console station communications.

**Systems Utilities:** System/34 SSP provides functions for utility programs that allocate files, rename files, generate load modules from user-created display formats, build job menus, and other common functions.

**Data Management:** This SSP provides data management support for the disk, the display, the keyboard, and printers. The support for disk also allows the user to optionally specify space for more than 200 disk files, up to a maximum of 920 on mdls XX1 to XX3 and 984 for mdls XX4 and XX5. This display station data management manages all input and output to the display stations, including the retrieval of display formats from a disk library, and merging program data prior to displaying the format on the display.

SSP utility programs fully support the diskette unit and the diskette magazine as a save/restore device. The Diskette 1 in 128- or 512-byte sector formats is supported. The Diskette 2D (2-sided double density) is supported in 256- or 1024-byte sector formats.

The diskette magazine support allows input/output operations to begin on any one of 23 specified diskettes and overflow automatically to the next diskette in the magazine, to the next magazine, or from one individual slot to the next.

**System History Area:** System/34 provides a history area on disk which contains all recently executed OCL statements and all messages issued to the log device. The messages and data may be retrieved and redisplayed on the display station or printed. Either all the OCL statements or only those originally displayed may be printed as a hard copy log of the activity of the system. Individual display station operators can display or print history file entries created only at their own display station.

Entries are time-stamped and include the job identification generated by the SSP to assist in determining the sequence of activity on the

## Preconfigured S/34 System Support Program (cont'd)

system. The user can prevent the history file from being overwritten during an Initial Program Load (IPL).

**Print Spooling:** Print spooling is supported by the SSP in either single program or multiple program mode. When spooling is active, printer output requests are intercepted and stored on disk. Spool writers are used to retrieve the print records from disk for printing. A print queue is maintained of job names whose printer data is yet to be printed, or specified as 'Retained after Printing'. System console commands are provided to start/stop, restart (at a page number), cancel, hold/release, change priority, and display jobs in the print queue. Print spooling is supported for any and all printers attached to the system simultaneously. In addition, multiple logical print files, up to 8, from a single RPG II program may be directed to one printer or separate printers.

The size of the primary spool disk file is 48 blocks. The spool intercept routine will allocate up to five additional extents if necessary. These extents will be freed up by the spool writer as they become empty.

The print spooling function can be turned off at IPL. The print spool file size can be changed at IPL.

An OCL statement is provided for use in passing parameters from the user job to print spool, such as forms alignment (yes/no), special form required, number of copies, priority, and deferred printing.

**User Access to Spool:** A utility permits spooled data to be copied to a data file which may be saved on diskettes restored for later use, and viewed on a display station.

While viewing the output, the user can elect to print a copy of the information. The entire report or selected pages can be printed without re-executing the job.

**Interrupt/Resume:** The operator may interrupt a processing program, execute another job such as inquiry into a file, and return to the processing program. Processing of the interrupted program will resume when the operator indicates the completion of interrupting activity.

**Multiple User Library Support:** The System/34 SSP provides for multiple user libraries. Parameters and OCL statements allow the user to specify a library name. If the library name is not specified, the default is to the system library (#LIBRARY).

**Operator ID and Password Security to the File/Library Level:** Each operator who signs on to a System/34 display station is prompted for an identification and, optionally, a password. This data is then checked by the SSP before allowing the operator any further access to the system.

Also, files and program libraries can be restricted to authorized users. These users can be further classified by type of use. An option allows the creation of audit entries in the system history area for each use of a secured file/library.

**Control Program Support for Compilers and Utilities:** This SSP provides control program services for RPG II Subset (5726-RG2), BASIC Subset (5726-BA2), and Utilities Program Product Subset (5726-UT2). Included are disk data management, printer and spooling support, program library maintenance, OCL and procedure support and main storage allocation and management.

The language compilers and utilities function like user batch programs. In a multiprogramming environment, multiple copies of a compiler or utility may operate concurrently if necessary resources are available.

**Support for Directly Attached Display Stations and Printers:** This SSP allows the System/34 to support a maximum of four 5251 mdl 1 or mdl 11 displays or two 5252 displays and up to two 5256 printers and up to two 5225 (or 5224) printers as locally attached devices. Remote device support is not provided.

**Support for Either 1920- or 960-Character Displays:** When using this system support, the System/34 supports up to four, either 1920- (5251 mdl 11) or 960- (5252 or 5251 mdl 1) character display stations, but not a mixture. All SSP display formats will be supported on either display size. Some formats (such as message displays) will present fewer lines when output is directed to 960-character display.

**Configuration of the SSP:** The software automatically configures itself during the first IPL after the system has been copied to the system disk. Workstation IDs and addresses are fixed. No other configuration capability is supported.

Some preconfigured values and options may be altered at IPL to temporarily select or omit functions or alter performance characteristics of the system.

The following System/34 hardware features are *not* supported by the preconfigured SSP (5726-SS2):

- All Communications Adapters
- 5211 and 3262 Line Printers
- 5250 Magnetic Stripe Reader
- 5251 mdl 2 and 12 Displays

- 1255 Magnetic Character Reader
- Multinational Character Set Feature
- Additional Work Station Adapter for 9 to 16 Local CRTs

The following optional System/34 SSP software (5726-SS1) functions are *not* supported by the Preconfigured SSP Subset (5726-SS2):

- BSC
- MRJE
- SRJE
- SNA/SDLC
- ICF Subsystem
- MICR SUBR08
- MICR SUBR25
- SMF
- Subconsole
- Checkpoint/Restart
- Remote Work Station Support
- HELP
- Extended Index Data Management
- Multinational Conversion Utility
- I-exchange (Extended 5280 Support)
- MLCA
- Auto-Call
- FORTRAN and COBOL execution
- Overlay Linkage Editor
- SSP-ICF

In addition, the system configuration function (CNFIGSSP) is not supported.

**Program Use During Customer Preinstallation Testing:** The Preconfigured System/34 System Support Program Subset (5726-SS2) is available to customers for preinstallation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

#### HARDWARE REQUIREMENTS

The Preconfigured IBM System/34 System Support Program Subset runs on all models of the System/34 containing Microcode feature #9850.

The IBM System/34 Subset licensed programs are designed to operate in an environment that includes the Preconfigured IBM System/34 System Support Program Subset (5726-SS2), or Release 7 of 5726-SS1 while it is available, or its equivalent. The SSP order should be entered via AAS at the same time as the system order.

The Preconfigured System/34 System Support Program Subset (5726-SS2) consists of parts of System/34 SSP (5726-SS1) stabilized at Release 7. No release update or enhancements are planned.

#### SOFTWARE REQUIREMENTS

There are no programming requirements for operation of the Preconfigured IBM System/34 System Support Program Subset on System/34.

#### DOCUMENTATION (available from Mechanicsburg)

*Preconfigured System/34 Planning and Installation Guide (GA21-9799) ... Preconfigured System/34 System Support Program Subset Licensed Program Specifications (GC21-9032) ... System/34 Installation Manual - Physical Planning (GA21-9242) ... System/34 Introduction (GC21-5153) ... System/34 Planning Guide (GC21-5154) ... System/34 Command and OCL Statements Reference Summary (GX21-7690) ... System/34 System Support Reference Manual (SC21-5155) ... System/34 Operator's Guide (SC21-5158) ... System/34 Displayed Messages Guide (SC21-5159) ... System/34 Installation and Modification Reference Manual (SC21-7689) ... System/34 Master Index (SC21-7739) ... System/34 Concepts and Design Guide (SC21-7742).*

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/34 MOTOR FREIGHT ACCOUNTING SYSTEM  
MFAS (Single Program Mode)  
5726-T21**

**PURPOSE**

**Revenue Accounting:** This application provides small to medium size general commodity or specialty motor freight carriers with a powerful aid in managing their business.

The IBM System/34 MFAS Revenue Accounting licensed program offers conventional revenue accounting functions to the small and medium size general commodity and specialty carrier in the motor freight industry. These functions are divided into the five categories of (1) Freight Bill Entry and Daily Reports, (2) Accounts Receivable, (3) Interline Payables, (4) Shipment Analysis, and (5) Owner/Operator Accounting.

The application is designed to help the general freight and specialty carrier manage revenue accounting requirements and report prime motor freight sales and operational data.

The entry of data from a coded copy of the freight bill establishes records for daily statistical reporting, accounts receivable, interline payables, shipper/consignee and interline statistics and shipment analysis.

The entry of the owner/operator accounting data produces records of owner/operator freight bill revenue, expenses, charges, advances, and settlement amounts. Owner/operator accounting will also produce settlement sheets detailing those items used in settling with the owner/operator. Owner/operator accounting is by owner and/or driver or unit.

**HIGHLIGHTS**

- Wide variety of reports and report options included:
  - Management and operational data reporting is a byproduct of normal data entry.
  - Detail or summary listings within a range of keys is supported in many reports
  - Statements for freight bill accounts receivable optionally printed on stock paper or preprinted forms with or without tear off portion for turnaround document.
- The Motor Freight Accounting System can co-reside in the System/34 with the Distribution Financial Accounting System and all application areas with the exception of owner/operator accounting can supply data to general ledger.
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
  - Clear audit trails and control techniques are provided
  - Sample user-oriented forms for data preparation, file creation, audit and control are provided
  - Security code deters unauthorized execution of programs
  - A journal reference numbering system supplies an audit trail for any area that generates transactions for the DFAS General Ledger
- Can be installed without customer programming capability:
  - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
  - File maintenance and audit procedures provided
  - Detailed Runbook
  - Step-by-step installation activity plan provided by the *Application Installation Guide*
  - User's information supplied to the supervisor by the *Application Reference Manual*

**DESCRIPTION**

The Motor Freight Accounting System is a ready-to-execute application for the small to medium size motor carrier.

The system uses the Data File Utility as its data entry approach. Support is provided for transaction entry through the System/34 keyboard or through a diskette keyed offline on a 3740 Data Entry System. The Motor Freight Accounting System Revenue Accounting licensed program can be installed with the Distribution Financial Accounting System General Ledger, Accounts Payable, and Payroll Application Program in separate steps, at different times and be an interrelated system.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a carrier's requirements. It provides the following:

- Tailoring the application on-site at installation time
- Allows the user to change the selection of provided functions as business changes
- All provided functions are included in the programs but only required functions are executed
- File sizes may be expanded or contracted as needed by rerunning the System Tailoring Procedure

The *Application Installation Guide* provides a step-by-step installation activity plan including sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. The *Application Reference Manual* provides information on the day-to-day use of the application.

The Runbook provides the operator with a detailed set of instructions showing all the activities necessary to run the procedures on a System/34. The *Procedure Reference Summary* is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly familiar with the particular procedure.

The System/34 Motor Freight Accounting System runs in single program mode. The System/34 licensed program supports only one work station, no spooling, no multiprogramming and no file sharing.

**Application Description:** The Motor Freight Accounting System is a full function, ready-to-execute application. Included are the *Application Reference Manuals*, *Installation Guide*, a Runbook, Source Code, Object Code, execution procedures, and the *Application Logic Manual*.

These are some general features which the Motor Freight Accounting System has:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort Specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline data entry through the System/34 Keyboard console or by means of diskettes keyed offline on a 3740 Data Entry System.
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files.
- Reprint options are possible because file updating is separated from report writing functions
- Selective printing options are available for many report functions

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 licensed programs is a customer responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/34 licensed program will execute in single program mode on all models of the System/34 which have 48K bytes of main storage. The programs are compiled assuming a 48K system. Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-Character Record feature (#5455) and Feature Group A (#4004).

The Motor Freight Accounting System is designed to co-reside with the Distribution Financial Accounting System. No other licensed programs or user-written programs may co-reside with these applications unless stringent coding requirements for the programs and procedures are met. The *Application Logic Manual* discusses these coding conventions.

**SOFTWARE REQUIREMENTS**

The IBM System/34 licensed programs are compiled in System/34 RPG II programming language and executed under control of the System/34 System Support Program (5726-SS1). System/34 Utilities licensed program (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility and Work Station Utility, is required for execution of the programs. The System/34 RPG II Compiler (5726-RG1) is required if modifications to the source code are necessary.

**TERMS and CONDITIONS:** See PP Index

**SYSTEM/34 UTILITIES  
5726-UT1**

**PURPOSE**

The following utilities are provided with the IBM System/34 Utilities licensed program:

- Data File Utility (DFU)
- Sort
- Source Entry Utility (SEU)
- Workstation Utility (WSU)
- Screen Design Aid (SDA)

Each display station using DFU, Sort, WSU Generator, SEU, and SDA has its own copy of the utility (multiple copies can be executing at one time). Only one copy of a specific WSU-created module can be executing at one time; however, one WSU module services multiple display stations. All models of the IBM 5251/5252 Display Stations are supported by these utilities.

**DESCRIPTION**

**DATA FILE UTILITY (DFU)**

The following disk data file management functions are provided as part of DFU:

- Data File Creation and Maintenance (Indexed Files, Sequential Files, or Direct Files)
- Data File Inquiry (Indexed Files, Sequential Files, or Direct Files)
- Data File List (Indexed, Sequential or Direct Files)

All functions of the above utility take advantage of cataloged RPG II File Description and Input Specifications. To use any of the functions, the user need only know the name of the file, a name to be assigned to the job description, and the name of the cataloged RPG II specifications. The functions will prompt for all the other information necessary to tailor the job to the user's task. Field names are included with the prompts to aid the user in selecting the data fields to be used.

Previously, DFU copied the entire field from the previous record when the DUP key was pressed in ENTER, UPDATE, or INQUIRY mode. If non-DUP characters were inserted into the field, DFU stopped copying from the previous record. In Release 8, DFU was modified to allow the operator to override 'DUP' characters in a field as required. This support enables an operator to key over a portion or all of the 'DUP' characters in a field and, upon pressing the ENTER key, have only the portions of the field containing 'DUP' characters duplicated. The remaining characters in the field will be recorded as keyed.

**Data File Creation and Maintenance:** This function provides the necessary capabilities to create and maintain Indexed or Direct data files on disk. You can only change records in an existing sequential data file. Maximum use is made of the display to prompt the operator by field name for the data to be entered. For update, the data currently in the record is displayed. Highlights include:

- Formatted Report for an Audit Trail
- Auto Duplication of Fields
- Control Totals
- Generated Keys
- Modulus 10 and 11 Self-Check Digit
- Record sequencing

**Data File Inquiry:** This function provides the necessary capability to allow inquiry into any indexed file, sequential file, or direct file. The records are displayed showing the current status of the information in the file. Highlights include:

- Retrieval by record key for indexed files and relative record number for direct files and sequential files
- The ability to roll forward or backward through the file by key sequence for indexed files, and by relative record number for direct files and sequential files
- The ability to print selected records with the 'PRINT REC' command key
- All displayed fields include column headings for easy identification

**Data File List:** This function provides the capability to list and summarize selected information from any indexed, direct or sequential file on disk. The function is very useful for obtaining one-time reports and for creating recurring management reports. Highlights include:

- Page headings including date and page number
- Column headings
- Edited data fields
- Column totals - both final and subtotals

- Selection based on record codes and/or field values
- Sort, ascending or descending, on up to five fields
- Summary list with totals only
- Retrieve and print data from a related index master file
- Calculate and print additional result fields

The System/34 DFU capabilities include the data file management capabilities of System/32 DFU. In addition, DFU and RPG II source specifications created and saved on System/32 may be loaded to a System/34 library and used to execute a comparable job on System/34.

**SORT**

The System/34 Sort utility provides the function and capability of the proven System/32 Sort. Highlights include:

- Multiple record types
- Record selection based on field contents, including by comparison to system date
- Support of all data fields except binary
- ADDROUT (Address out) Sort
- Tag Along Sort
- Summary Tag Along Sort
- Automatically allocated work file
- Sort into ascending, descending or user-defined sequence
- Reformatting of records in a file
- Dynamically adjusts to region size available

System/34 extensions include:

- Multiple input files
- Equal control field ordering
- ALTSEQ by field
- Loadable SORT interface

The Sort Control Specifications used by System/32 may be used on System/34 and will result in the same data file output.

**SOURCE ENTRY UTILITY (SEU)**

SEU can be used to create and maintain OCL procedures, display format specifications, 1255 control specifications, RPG II, Auto Report, WSU, Display Formats, FORTRAN, Assembler and source statements. Highlights include:

- Display Formats are provided for the fixed-format statements (for example, RPG II, WSU) to aid in key entry of fields.
- Free-form display format for any statements to be entered.
- User-defined display formats may be used.
- Optional RPG II and Auto-Report syntax checking.
- Optional resequencing of statements in library.
- The ability to move statements in a member.
- The ability to include statements from any source or procedure library member in the system or user library.
- The ability to delete statements.
- Statement insertion.
- Rolling forward or backward through cataloged statements.
- Optional listing of statements.
- Use of display to show statement being entered or updated.
- Scan capability controlled by a character mask.
- Global replace option

With Release 8 modifications, SEU has been changed to default the number of lines per statement and the roll factor to 16 for 1920-character displays, and to 4 for 960-character displays. Previously, the default values were 8 and 2, respectively. This change allows viewing of a larger segment of the displayed source at one time.

**WORKSTATION UTILITY (WSU)**

WSU provides an easy-to-use set of specifications for defining interactive data entry programs which support one or more display stations. Specifications describe the following program variables:

- Job (name, number of workstations, region size)

### S/34 Utilities (cont'd)

- Optional Transaction File (a special direct organization disk file created and managed by WSU to contain key entered records)
- Master Files (up to 20 disk files accessed or updated by the program)
- Display Formats (formats to be displayed on the 5251 Display Stations to prompt for data entry and/or display error messages)
- Calculations (the arithmetic, logical edit or I/O operations to be performed in conjunction with the entry of data in response to a display format)
- RPG II File Description and Input specifications are referenced for a description of the transaction and master files.

The WSU specifications are processed by the WSU Generator and the SSP Screen Format Generator Routine (\$SFGR utility) to produce:

- An object definition module to be executed by WSU when the job is invoked.
- Display Formats
- System/34 OCL procedures to control execution of the job when invoked.

#### Highlights

- Logical combination of display format description and calculation specifications.
- Automatic management of the transaction file with each workstation's records logically separate.
- Operator review, correction and insertion of transactions.
- Each operator may sign-on, sign-off, and resume entry independently.
- Recovery of the transaction file after system failure is provided.
- Different WSU-generated programs may be executing concurrently.
- WSU programs execute as MRT (multiple requester terminal) programs to optimize performance.
- WSU programs will dynamically adjust to larger region size to reduce overlay fetches from disk or to smaller execution region size if memory needs to be constrained.
- The number of active workstations can vary and is transparent to programmer-supplied logic.
- WSU allows the user to specify display formats using a variable starting line number.
- Masking of Command and Function Keys.
- Capability to access the originating workstation ID for a transaction.
- Options at generation to replace existing programs, control portions of the output listing, and suppress OCL generation.
- Random additions to indexed master files
- Online debugging via DEBUG operation code
- WSU transaction file update capability (SUBR22)
- WSU edit date fields greater than 6 characters
- WSU optional 'SR' in subroutines

#### SCREEN DESIGN AID (SDA)

SDA provides an interactive approach to designing, creating and maintaining display formats and job menus. Increased productivity can result by eliminating the amount of clerical work associated with coding specification sheets, transcribing source code, and correcting transcription or coding errors.

#### Highlights

- Create a new WSU/SFGR source specification member.
- Add new WSU/SFGR source specifications to an existing member.
- Update entire formats in an existing WSU/SFGR source member.
- Delete entire formats from a source member.
- Update, insert and delete individual source specifications via SEU.
- Display formats in an SFGR LOAD member.
- Create and update MENUs and their associated source members.
- Create from an SFGR source member an RPG II skeleton program to use the formats.
- Help function which displays text describing the use of SDA.
- Generation of WSU programs for master file inquiry, maintenance, or transaction file creation.

- Field level syntax checking.
- Random format update.
- Optional source specification sequencing.

**Program Use During Customer Pre-Installation Testing:** The System/34 Utilities licensed program (5726-UT1) is available to customers for pre-installation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

#### SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

##### HARDWARE REQUIREMENTS

The IBM System/34 Utilities licensed program runs on all models of the System/34. Each of the five programs in the Utilities licensed program requires a minimum of 14K (14,336) bytes of main storage. Sort, DFU and WSU will take advantage of additional main storage if it is available.

##### SOFTWARE REQUIREMENTS

The current release of the IBM System/34 Utilities licensed program operates under control of the current release of IBM System/34 System Support licensed program (5726-SS1).

##### DOCUMENTATION

(available from Mechanicsburg)

*System/34 Utilities Program Product Licensed Program Specifications (GC21-7659) ... System/34 Workstation Utility Reference Manual (SC21-7663) ... System/34 Data File Utility Reference Manual (SC21-7656) ... System/34 Source Entry Utility Reference Manual (SC21-7657) ... System/34 Sort Reference Manual (SC21-7658) ... Workstation Utility Debugging Template (GX21-7697) ... System/34 Screen Design Aid Programmer's Guide and Reference Manual (SC21-7716)*

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/34 UTILITIES SUBSET  
5726-UT2**

**PURPOSE**

This program is intended to support the Preconfigured IBM System/34 System Support Program Subset (5726-SS2).

The following utilities are provided with this Utilities Program Subset:

- Workstation Utility (WSU) Execution Support
- Data File Utility (DFU)
- Sort
- Source Entry Utility (SEU)

Each display station using DFU, Sort, and SEU has its own copy of the utility (multiple copies of the same utility can be executing at one time). Only one copy of a specific WSU-created module can be executing at one time; however, one WSU module can service multiple display stations.

**WORKSTATION UTILITY (WSU) EXECUTION SUPPORT**

Data entry, update, and inquiry programs written in WSU can be executed using this support. Generation support for WSU is provided with Release 7, 5726-UT1 and 5726-SS1.

**Highlights**

- Each operator may sign-on, sign-off, and resume entry independently.
- Recovery of the transaction file is provided after a system failure.
- Different WSU programs may be executing concurrently.
- WSU programs execute as multiple requester terminal (MRT) programs to optimize performance.
- WSU programs will automatically adjust to a larger execution region size to reduce overlay fetches from disk or to a smaller execution region size if memory needs to be constrained.
- The number of active workstations can vary and be transparent to the programmer-supplied logic.

**Utilities to support:**

- Copy a file, changing the record length
- Extract specific records from a file
- Rebuild a WSU transaction file

**DATA FILE UTILITY (DFU)**

The following disk data file management functions are provided as part of DFU:

- Data file creation and maintenance (indexed files, direct files)
- Data file inquiry (indexed files, sequential, or direct files)
- Data file list (indexed, sequential or direct files)

All functions of the above utility take advantage of cataloged RPG II File Description and Input Specifications. To use any of the functions, the user need only know the name of the file, a name to be assigned to the job description, and the name of the cataloged RPG II specifications. The functions will prompt for all the other information necessary to tailor the job to the user's task. Field names are included with the prompts to aid the user in selecting the data fields to be used.

**Data File Creation and Maintenance:** This function provides the necessary capabilities to create and maintain indexed or direct data files on disk. Maximum use is made of the display to prompt the operator by field name for the data to be entered. For update, the data currently in the field is displayed. Highlights include:

- Formatted report for an audit trail
- Auto duplication of fields
- Control totals
- Generated keys
- Modulus 10 and 11 self-check digit
- Record sequencing

**Data File Inquiry:** This function provides the necessary capability to allow inquiry into any indexed file, sequential file or direct file. The records are displayed showing the current status of the information in the file. Highlights include:

- Retrieval by record key for indexed files and relative record number for direct files and sequential files
- The ability to roll forward or backward in key sequence for indexed files and by relative record number for direct files and sequential files
- The ability to print selected records with the 'PRINT REC' command key

- All displayed fields include field headings for easy identification

**Data File List:** This function lists and summarizes selected information from any indexed, direct, or sequential file on disk. The function is very useful for obtaining one-time reports and for creating recurring management reports. Highlights include:

- Page headings including date and page number
- Column headings
- Edited data fields
- Column totals - both final and subtotals
- Selection based on record codes
- Selection based on field content
- Sort, ascending or descending, on up to five fields
- Summary list with totals only
- Calculation on record fields to obtain result fields
- Retrieve and print data from a related index master file
- Calculate and print additional result fields

The System/34 DFU capabilities include the data file management capabilities of System/32 DFU. In addition, DFU and RPG II specifications created and saved on System/32 may be loaded to a System/34 library and used to generate and execute a comparable job on System/34.

**SORT**

System/34 Sort provides the function and capability of the System/32 Sort. Highlights include:

- Multiple record types
- Record selection based on field contents, including by comparison to system date
- Support of all data fields except binary
- ADDRROUT (tag) sort
- Tagalong sort
- Summary tagalong sort
- Automatically allocated work file
- Ascending, descending, or user-defined sequence
- Dynamically adjusts to region size available
- Reformatting of records in a file

System/34 extensions include:

- Multiple input files
- Equal control field ordering (file merge)
- ALTSEQ by field

The Sort Sequence Specifications used by System/32 can be used on System/34 and will result in the same data file output.

**SOURCE ENTRY UTILITY (SEU)**

SEU can be used to create and maintain OCL procedures, RPG II, display screen formats, and sort source statements. Highlights include:

- Display Formats for the fixed-format statements (for example, RPG II) to aid in key entry of fields.
- Free form display format for any statements to be entered.
- User-defined display formats may be used.
- Optional RPG II syntax checking.
- Optional sequencing of statements in a member.
- The ability to move statements in a member.
- The ability to include statements from another source or procedure library member in the system or user library.
- The ability to delete statements.
- Statement insertion.
- Rolling forward or backward through cataloged statements.
- Optional listing of statements.
- Use of display to show statement being entered or updated.
- Scan capability controlled by a character mask.
- Global replace option



PROGRAM PRODUCTS

**S/34 Utilities Subset (cont'd)**

The following System/34 Utilities (5726-UT1) functions are *not* supported:

- WSU compilation
- SDA Screen Design Aid

**Program Use During Customer Pre-installation Testing:** The IBM System/34 Utilities Subset (5726-UT2) is available to customers for pre-installation testing on IBM Test Center systems in accordance with IBM's Program Testing Policy.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

This IBM System/34 Utilities Subset runs on all models of the System/34 supported by 5726-SS2. Sort, DFU, and SEU require a minimum of 14K (14,336) bytes of main storage. Sort and DFU will take advantage of additional main storage if it is available. WSU programs may require more memory than is available on a minimum system.

**SOFTWARE REQUIREMENTS**

This IBM System/34 Utilities Subset (5726-UT2) operates under control of the IBM Preconfigured System/34 System Support Program Subset (5726-SS2), or Release 7 of 5726-SS1 while it is available, or its equivalent.

The System/34 Utilities Subset (5726-UT2) consists of parts of System/34 Utilities (5726-UT1) stabilized at Release 7. No release update or enhancements are planned for System/34 Utilities Subset (5726-UT2).

**DOCUMENTATION**

(available from Mechanicsburg)

*System/34 Utilities Subset Licensed Program Specifications (GC21-9033) ... System/34 Data File Utility Reference Manual (SC21-7656) ... System/34 Source Entry Utility Reference Manual (SC21-7657) ... System/34 SORT Reference Manual (SC21-7658) ... Workstation Utilities Reference Manual (SC21-7663).*

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**IBM SYSTEM/34 BUSINESS MANAGEMENT  
ACCOUNTING SYSTEM**

General Ledger	5726-XBB
Accounts Payable	5726-XBC
Accounts Receivable	5726-XBA
Payroll	5726-XBD
Inventory Accounting	5726-XB9
Billing	5726-XB8

**PURPOSE**

These multi-industry licensed programs are written in System/34 BASIC programming language and are an extension of the Business Management Accounting System programs with accounting functions that are identical to those available for Datamaster. The IBM System/34 Business Management Accounting System licensed programs provide the user with powerful tools to perform business accounting while providing additional management information. The programs contain functions applicable to a wide range of industry classifications.

The program design provides an accounting base of information and incorporates a flow of information in terms that are familiar to the user. This base of information is then available to improve productivity through the managerial reporting provided by the programs. The fundamentals of accounting provided by the applications give the entry level user the benefits of an automated accounting system without the expense or requirement of a programming staff.

**HIGHLIGHTS**

- Master Menu displays all applications installed.
- Programs and procedures required to run the applications will reside in the application library on disk. Master files, interface files, data entry files and work files will also be disk resident.
- Built-in auditability and control characteristics through the use of familiar five-column journals, sequential journal numbering and inter-application data integrity.
- Program documentation is designed to promote customer self-sufficiency during installation and operation.
- The Atlanta National Market Support Center (formerly the ACSC) provides a direct customer toll free number for questions related to installation and operation of these applications.
- Ease-of-use is enhanced through:
  - Menu driven task selection
  - Consistent data entry programs and procedures for all applications
  - Common file maintenance techniques including user-defined field defaults
  - Use of generally accepted accounting terminology
- Installation-time tailoring options allow the user to select key functions and perform file sizing.
- A program update (PTF) procedure is provided to aid the operator in applying program updates provided by the Atlanta National Market Support Center (ANMSC) or the Program Information Department (PID).
- System/34 BRADS file definitions are provided with the applications for selected master files.
- Optional security code by application for each company.
- Multi-company support.
- File sharing capability supporting concurrent operations for any workstations signed on to that company.
- Full screen file load is provided to support loading of the customer master, item master and item balance files.

**DESCRIPTION****IBM SYSTEM/34 GENERAL LEDGER (5726-XBB)**

The IBM System/34 General Ledger application is a multi-industry application designed to accomplish the basic accounting functions of posting journal entries to the General Ledger, generating financial statements, and producing special journals. The programs are based on double entry accounting principles in accordance with generally accepted accounting practices. Transactions may be directly entered as general journal entries and also received as summary entries from the IBM System/34 Billing, Accounts Receivable, Payroll and Accounts Payable applications, if installed.

**Functions and Features**

- Calendar-driven 1 to 13 period support
- User-defined fiscal year
- Optionally combined financial statements for multiple companies
- User-defined statement formatting

- Special journal capabilities which allow the user to tailor journal formats
- Previous year history maintained for comparative statements
- Budget and encumbrance support
- Annual ledger capability
- Page width option allowing statements on 8-1/2 x 11 paper
- Future fiscal year posting
- Automatic year-end closing.

**IBM SYSTEM/34 ACCOUNTS PAYABLE (5726-XBC)**

The IBM System/34 Accounts Payable application is a multi-industry offering designed to assist the user in controlling the outflow of cash and maintaining accurate records of liabilities to trade and other vendors. Payable items are handled on an accrual basis and vendor analysis reporting allows the user to determine key purchase volumes and discounts taken or lost for the current and previous year. Summarized journal information can be passed to the IBM System/34 General Ledger application, if installed.

**Feature and Functions**

- Allows one-time vendor checks
- Cash discount by percent or amount on invoice total or line items
- Supports multiple General Ledger distributions per invoice
- Payment selection by due date and/or by vendor/invoice
- Partial payment support
- User-defined excessive check amount warning
- Debit memos available
- Vendor open-item inquiry
- Manual checks
- User-tailorable five-column Purchase and Cash Disbursement Journals
- Default General Ledger distribution by vendor
- Default vendor cash discount percent
- Check reversals

**IBM SYSTEM/34 ACCOUNTS RECEIVABLE (5726-XBA)**

The IBM System/34 Accounts Receivable application is designed to assist the user in managing one of the most important assets of a business--the money owed by its customers. This multi-industry offering provides timely information to help improve cash flow, and reduce bad debt losses through control of accounts receivable. Invoice transactions can be entered directly into the Accounts Receivable application and also received from the IBM System/34 Billing Application. Cash Receipts and Adjustment transactions are entered through the Accounts Receivable data entry menu option. Accounts Receivable can also pass summarized accounting information to the IBM System/34 General Ledger Application, if installed.

**Functions and Features**

- Supports entry of non-Accounts Receivable cash such as vending machine receipts
- Open Item or Balance Forward account type selection by customer
- Cash and COD sales support
- Partial and over payment of invoices
- Statement selection by customer
- Supports invoices with future due dates
- Current plus four past due periods
- Optional late charges by customer
- Consolidated statements for multi-branch companies
- Interactive cash entry for open item customers
- User-tailorable five-column Sales and Cash Receipts and Adjustment Journals
- Full screen file load is provided to support loading a large volume Customer Master file.

PROGRAM PRODUCTS

**S/34 Business Management Accounting System (cont'd)**

**IBM SYSTEM/34 PAYROLL (5726-XBD)**

The IBM System/34 Payroll application is a multi-industry solution that performs basic payroll computations and produces payroll checks with earnings statements and supporting reports. Both hourly and salaried payroll processing is supported. Individual earnings may be taxed for up to three taxing jurisdictions per time and adjustment transaction. Summarized accounting information can be transferred to the IBM System/34 General Ledger application, if installed.

**Features and Functions**

- Weekly, bi-weekly, semi-monthly and monthly pay frequency
- Shift differentials as a percent of employees hourly rate or a fixed dollar amount
- Hourly, exempt and non-exempt salaried employees
- Payroll calculations provided for:
  - Gross Pay
  - Federal Income Tax (FIT)
  - Federal Insurance Contributions Act (FICA)
  - State and Local Taxes
  - State Disability Insurance (SDI)
  - Federal Unemployment Tax Act (FUTA)
  - Earned Income Credit (EIC)
  - Net Pay
- Taxable and non-taxable adjustments
- Automatic deduction based on:
  - Percent of taxable gross
  - Rate per hour worked
  - Flat dollar amount per pay period
- Resetting deductions (i.e., bonds)
- Automatic benefits (with optional maximums) can be calculated using the same algorithms used for automatic deductions
- Separate checks available for vacation and bonus payments
- Tip accounting with optional minimum hourly guarantee
- Workmen's compensation worksheet
- Detailed earnings and deductions shown on earnings statement

**IBM SYSTEM/34 INVENTORY ACCOUNTING (5726-XB9)**

The IBM System/34 Inventory Accounting Application offers management reports which help the user to optimize inventory levels. Up-to-date reports reflecting stock movement, on-hand positions, sales and cost information enhance purchasing decisions. The Inventory Accounting application can receive summarized sales information from the IBM System/34 Billing application.

**Features and Functions**

- Support for up to three warehouses per item
- Broken-case handling
- Pricing conversion
- Both returns and allowances supported
- Maintains both average and last cost for an item
- Both stock movement and financial information maintained
- Suggested reorder quantities based on user supplied:
  - minimum balance
  - maximum balance
  - lead time
  - pack size
  - vendor minimum
- Item inquiry including both item master and item balance information
- Inventory analysis based on sales, cost and profit amounts
- Full screen file load is provided to support loading large volume Item Master and Item Balance files.

**IBM SYSTEM/34 BILLING (5726-XB8)**

The IBM System/34 Billing Application is a multi-industry billing application providing the user with the ability to create invoices for customer orders already picked and shipped. Customer and item names, prices and tax information are automatically retrieved from the Billing Application master files during invoice entry. Summarized data is optionally available to the IBM System/34 Accounts Receivable, General Ledger and Inventory Accounting Applications, if installed.

**Features and Functions**

- Post billing

- Selective printing of invoices
- Five standard prices
- Pricing conversion
- Broken-case pricing
- Flexible terms and invoice discounts
- Federal excise tax
- Special charges and comments
- Credit memo support with returns and allowances
- Billing on non-inventory items
- Cash and COD sales
- Invoices for one-time customers
- Up to three sales taxes per invoice, maximum of 50 taxing bodies
- Optional profit tear strip on invoices
- User-tailorable five-column Sales Journal
- Data entry overrides of master file data
- Full screen file load is provided to support loading large volume Customer Master and Item Master files.

**PROGRAM DOCUMENTATION**

The documentation provided for each application is designed to help the user understand, install and operate the application. The materials are consistent in size and format with the IBM System/23 Datamaster publications and:

- Introduce new application users to automating typical business tasks in a way that invites use, reinforces efforts to learn and use, and builds confidence and willingness to reuse after learning
- Are written in "friendly", user-oriented language
- Are visually attractive with multi-color printing
- Are small in size to be usable in a space-limited work area
- Are presented in a step-by-step task fashion that guides the user through installation and operation
- Are designed to assist in communication with the Atlanta National Market Support Center (ANMSC)
- Provide tables of contents along with master indexes (one per application) that pinpoint information

The following materials are available for each application.

**Introducing**

This book is intended for all users of the application. The owner/executive, installer, operator, user department, programmer and consultant can use this book as their first source of information about the application. The book is designed to be a general introduction to how the application fits within the user's business.

**Learning**

This learning package consists of a book, cassettes, and a sample data files diskette. The learning consists of separate exercises which guide the operator through aspects of daily operations in a very step-by-step fashion. The learning package refers the operator to specific sections of the Running book so that, in addition to application training, the operator becomes familiar with the format of the Running book.

**Installing**

This book details the steps to follow in installing and tailoring the application, collecting and recording the data, entering it, and scheduling operator training.

**Running**

This book contains information the operator needs in order to run the application.

**Using**

This package contains a book and a forms pack. The book is intended primarily for user department personnel who are not System/34 operators. It has the information required by the user to:

- Prepare input for submission to the operator
- Analyze reports
- Submit changes to files
- Aid in using the reports to help manage the business
- Understand alternative uses of the reports

The forms pack contains reproducible camera ready copies of all input forms, preprinted IBM forms, and any control logs peculiar to that application that are required to install and run the application. Instructions for using the forms are printed on the back of each form. The



PROGRAM PRODUCTS

**S/34 Business Management Accounting System (cont'd)**

forms in the forms pack are on 8-1/2" x 11" paper. The customer can order additional forms from a printer or IBM's System Supplies Division. Preprinted forms will be documented in actual size for the user to provide to his printer.

**Messages**

Messages for each application are printed as separate pages which are delivered with each application library.

**Application Program Manual**

A separate application program manual is available as optional material. It contains record formats, logic flows, and other technical information to be used primarily by the experienced BASIC programmer interested in understanding the detail design of the application.

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

The customer is responsible for error detection and analysis, and submission of APARs.

IBM Central Service is responsible for the development and distribution of program fixes, but the customer has the responsibility to apply fixes to the program.

Note: Where changes in Law or Industry Standard (local or national) change program function requirements on delivered programs, IBM may furnish program changes, but it is not obligated to make these changes available. References to tax reports and calculations for the System/34 Disk Business Management Accounting System applications reflect the 1982 version of the tax law.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM System/34 Business Management Accounting System Programs (General Ledger, Accounts Payable, Accounts Receivable, Payroll, Inventory Accounting, and Billing) are written in BASIC and operate on an IBM System/34 with the following minimum configuration:

- 1 - 5340 System Unit Model D21 (8.6 megabytes of disk storage, 2D diskette and 96K bytes of main storage)
- 1 - System printer, either a serial printer or a line printer with a 96-character belt
- 1 - 5251 Display Unit (Model 11 or Model 12)

**SOFTWARE REQUIREMENTS**

The System/34 Business Management Accounting System Programs are written in System/34 BASIC programming language, and execute under control of:

- System/34 System Support Program - (5726-SS1 Release 7 or later)
- System/34 BASIC - (5726-BA1)
- System/34 Utilities - (5726-UT1)

or

- Preconfigured System/34 System Support Program Subset - (5726-SS2)
- System/34 BASIC Subset - (5726-BA2)
- System/34 Utilities Subset - (5726-UT2)

System/34 Utilities (5726-UT1 or 5726-UT2), which include SORT, are required for execution.

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

## PROGRAM PRODUCTS

**SYSTEM/34 JOB ANALYSIS SYSTEM  
JAS/34 (5726-XP1)****PURPOSE**

The IBM System/34 Job Analysis System (JAS/34) is a powerful aid to management for planning, scheduling, supervising, and controlling project-oriented work through the use of the critical path method. Designed to be easily used by non-technical personnel, the JAS/34 functions consist of an interactive data entry processor, network processor, and a report processor.

**HIGHLIGHTS**

- Front-to-back interfacing of up to 10 subnets to form a network with up to 14,720 activities.
- Accommodates up to 10 subnets per master file.
- Allows interactive creation of JAS/34 input records.
- Handles interactive correction of JAS/34 input records.
- Provides for interactive insertion of additional JAS/34 input records.
- Supports up to eight workstations by the interactive data entry processor.
- Handles up to 32 calendars.
- Has four types of time relationships between work items.
- Offers multiple starts and ends.
- Modifies reports easily modifiable.
- Progress reporting specifying actual start date and/or remaining duration.
- Provides levels of milestones.

**DESCRIPTION**

Interaction between the user and the interactive data entry processor will be provided by a series of workstation display screens to which the user responds by entering the data requested on the screen. When appropriate, flow from screen to screen will be automatic, or under user control. Data entry may also be accomplished by using batch input records entered via the Source Entry Utility (SEU) or entered via an IBM 3741 from a diskette created offline.

JAS/34 can handle up to 1,472 activities or work items and relationships per subnet, depending on region size. To get maximum flexibility, control records are used. JAS/34 is written in the System/34 Assembler language.

**CUSTOMER RESPONSIBILITIES**

All users should know the various features of this system before attempting to use it for actual project control. Users will need to know the fundamentals of the critical path technique before they can prepare input.

The customer must describe the activities which form the project network. This data may be recorded on diskettes for entry into the System/34 using a 3740, or it can be entered directly from the keyboard using the Source Entry Utility, or it can be entered with guidance from the system by using the interactive data entry processor.

The customer should provide for safekeeping of the diskette to ensure his continued operation (back-up). A *User's Guide* will also be provided. Procedure for installation will be furnished.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The interactive data entry processor requires a minimum of 24K bytes of main storage and, therefore, requires an IBM System/34 with at least 48K bytes of main storage. All other modules of JAS/34 require a minimum of 14K bytes of main storage and, therefore, will run on any model of the IBM System/34 which has a 14K region available. JAS/34 will take advantage of additional main storage if it available.

**SOFTWARE REQUIREMENTS**

JAS/34 must be used under control of the IBM System/34 System Support Program (5726-SS1). The IBM System/34 Utilities (5726-UT1) are required.

If assembly of the source machine-readable material is desired, the IBM System/34 Basic Assembler and Macro Processor (5726-AS1) is required.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/34 Job Analysis System (JAS/34) Proposal insert (G280-0040) ... Promotional Brochure - For the project managers: A tool from IBM to help with planning, estimating and scheduling (G580-0134) ... IBM System/34 Job Analysis System (JAS/34) General Information Manual (GH30-0511).*

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

**WORK STATION SEARCH FACILITY/34  
FOR THE SYSTEM/34 (WSF/34)  
5726-XR1**

**PURPOSE**

The Workstation Search Facility/34 provides System/34 Workstation users with a powerful tool to search disk files rapidly for records meeting terminal user-selected search criteria. This facility is designed to be used as a means of selecting records for further processing by user-written inquiry, file maintenance, order entry, and other programs. This offering will allow the user to define the searches required that will best aid the organization.

WSF/34 is applicable to any industry classification. Manufacturers and distributors can use the facility for customer and item searches; hospitals for patient or guarantor; schools for student lookups, etc.

**HIGHLIGHTS**

- Reduces the need for alphabetically sorted master file listings.
- Ease-of-operation allows non-DP personnel within the organization to search their files for information.
- Keyword in Context (KWIC) technique for searching alphabetic fields without requiring data base changes by the user. Blanks and special characters (if preceded or followed by a blank position) are considered delimiters.
- User-defined literals are excluded during the index creation process (for example, THE, AND, CO, INC, etc.)
- Use of up to eight-character search argument with null characters within the argument. This facility may be used in those cases where the exact spelling of the search criteria is unknown.
- Use any combination of six logical search operators (equal, less than, less than or equal, greater than, greater than or equal, or not equal).
- AND/OR logic to define the relationship between the primary, secondary and tertiary searches.
- Both 960- and 1920-character screens are supported and are workstation independent.
- Indices may be created without knowing the data processing file structure, and all standard System/34 data file organizations are supported.
- Optional user-defined security passwords to prevent unauthorized use of searches
- Creation of up to 13 cross-reference indices per tailoring session for fast searching of high use data fields.
- Supports all data field formats with the exception of binary fields.
- Displays up to 20 matches at a time.
- Allows forward and backward paging, termination of a search or start of a new search at any time.
- Second level display on a selected line provides additional data from the selected master record. This screen displays unformatted data directly from the record.
- User-oriented tailoring procedure that will allow the user to easily define the required searches and then will generate the required RPG II source programs and required OCL and invoke the required compiles and execution of the index creation program.

**DESCRIPTION**

WSF/34 (5726-XR1) is an application product designed to process System/34 disk records. It is a cross-industry offering and will execute in conjunction with licensed program and non-licensed program users.

The operator will define through an interactive workstation session the search required, up to 76 characters of information to be displayed on matching master records. Additionally, information such as the name of the file, record size and approximate number of records will be required. The Application Reference/Runbook will provide the operator with an explanation of the required and optional fields to be entered during this session. Each response will be edited as the information is entered.

The offering can reduce the need for referencing voluminous printed reports by displaying up to 20 records at a time that meet search criteria. If more than 20 records meet the criteria, the screen display can be paged forward or backward to allow a review of all matched records. Also, when the desired record is displayed, you can select to have the entire contents of the record, as it appears on disk, to be further displayed.

The WSF/34 application consists of four programs: An interactive entry/edit program, a tailoring program, and two skeletal programs which, when copied and modified by the tailoring program, provide user unique Index-build and Search programs.

The first segment consists of two programs. The first is an interactive entry/edit program in which unique tailoring answers to three or more displays are supplied. The second is a tailoring program that uses these

answers to modify the two skeleton source programs of the other two segments, and also creates operational procedures that are self-initiating. The first and second segments will be run sequentially as one session if the user does not want to modify the source prior to compilation. The sequential operations of this session would be:

1. Answers to displays are temporarily stored on disk.
2. Answers are used to tailor two skeleton source programs and create tailored procedures.
  - a. Index-build program
  - b. Search program
  - c. Procedures to run the Index-build and Search programs
  - d. Procedures to compile the Index-build and Search programs
3. Compilation of Index-build and Search programs.
4. Run the Index-build program which:
  - a. Creates unique search pointer files
  - b. Creates procedure and utility statements for a sort
5. Sorts pointer files into alpha order.

If the user wants to modify the source code before compilation, only sequential operation steps 1 and 2 will be performed. The users will need to be familiar with the source entry utility (SEU) to be able to modify either the Build-pointers or Search program source code. They will also need to know how to compile the source programs because the compile procedures of step 3 will not be created.

The second segment consists of the tailored Build-search-pointers program. This program determines which data fields of a particular master file are to have pointer files created, as specified by the answers created during the running of the interactive entry/edit program. The build pointers program then creates one or more pointer records per master record for each search. If the user chose not to modify the build-pointers program before compiling, it will run automatically when both the interactive and tailoring programs are finished.

The build-pointers program can also be run as a standalone program. The pointer files should be recreated after records are added or changed in the master file. The build-pointer program can be run any time.

The third segment of the WSF/34 application consists of the tailored search program. A workstation user initiates a particular search program by entering the name that was assigned during the running of the interactive entry/edit tailoring session. The search program returns a display allowing the user to key in the search request parameters. Records that match the search criteria are then displayed to the workstation user.

During the tailoring process, control logs are filled out that will aid the user in maintaining the search and index data base. Copies of these control logs, along with data entry forms, are provided to facilitate the actual entry during the tailoring process.

The WSF/34 Application Reference/Runbook provides the user with the information necessary to install WSF/34, execute tailoring of searches, and defines how the user would approach special situations. This document provides step-by-step instructions for operating the application.

The *WSF/34 Application Logic Manual* is provided as licensed documentation for use by the self-sufficient user if modifying, and for the systems engineer when maintaining WSF/34. Information on naming conventions, application program functions and specifications and other information pertaining to the application is presented in this manual.

Instructional information regarding the execution of the sample problem is provided in the WSF/34 Application Reference/Runbook. The sample program will include a master file and tailoring instructions so that a user becomes self-educated on the tailoring and search programs and procedures.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration for WSF/34 application is an IBM System/34 with:



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PP 5726-XR1.2  
Dec 83

PROGRAM PRODUCTS

**WSF/34 (cont'd)**

- IBM 5340 System Unit with Diskette 1 drive, 8.6 megabytes of disk storage and 48K (mdl B11).
- One system printer, either line printing at 160 lines-per-minute, or serial printing at 40 characters-per-second.
- One IBM 5251 Display Station (mdl 11)

**SOFTWARE REQUIREMENTS**

The WSF/34 application programs are written in IBM System/34 RPG II programming language and execute under control of the IBM System/34 System Support Program (5726-SS1, Release 2, Release 3 required for 960-character display support). IBM System/34 Utilities Program Product (5726-UT1), which includes Sort, Data File Utility, Source Entry Utility, and Workstation Utility, is required for execution of the programs. The IBM System/34 RPG II Compiler (5726-RG1) is also required.

**DOCUMENTATION**

(available from Mechanicsburg)

*Executive Brochure* (G580-0212) .

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**5727-AP1 - APF/36  
SYSTEM/36 5224/5225 ADVANCED PRINTER FUNCTION****PURPOSE**

The System/36 5224/5225 Advanced Printer Function (APF/36) allows the System/36 to use special functions on the 5224 mdls 1 and 2, and the 5225 mdls 1-4 Printers. APF/36 consists of a forms generation utility and an alternate character set capability and facilities for creating logos and generating bar graphs and bar codes.

**HIGHLIGHTS**

APF/36 allows the user to:

- Define alternate character sets and symbols, including OCR-A characters.
- Define large characters (up to nine times normal size).
- Cause UPC (Version A), Code 39 (A-Z, 0-9, \*), or EAN type bar codes to be generated.
- Build logos and emblems.
- Allow bar graphs to be generated.
- Produce a customized form which can be merged with spooled application report data.
- Select elements from the large (2x2) characters provided (2 print positions high and 2 print positions wide).
- Select or expand elements from a set of standard size (1x1) characters provided.

**CONSIDERATIONS**

The bar codes that this licensed program prints represent a reasonable facsimile of Code 39 (A-Z, 0-9, \*), UPC (Version A), and EAN bar codes. Users must test all bar codes printed in conjunction with this licensed program to make sure that the wand or scanning mechanisms used are able to adequately read the codes generated. Nonglossy paper is recommended. The OCR-A characters shown in the *APF/36 User's Guide* also represent a reasonable facsimile which would have to be tested by the users on their own wand or scanning mechanisms.

This bar code printing ability was tested with an INTERMEC® visible light hand wand mdl 1240 and a mdl 1 bar code reader.

The OCR-A printing ability was tested with a Recognition Product®, Inc. OCR wand mdl 30 and an IBM 5265.

This in no way represents an endorsement of INTERMEC®, Recognition Products, Inc.®, or any other non-IBM product.

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**CUSTOMER RESPONSIBILITIES**

Users must test all bar codes presented in conjunction with this licensed program to make sure that the wand or scanning mechanisms used are able to adequately read the code generated.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

Minimum system requirements are:

- IBM System/36, any model.
- Minimum region size is 34K bytes.
- IBM 5251 mdl 11, 5291 or 5292 Display Station.
- An IBM 5224 mdl 1 or 2 or an IBM 5225 mdls 1-4.

**Note:** When utilizing the IBM 5225 Printer mdls 1-4, factory EC 323150 or no-charge field bill of material (FBM) 6844756 must be installed, and for the IBM 5225 mdl 1, factory EC 987958 or no-charge FBM 6840638 must be installed.

APF/36 support requires 887 blocks of disk space.

In addition:

- For each logo file created by the user, 20 blocks will be reserved.
- For each alternative character set file created by the user containing 48 characters, 204 blocks will be reserved.
- For alternative character set created by the user containing 96 characters, 406 blocks will be reserved.
- For each forms control file created by the user, 40 blocks will be reserved.

The size of a copied spool entry will depend on the amount of user data.

- Minimum disk storage requirements:

- A logo-file - 20 blocks.
- An alternate character set file for 48 characters - 204 blocks.
- An alternate character set file for 96 characters - 406 blocks.
- A forms control file - 40 blocks.
- A copied spool entry is dependent upon the amount of user data.
- APF/36 library - 100 blocks.

**SOFTWARE REQUIREMENTS**

IBM System/36 System Support Program (5727-SS1).

**COMPATIBILITY**

The user interfaces and files are compatible with the System/36 5224/5225 Advanced Printer Function Programming RPO (5799-BFN).

**CONVERSION (not applicable)****SECURITY/INTEGRITY**

The same as the System/36 System Support Program (5727-SS1).

**PERFORMANCE**

Overall performance of APF/36 is dependent on the type of characters being created and printed and their dot intensity. Performance information is available in the *APF/36 User's Guide*.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/36 5224/5225 Advanced Printer Function Specifications (GC21-7981) ... IBM System/36 5224/5225 Advanced Printer Functions User's Guide (SC21-7984).*

**RPOs ACCEPTED:** Yes

## PROGRAM PRODUCTS

**SYSTEM/36 ASSEMBLER and MACRO PROCESSOR  
5727-AS1****PURPOSE**

The System/36 Assembler licensed program is a symbolic programming language used to write programs or subroutines for the System/36. The System/36-supplied macro instructions perform system services and provide device support for the Assembler user.

**SPECIAL SALES INFORMATION**

The Assembler is intended for use where customer requirements cannot be satisfied by other forms of available program support.

**HIGHLIGHTS**

Some of the features provided are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Convenient Data Representation
- Operand Field Expressions
- Source Identification - Sequence Fields
- Assembler Instructions
- Cross-Reference Listings
- Error Checking and Diagnostic Messages

**DESCRIPTION**

**Assembler:** The System/36 Assembler licensed program is a symbolic programming language used to write programs or subroutines for the System/36. Source programs written in this language are processed by the System/36 Assembler licensed program to produce relocatable object programs which are subsequently converted to executable format by the System/36 System Support Program Overlay Linkage Editor facility. The System/36 libraries are used to store the source statements, relocatable object programs and executable 'load' programs.

The System/36 Assembler may also be used for assembly of relocatable subroutines for use with System/36 RPG II, COBOL, and FORTRAN programs. The subroutines written in System/36 Assembler language are coded by the user and separately assembled. The process of program linking is accomplished during compilation of the RPG II, COBOL, and FORTRAN source programs.

**System/36-Supplied Macro Instructions:** System/36-supplied macro instructions provide support to the Assembler user through the Macro Processor for the following System Support Program facilities: Disk functions, printer operation, keyboard and display screen access, binary synchronous communications, and other SSP services such as Timer, EOJ, Message Log, program load.

The macro instructions are supplied to provide an interface to existing SSP support.

The BSC Macro instructions provide communication with:

- Another System/36 (RPG II or Basic Assembler)
- System/34 (RPG II or Basic Assembler)
- System/32 (RPG II or Basic Assembler)
- System/3 (MLMP, CCP or RPG II)
- System/7 (MSF/7)
- System/38 (CPF)
- System/360 (BTAM)\*
- System/370 (BTAM,VTAM/NCP, CICS/VS or IMS/VS)\*
- 3741 mdl 2 or 4
- 3747
- 5231 mdl 2 (receive mode only) - supported as 3741 mdl 2 or 4
- 5280 Distributed Data System
- Office Systems/6, 6580 Displaywriter
- Series/1 (supported as a System/3)

\* Note: The 3704/3705 Emulation Program (EP) or Partitioned Emulation Program (PEP) extension to 3704/3705 NCP can be used to emulate the 2701.

Additional macro instructions will provide support for the Interactive Communications feature (SSP-ICF) provided by the System/36 SSP. Specific support is for:

- System/370 IMS/VS (IRSS and SNA/SDLC), CICS/OS/VS, and CICS/DOS/VS using BSC or SNA/SDLC protocols

- System/3 mdl 15D CCP using BSC protocols
- System/36, System/34, System/32, 5110, 3741, 5230 Office Systems/6, 6580 Displaywriter using BSC protocols (point-to-point only)

The assembler macro instructions will support the loadable sort interface from the System/36 System Support Program SORT utility.

Additional macro instructions provide interfaces to the scientific instruction set.

Additional macro instructions may be written by the user using the macro instructions definition language.

All macro instructions are expanded into Assembler source language statements by the Macro Processor that in turn can be processed by the System/36 Assembler.

**CUSTOMER RESPONSIBILITIES (not applicable)****SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

IBM System/36 Assembler and Macro Processor licensed program executes on all models of the IBM System/36.

**SOFTWARE REQUIREMENTS**

The current version of the IBM System/36 Assembler and Macro Processor operates under control of the current version of the IBM System/36 System Support licensed program (5727-SS1).

**COMPATIBILITY**

System/34 Assembler programs that do not use IBM-supplied macro instructions and system interfaces can be assembled on System/36 and will execute. System/34 Assembler programs that use IBM-supplied macro instructions require conversion.

**CONVERSION**

There is a significant difference between IBM System/34 and IBM System/36-supplied macro instructions. System/36 Assembler programs may require different macro instruction parameters and keywords than System/34.

**SECURITY/INTEGRATION (not applicable)****PERFORMANCE CONSIDERATIONS (not applicable)****DOCUMENTATION**

(available from Mechanicsburg)

*System/36 Assembler and Macro Processor Licensed Program Specifications (GC21-7893) ... Assembler Messages (SC21-7942) ... Programming With Assembler (SC21-7908).*

RPQs ACCEPTED: Yes

## SYSTEM/36 BASIC 5727-BA1

### PURPOSE

System/36 BASIC (Beginners All-purpose Symbolic Instruction Code) is a high-level interactive language for users who have commercial data processing requirements or who need to solve business, technical, and scientific problems.

### HIGHLIGHTS

System/36 BASIC offers the following functions and advantages to the user:

- Alternative index paths are supported for indexed files. The paths are dynamically maintained. Program coding for an alternate index path is the same as for the indexed file. Alternate index paths must be created by BLDINDEX.
- Variable and function names can be up to 31 characters long and can contain underscore. Longer variable and function names allow more unique names and improve the readability of BASIC programs.
- Program lines can be up to 4 display screen lines long. Read/write lists and other statements that extend for more than one line can be entered as one statement.
- A program line can contain multiple BASIC statements. Multiple statements on a line can shorten a program.
- The program can read the cursor position row and column when a function key is pressed.
- BASIC program lines can be selectively renumbered. By renumbering program lines you can move lines within a program.
- A storage index will be automatically allocated when the performance of accessing a large indexed file can be improved. Coding of the index size in the program is eliminated.
- A program can access up to 255 display formats.
- Multiple Requesting Terminal (MRT) programs can continue processing when a permanent I/O error is caused by a terminal being powered off or by a remote terminal line failure.
- Program versions can be tracked with the modification reference number and date/time stamp in the source member directory entry, the compile listing, and the subroutine/load member directory entry.
- The number of program statements is not limited by region size.
- The user can stop a running program to examine or change variables, and then can resume execution.
- The display screen can be generated using any of the following:
  - The Screen Design Aid (SDA) utility.
  - The FIELDS parameter of the BASIC INPUT and PRINT statements. This method provides most of the formatting capability of SFGR.
  - The screen format generator (SFGR) SSP utility.
- The syntax of each source statement is checked. If a syntax error occurs, the operator can press the Help key to display the syntax and explanation of the BASIC statement used.
- BASIC program execution flow may be traced and displayed or printed. Simple commands control the start and stop of tracing.
- A Help function is provided that displays descriptions of the BASIC commands, statements, and intrinsic functions. The Help function also displays the syntax of each BASIC command and statement.
- BASIC program lines can contain a label. A line can be referenced with either a line number or a label. Labels can simplify programming.
- BASIC procedures can be created. BASIC procedures contain BASIC commands which are used to control the loading and running of BASIC programs. BASIC procedures can also contain BASIC statements, comments and data.
- BASIC supports input and update operations for user switches and local data areas.
- BASIC supports all System/36 file organizations (see "Software Requirements").
- A disk file can be assigned to a user for the duration of multiple job steps.
- The execution of each BASIC command can be logged to the history file.
- Fields of a disk file can be in zoned decimal, packed decimal, binary (1, 2, 3, and 4 bytes), alphanumeric format, or unformatted. Files with this type of data (except formatted) can be interchanged between BASIC, COBOL, and RPG.
- Library source members and OCL procedure members can be read from and written to a user library using a BASIC program.
- Logical (AND, OR, NOT) and Relational (for example, >, <, =, <=, >=, and <>) operators are provided.
- Input/Output may be formatted with the FORM or IMAGE statement. If unformatted, the Input/Output will assume default formats.
- Paging is provided through command keys and roll keys:
  - Command keys allow forward and backward paging by screen.
  - Roll keys provide up and down paging by line when the BASIC LIST command is used
- The following matrix operations are supported:
  - Addition
  - Subtraction
  - Multiplication by a scalar
  - Setting of all elements to a constant
  - Creation of an array of index elements that gives ascending or descending sequence of the data associated with each index element.
- Matrix multiplication, matrix inversion, determinant calculation and suggested user-defined functions are described in the *BASIC Reference Manual*
- Addroot SORT files can be read by BASIC.
- The BASICS procedure command converts a BASIC source member into a BASIC member ready to be executed. All invalid statements are dropped. This procedure can simplify conversion of programs from another system.
- Multiple Requesting Terminal (MRT) programs are supported.
- The Interactive Communications feature (SSP-ICF) is supported.
- Timed wait in SSP-ICF is supported as an intrinsic function.
- Cross-reference program listings are provided.
- An error message can be written on the error line of a display.
- Multiple spooled printer files are allowed in a single program.
- User can trap errors in procedures.
- User error control is supported on the file OPEN statement.
- A value for disk file extension when using extendable disk files can be specified on the OPEN statement.
- All run-time syntax errors can be trapped.
- Command keys are now allowed in INPUT and LINPUT.
- User can create his own collating sequence.

### DESCRIPTION

BASIC (Beginners All-purpose Symbolic Instruction Code) is a high-level interactive language for users who have commercial data processing requirements or who need to solve business, technical and scientific problems. System/36 BASIC is easy to learn and easy to use, allowing the programmer or the casual user to concentrate on the application aspects of programming. The System/36 BASIC implementation uses a design that prevents nonexecuted code from taking up main storage. Program size is not limited to region size. System/36 BASIC has the ease-of-use characteristics of an interactive interpreter and yet offers some of the performance advantages of a compiler.

The System/36 BASIC licensed program is designed in accordance with the American National Standard Minimal BASIC (x3.60-1978) as understood and interpreted by IBM.

**BASIC Design Overview:** System/36 BASIC is an interactive compiler. This means it provides the ease-of-use characteristics of an interactive interpreter. Some of these characteristics are:

- Syntax checking after each statement is entered.
- The capability of running the program immediately.
- The capability to stop the program execution, to examine or change variables, and then resume execution.

After each statement is entered, it is changed to internal source text. Because the program is maintained in this internal source text, it can be easily changed, corrected or executed by the programmer.

System/36 BASIC also provides some of the performance advantages of a compiler. The primary advantage of a compiler is improved execution performance over that of an interpreter. This advantage is provided by System/36 BASIC when there is sufficient region size to contain all of the program during execution. In this case, the source text is compiled only once for that execution of the program.



## PROGRAM PRODUCTS

**System/36 BASIC (cont'd)**

CUSTOMER RESPONSIBILITIES (not applicable)

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/36 BASIC licensed program will run on all models of the IBM System/36. The minimum region size is 28K bytes. Programs may require a larger region size. Increasing region size may improve performance.

The IBM System/36 BASIC licensed program requires a print belt with a minimum of 64 characters to print all of the uppercase characters on the IBM 3262 printer. A print belt with a minimum of 96 characters is required to print lower case characters.

When the System/36 BASIC licensed program is installed with the Multinational Character Set feature and keyboards that do not contain the \$, # or < symbols, these characters, if used, must be entered as their 2-character hexadecimal equivalent.

**SOFTWARE REQUIREMENTS**

All IBM System/36 licensed programs are designed to operate in an environment that includes the System Support Program (5727-SS1) or its equivalent.

The BASICR Operation Control Language command provides the capability to evoke a BASIC program without using BASIC command mode. BASICR also supports the use of a procedure that could contain // FILE OCL to override parameters in a BASIC file OPEN statement.

BASIC does not support logical processing of unformatted sequential access files created by the IBM System/36 FORTRAN IV (System/34-compatible) licensed program (5727-FO1) or FORTRAN floating-point data.

Source Entry Utility (SEU as part of Utility Program, 5727-UT1) is available to help the data entry person enter BASIC source statements into a library source member without using the System/36 BASIC licensed program. In this case, no syntax checking is done until the source code is processed by the System/36 BASIC licensed program.

Previously entered source statements can also be changed with SEU. A BASIC program must be in a library source member in order to use SEU. The SEU scan feature may also be useful when changing a BASIC program.

The SORT program can be used to sort all BASIC disk data files.

**COMPATIBILITY**

System/34 BASIC programs must be transported to the System/36 in source format. A LOAD or BASICS command must then be used to translate BASIC source statements in System/36 BASIC subroutine members. No source statement changes are required.

Minor differences exist between System/23 Datamaster BASIC and System/36 BASIC. An outline of these differences is available in the *IBM System/36 BASIC Reference Manual*.

Differences do exist between 5100/5110 BASIC and System/36 BASIC. Conversion of most source programs will be required. An outline of these differences is available in the *IBM System/36 BASIC Reference Manual*.

BASIC will execute concurrently with System/36 FORTRAN programs.

**CONVERSION**

If a program used CURROW, CURCOL, or USERID as a variable name, the program must be changed (these are now reserved names). BASIC MRT procedures must be rewritten due to the new Local Data Area specification, and region size must be raised to 28K if it has been set to a lower value in a System/34 procedure.

SECURITY/INTEGRITY (not applicable)

PERFORMANCE (not applicable)

**DOCUMENTATION**

(available from Mechanicsburg)

*Programming With BASIC (SC21-9003) ... IBM System/36 BASIC Licensed Program Specifications (GC21-9011) ... BASIC Summary (SC21-9012) ... BASIC Messages (SC21-7943).*

RPOs ACCEPTED: Yes



## PROGRAM PRODUCTS

**SYSTEM/36 BUSINESS REPORT/APPLICATION  
DEVELOPMENT SYSTEM (SYSTEM/36 BRADS)  
5727-BR1****PURPOSE**

The System/36 Business Report/Application Development System brings data base power to users of the IBM System/36. With BRADS, users can productively develop and install system-justifying applications, often without becoming or hiring programmers.

Users can also expand the value of applications which run on their IBM System/36 by querying the data bases and by developing new reports.

**HIGHLIGHTS**

System/36 BRADS may be used to:

- Create, maintain and update data files.
- Create screen-driven data entry programs.
- Retrieve information from the files using a simple query.
- Create formatted reports using prompted report generation screens.
- Develop complete applications through use as a:
  - Highly productive development tool. The System/36 BRADS facilities can be used to create applications that execute under the control of System/36 BRADS.
  - Program generator for screens and reports. The screen and report programs generated by BRADS can be added to other BASIC programs to create applications that execute independently or in conjunction with System/36 BRADS.
- Create additional queries and reports for applications by creating BRADS file definitions.
- Provide design documentation maintained as a by-product of System/36 BRADS, which fulfills much of the user's documentation requirements.

Files may be shared for input among workstations while executing QUERY or COPY commands. Files may be shared while executing reports if the access method is 'input only'. Directories may not be shared.

System/36 BRADS also contains a spread sheet generator facility which may be used, for example, to:

- Produce forecasts showing expected revenues, operating costs, capital expenditures, taxes, and other expenditures.
- Try a variety of 'what-if' adjustments on the original spread sheet data to investigate alternative plans.
- Produce reports that examine the differences (variances) between plans or between plans and actual performance.
- Produce reports showing percentage relationships between rows or between columns (for example, growth from month-to-month).
- Consolidate or deconsolidate plans and evaluate performance of separate operating entities (for example, departments, companies, products).
- Combine historical and predictive data together.

The spread sheet generator facility provides the user flexibility in addressing applications such as:

- Balance Sheets
- Budget Planning and Forecasting
- Cash Requirements and Forecasting
- Commercial Loan Evaluation
- Common Sizing Analysis
- Comparative Analysis
- Consolidation and Deconsolidation
- Investment Analysis
- Material and Labor Requirements
- Manpower Projection
- Merger and Acquisition Analysis
- Product Planning
- Profit and Loss Statements
- Real Estate Investment

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility of personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

The customer is responsible for applying any program fixes distributed by IBM Central Service.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/36 Business Report/Application Development System (System/36 BRADS) is designed to operate on all models of the IBM System/36 having at least:

- 128K bytes of main storage
- One IBM Printer
- One 1920-character IBM Display with keyboard
- 30.8 megabytes of disk storage

Additional main storage will enhance performance when more than one workstation is operating concurrently. System/36 BASIC requires a printer with a minimum of 64 characters. A printer capability of at least 96 characters is required to print both upper and lower case characters.

**SOFTWARE REQUIREMENTS**

The IBM System/36 Business Report/Application Development System (System/36 BRADS) programs are written in IBM System/36 BASIC programming language, and are designed to execute under control of Release 1 or later of the System/36 System Support Program (5727-SS1), which includes Sort and System/36 BASIC (5727-BA1).

**Customer Education:** First time System/36 BRADS users should read *System/36 Brads Concepts* and self-study manuals: *System/36 BRADS Learning 1 and Learning 2*. A similar publication, *System/36 BRADS Learning 3*, covers the spread sheet generator facility.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/36 BRADS Learning 1 ... System/36 BRADS Learning 2 ... System/36 BRADS Learning 3 ... System/36 BRADS Concepts ... System/36 BRADS Reference ... System/36 BRADS Reference - Spread ... System/36 BRADS Messages ... System/36 BRADS Planning Guide ... System/36 BRADS Licensed Program Specifications ... BRADS Marketing Flyer (G580-0390) ... BRADS Features and Sample Reports (G280-0237).*

**RPQs ACCEPTED:** No

**SYSTEM/36 COBOL COMPILER AND LIBRARY  
5727-CB1**

**PURPOSE**

The IBM System/36 1974-level COBOL Compiler and Library is a licensed program that operates under control of the System/36 System Support Program (5727-SS1).

**HIGHLIGHTS**

**Enhancements**

- Language extensions to support workstations and interactive communications using SSP-ICF.
- The COBOL SORT/MERGE verbs are supported for up to eight input files. Multiple sorts are allowed in the same program.
- Nested IF statements are supported.
- ADD, SUBTRACT, and MOVE CORRESPONDING are now supported. This will reduce the number of instructions required to edit group items for printing or to do data conversion of group items.
- Support for abbreviated combined relations will allow users to code implied subjects and operands such that the following statement will be valid:  
If A = B, OR C...
- Substring capability will allow the user to use the verbs STRING and UNSTRING to combine or take apart fields respectively. These powerful instructions are useful in text processing.
- Table processing will support the ASCENDING/DESCENDING options and the functions:
  - SEARCH
  - SEARCH ALL
- Variable-length tables are also supported by the OCCURS DEPENDING ON option to allow the user to restrict table searches to valid data only and thus save processing time.
- The INSPECT verb replaces the 1968-level EXAMINE. The function has been enhanced to allow use of multiple characters.
- File processing support:
  - Alternate index paths.
  - The record DELETE option is supported.
  - Add to sequential files is supported via the OPEN WITH EXTEND option.
  - The START verb will support NOT LESS THAN as well as EQUAL keys which will allow the user to do generic searches on indexed files.
  - Optional files are supported to allow the user to continue to run even if some of the files do not exist.
  - The DYNAMIC ACCESS option is supported so that a user can now process the same file both sequentially and randomly without having to doubly define the file.
  - The user can specify top and bottom margins for a printer file.
  - The FILE STATUS function is supported so that the user can interrogate the result of a file operation.
  - USE after STANDARD ERROR/EXCEPTION is supported to allow the user to combine error/exception logic in one section of the program.
- The value clause for level 88 supports multiple values. The THROUGH option also allows users to easily do range checking.
- Multiple result fields in arithmetic statements are supported.
- The REMAINDER option of the DIVIDE is supported.
- The RENAMES capability has been extended with:
  - Level 66 items
  - THROUGH option is supported
- The edit character of '/' for data edits is allowed.
- The COPY function supports the REPLACING option. This allows users to replace copied character strings, either entirely or partially, to fit the requirements of the source program.
- The 1974 DEBUG module is supported. This gives the user a special group item called DEBUG-ITEM which can be processed at desired debug points in the program. This support also includes both compile and execution time switches for suppression of the debug function.
- Additional debug support of EXHIBIT and TRACE.
- Additional compiler options include:
  - A cross-reference listing of data names and labels.
  - Flagging of all statements exceeding a specified FIPS (Federal Information Processing Standard) level.

- Syntax-only compiles to allow users to check syntax prior to generating object code.
- Semi-interactive syntax checking is provided to allow users to compile and correct source programs without requiring a source listing printout.
- Enhanced support for multiple spooled printer files in one program.

**DESCRIPTION**

The System/36 COBOL Compiler and Library is a licensed program that operates under control of the System/36 System Support Program (5727-SS1). The compiler and library are disk resident. The compiler requires as input a COBOL source language program, and produces as output, by means of the system's Overlay Linage Editor, a System/36 machine language runnable program cataloged in a user library. A source program listing, diagnostic messages, and main storage map can also be requested.

This compiler is designed according to the 1974 standard.

**Industry Standards:** IBM System/36 COBOL is designed according to the following industry standards as understood and interpreted by IBM:

- American National Standards (ANS) COBOL, X3.23-1974 ANS COBOL is identical to ISO 1989-COBOL, approved in February, 1978 by the International Organization for Standardization. The following ANS processing modules are included:

2 NUC	1, 2
2 TBL	1, 2
2 SEQ	1, 2
2 REL	0, 2
1 INX	0, 2
2 SRT	0, 2
1 SEG	0, 2
2 LIB	0, 2
1 DEB	0, 2
1 IPC	0, 2

The first digit above represents the level of the modules included in the compiler. The second digit represents the lowest level specified for American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler). The third digit represents the highest level specified in the standard.

- December 1975 Federal Information Processing Standard, (FIPS PUB 21-1), Low-Intermediate level. However, additional support is provided for many features of higher FIPS level.

The following exceptions apply to the above standards:

- The DELETE function is implemented by marking deleted records with a hexadecimal FF in position 1 of the record. When operating with DELETE mode files, the user is excluded from placing a hexadecimal FF in this position.
- The ALTERNATE RECORD KEY clause is not supported. Comparable function may be utilized by defining additional indexed file access paths outside the COBOL program.
- RERUN is supported for syntax checking only.

**Additions:** In addition to the standard language, the following additional features are provided:

- Extensions to the modules of American National Standard COBOL listed above include certain language elements which are defined in higher levels of the American National Standard COBOL than those listed. The following extensions are supported:
  - Use of apostrophe instead of quotes.
  - Extended data types of computational-3 (packed) and computational-4 (binary).
  - Additional debugging support with EXHIBIT and TRACE.
  - ACCEPT from console.
  - DISPLAY upon console.
  - File definition using the FILE CONTROL entries of SELECT and ASSIGN.
  - Standard error handling using FILE STATUS and the USE procedure in the DECLARATIVES SECTION.
  - Extensions to standard file processing verbs for:
    - OPEN/CLOSE
    - READ/WRITE
  - Support for display format indicators as boolean data types (0,1) and turning them on and off via the SET statement.
  - Acquire and release workstations and SSP-ICF sessions supported through ACQUIRE and DROP.
  - Support for UPSI switches.
  - ACCEPT/DISPLAY statements support reading and writing of the workstation local data area (WSDA).

**Additional Compiler Features:**

System/36 COBOL offers additional compiler features which can be chosen by the programmer:

**S/36 COBOL Compiler and Library (cont'd)**

- Alternative index paths are supported for indexed files. The paths are dynamically maintained. Program coding for an alternate index path is the same as for the indexed file. Alternate index paths must be created by BLDINDEX.
- FIPS Flagger issues messages identifying statements and clauses in a COBOL source program that exceed a user-specified FIPS level.
- Symbol Cross-Reference produces two alphabetic listings of user-specified names. One of the names is defined in the Data Division and one of the names is defined in the Procedure Division.
- Online programming is supported by the diagnosed source member output option of the compiler. Diagnostic messages and summary information are inserted into appropriate places of the source member. The member may then be viewed/changed by SEU (Source Entry Utility).
- Online programming also provides an automatic cycle that enables you to enter a program, compile it, review/correct compile errors (via SEU), and recompile the program without leaving the display or using a printer. The inserted diagnostics are dropped on the next compile or may be optionally dropped by SEU.
- Many compile options such as print/noprint, source/nosource, xref/noxref, and debug/nodebug can be overridden from the online prompts.
- When the performance of accessing a large indexed file can be improved, a storage index will automatically be allocated. Coding of the index size in the program is eliminated.
- Up to 255 display formats may be accessed from a workstation file defined in a program.
- Multiple Requesting Terminal (MRT) programs can continue processing when a permanent I/O error is caused by turning the power off at a display station or by the failure of a communications line to a remote display station.
- Program versions can be tracked with the modification reference number and date/time stamp in the source member directory entry, the compile listing, and the subroutine/load member directory entry.
- Syntax Checking Compilation scans a source program for syntax errors. If errors are found, error messages are generated. No object code is produced.
- Parameter Prompting allows the user to request prompt screens for the specification of parameters needed for entering, updating, compiling, or executing COBOL programs.
- Multiple Printer Files allows the specification of up to 25 different printer files in the same program.
- Standard Program Linkage allows programs written in System/36 COBOL to call or be called by other programs written in System/36 COBOL, System/36 FORTRAN, or System/36 Assembler language.

**Disk File Support:** The access methods supported by System/36 COBOL, based on physical data organization, are as follows:

- Sequential Organization
  - Consecutive processing, including update in place and consecutive add (extend).
  - Random processing, by relative record number, including updating. This requires that the file be described as RELATIVE in the COBOL program.
- Indexed Organization
  - Random processing, by key or relative record number.
  - Sequential processing, by key including file loading.
  - Dynamic processing, combined random and sequential processing.
- Direct Organization
  - Random processing, by relative record number, including updating and file loading.
  - Consecutive processing.
  - Dynamic processing, combined random and sequential processing.

Standard System/36 disk labels are mandatory for all disk files. Nonstandard labels cannot be used except as data records within a file.

Record size can range from 1 byte to 4,096 bytes, and records may be processed as blocked or unblocked. The block size for a given file may be varied between programs up to a maximum block size of 9,999 bytes. Logical records may span physical disk sectors, blocks, tracks, or cylinders.

**Workstation Support:** Low-volume, unformatted, line-at-a-time workstation support is provided with the ACCEPT and DISPLAY verbs. File processing has been extended to support a TRANSACTION

organization type. Using this organization type, the user can define one file that supports single or multiple workstations, and single or multiple SSP-ICF sessions in any combination. Since the support is provided in a COBOL standard file, the user codes standard COBOL verbs, with extensions where necessary, to accomplish the job.

**CUSTOMER RESPONSIBILITIES (not applicable)****SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/36 COBOL Compiler and Library licensed program runs on all models of IBM System/36.

**SOFTWARE REQUIREMENTS**

The current version of the IBM System/36 COBOL Compiler and Library licensed program operates under control of the current version of the IBM System/36 System Support Program (5727-SS1).

**CONVERSION/COMPATIBILITY**

No conversion of source programs from System/34 COBOL '74 compiler is required. There is a high degree of compatibility between the System/36 COBOL compiler and System/38 COBOL, the System/3 subset '68 COBOL, System/32 PRPQ COBOL, and System/34 PRPQ COBOL compilers. Differences do exist and some conversion effort will be required.

**SECURITY/INTEGRITY (not applicable)****PERFORMANCE CONSIDERATIONS**

The System/36 COBOL Compiler and Library licensed program runs on all models of IBM System/36. The minimum region size is 24K bytes. Additional main storage may allow faster compilation of a large source program. The Overlay Linkage Editor constructs overlays (if necessary and possible) to fit the object program into the available main storage. The region size required for an object program is a function of source program complexity and its ability to be overlaid.

The System/36 COBOL Compiler accepts source statements from the source member on disk, from a procedure member on disk, or from a display station keyboard. Compiler output can consist of a source listing and diagnostic messages on the printer, messages on the display screen, an object module on disk, and a diagnosed source member.

During execution of the COBOL object program, input is accepted from the keyboard, from a library procedure member (if that procedure is defined as the system input device), or from data files on disk. Output from the executing COBOL program is to the printer, display screen, or to data files on disk.

**DOCUMENTATION**

(available from Mechanicsburg)

*Programming With COBOL (SC21-9007) ... IBM System/36 COBOL Compiler and Library Licensed Program Specifications (GC21-9009) ... COBOL Summary (SC21-9013) ... COBOL Messages (SC21-7941).*

**RPQs ACCEPTED:** Yes

PROGRAM PRODUCTS

**SYSTEM/36 DISTRIBUTORS MANAGEMENT  
ACCOUNTING SYSTEM (DMAS)**

BILLING ... 5727-D41  
 ACCOUNTS RECEIVABLE ... 5727-D42  
 INVENTORY CONTROL ... 5727-D43  
 SALES ANALYSIS ... 5727-D44  
 PURCHASING ... 5727-D45  
 INVENTORY MANAGEMENT ... 5727-D46  
 GENERAL LEDGER ... 5727-D47  
 ACCOUNTS PAYABLE ... 5727-D48  
 PAYROLL ... 5727-D49  
 CROSS-APPLICATION SYSTEM SUPPORT ... 5727-D4A

**PURPOSE**

System/36 DMAS is a workstation application system that puts data processing in the hands of the using departments. Customer orders can be entered from the order desk, cash posted to customer accounts by the accounts receivable clerk, purchase orders created online by a buyer, and stock receipts entered by either warehouse or receiving department personnel. This can result in stock balances that reflect realtime data, lead to improved customer service, fewer lost sales, and optimum inventory investment. At the same time, vendor invoices can be entered by accounts payable personnel, journal entries processed by the bookkeeper and paychecks created by the payroll department. All of this can provide the user with the ability to exercise control over all aspects of his business using the facilities of one system.

System/36 DMAS includes the Inventory Management application which is a tool designed to assist buyers and management with the replenishment ordering of many different types of inventory. It incorporates innovative inventory management techniques that can, through better buying, help reduce the overall inventory investment - and the costs associated with acquiring and carrying inventory - while helping to assure that the right items are available to satisfy high levels of customer demand.

Facilities are provided to ease conversion of System/34 DMAS customers to System/36 DMAS. All that is required is that they back up their System/34 DMAS II master files and then restore them on System/36. The restore procedure is part of the System/36 DMAS installation process.

System/36 DMAS includes all the System/34 DMAS II, DFAS II and INVEN/3 functions. It incorporates system functions to take advantage of the workstation and multiprogramming capabilities of the System/36.

**HIGHLIGHTS**

- Interactive data entry is designed for simplicity and operator efficiency. Using this method, an operator gets a maximum amount of system-provided information in response to entering a minimum amount of data. Screen displays guide the operator through the data entry operation in a logical sequence. Most data entry is edited for reasonableness. Errors are signalled to the user along with descriptive data from the master file, which is an aid to visual verification. These errors can then be corrected interactively by the user.
- Multiple, interactive display stations may operate on one job or concurrently on different jobs. Several workstations can be used for customer order entry, while others may be used for posting payments, creating purchase orders, or entering inventory receipts. While this is occurring, a batch job may be running in the background. These capabilities dramatically increase the efficiency of entering data from the various centers of activity in a distribution business.
- The alpha search feature allows inquiry about customers and items when the workstation operator does not have the customer or item number available. By keying a portion of either the customer's name, or city, or both, the system will locate and display all customers meeting that criterion. Similarly, item name, item class, or both can be used to display items. An optional search field can be used when the customer or item is to be found by other than the first portion of the customer or item name.
- Comprehensive inquiry offers current data on demand. Displays show key information such as customer accounts receivable summaries, aged receivables status, customer sales and billing summaries, item inventory balances, item sales summaries, item price and cost data, vendor purchasing data, and active purchase orders for any item. In addition, a credit check which includes a summary of all accounts receivable (A/R), all in-transit to A/R, and all orders in process for a customer can be obtained. Alpha search can be used to locate desired customer and item inquiry data.
- Order status inquiries show the current status of customer or purchase orders in process or on file in the system. The user may choose to display all orders or only those meeting selection criteria.
- Comparative sales analysis provides inquiry displays which show historical comparisons and ratios. Quantitative figures and graphical comparisons are displayed for both item and customer

data. Latest-month data can be compared to the preceding month, to the same month in the preceding year, and to the latest 12-month average. Also, the current year-to-date data can be compared to the same period-to-date data in the previous year. The latest 13-month figures for any customer or item can be displayed in bar graph form. The various comparative sales analyses can show dollar sales, dollar profit, and quantity sold (items) or number of orders (customer) data, as selected by the user.

- Interactive file maintenance permits easy and accurate additions and corrections to master files from any workstation. Field descriptions, field lengths, and explanations of coded data are provided, while entered data is edited for reasonableness. A special feature allows rapid review and/or change of any or all item list prices. New prices are edited for reasonableness, as a protection against gross keying errors.
- All application procedures may be executed from a menu screen. Menu screens simplify the operators' duties by displaying a list of job numbers, with descriptions, that can be run. This reduces operator keying time and errors.
- Application options may be selected, depending on the type, at install time, run time, or by overriding standard data during data entry. Files may be resized as necessary to accommodate growth. Warning messages signal when files are approaching their capacity.
- The applications are integrated so that output from one becomes input (where appropriate) to others without the need to re-key the information. The highlights below identify, for each application, the other applications to which data is made available, or whose records are updated. Additionally, master files are shared between applications (where appropriate) to conserve file space, minimize file maintenance effort, and update the minimum number of records.

Data is provided from

- Billing to:
  - Accounts Receivable
  - Inventory Control
  - Sales Analysis
  - General Ledger

- Accounts Receivable to:
  - Billing
  - Sales Analysis
  - General Ledger

- Inventory Control to:
  - Billing
  - Sales Analysis
  - Purchasing
  - Inventory Management

- Purchasing to:
  - Inventory Control
  - Accounts Payable

- Inventory Management to:
  - Purchasing

Master files are shared as follows:

- Customer master:
  - Billing
  - Accounts Receivable
  - Sales Analysis

- Item/Item Balance masters:
  - Billing
  - Inventory Control
  - Sales Analysis

- Vendor master:
  - Purchasing
  - Accounts Payable

- Diskette magazine support for master file backup and recovery of all DMAS application programs.
- Auditability and control.
  - Order Reconciliation list.
  - System balancing to optional operator-entered control totals and the notation of any forced control totals.
  - Transaction registers.
  - Backing up of transaction files and master files.
  - System-produced notations of price-related operator overrides in the Billing application.
  - Financial data (receivables amounts and stock on hand) cannot be altered through file maintenance operations.
  - Sales statistics from deleted records are stored in summary form through year end, so that year-to-date sales and cost amounts balance to controls.

PROGRAM PRODUCTS

S/36 DMAS (cont'd)

- All pages of transaction registers (Invoice Register, Inventory Transaction Register, Receivables Transaction Register, Items Ordered/Received Register) are numbered with a perpetual serial page count to prevent valid report copies from being inadvertently destroyed or lost unnoticed.
- Prompting to override default options.
- No customer programming capability is required. Education programs are provided that are intended to help the customer attain operational self-sufficiency.
- Each application may be installed separately or in conjunction with the others. However, when Billing is installed, its output automatically serves as input to the Accounts Receivable, Inventory Control, General Ledger and Sales Analysis applications; when Accounts Receivable is installed, its output serves as input to General Ledger and Sales Analysis; when Purchasing is installed, some output serves as input to Accounts Payable.
- Reserved user space in master records.
- Basic screen functions across applications.
  - Ability to change mode between entry and review.
  - Cancel function may be performed.
  - Ability to add or insert new lines.
  - 1 to 8 lines may be entered and edited per body screen.
  - Ability to delete transactions.
  - Screens displayed in logical sequence.
  - Ability to unlock keyboard to make changes during review or entry.
- Flexible backup/recovery/restart to minimize the recovery process.
- Ease-of-installation: The Customer Service and Financial Applications use an improved installation and tailoring procedure which reduces the number of decisions and actions required of the user, and simplifies the entire installation process.
- Complete Documentation: Facilitates easy installation, operator and supervisor education, and efficient operation.
- Password and Resource security deter unauthorized use of the applications and functions within applications. A second level of DMAS security protects selected master file data.

DESCRIPTION

BILLING (5727-D41)

- Dynamic stock on-hand balance maintained and quantity available may be allocated to orders as they are entered. This allocate feature is optional with postbilling and standard in prebilling.
- Post- or prebilling methods available. Users may select either method, and change their choice at a later time.
- Credit limit checking (if A/R is installed) warns when customers' posted balance exceeds 90% of their credit limit.
- Extended credit check option displays total due currently posted in A/R, plus future-dated and in-transit charges, plus total of all orders in process. Comparison to credit limit and orders on credit hold are shown.
- Price check during order entry option will display complete order pricing data prior to picking list printing.
- Back orders are automatically reentered for customer and items that qualify.
- The printing of picking lists and invoices may be initiated following entry of an order. After an order has been entered, any operator may initiate the printing of a picking list on a printer located in the warehouse. The operator can also expedite delivery by calling for the printing of particular invoices to that warehouse.
- Alpha search on customer and item.
- Diskette and online workstation data entry.
- Multiprogramming allows for other batch and/or workstation jobs to operate concurrently.
- Multiple order entry workstation.
- Orders may be entered for new customers and for new items not on file. No file maintenance is required prior to entering orders.
- Flexible pricing, including: Discount from list or markup from cost, item quantity discounts, contract prices, or manually entered overrides.
- Operator override allows the operator to override defaults and information contained in master file data records.
- Orders may be cancelled, corrected, released to invoicing or retained in the file for later processing.
- Invoices/credit memos may be entered directly and changed, cancelled or remain in file for later processing.

- Picking documents and invoices printing flexibility:
  - For a particular warehouse or all warehouses
  - Within order number or invoice number limits
  - Based on 'all ready to be printed' or up to a specified number (for example, first 20).
  - Can be directed to different printer
  - The standard picking list printing sequence (list organization and content) can be overridden.
- An on-reserve warning is displayed when the quantity available of an item is less than the quantity on reserve.
- Interactive File Maintenance permits easy, accurate customer master file maintenance from any workstation.

ACCOUNTS RECEIVABLE (5727-D42)

- Cash application is simplified. The operator can select invoices for payment from a display of all of a customer's open items and selectively apply payments.
- Balance forward or open item. Either method is selectable for each account. The individual accounts can be changed from one method to the other at the end of an accounting period.
- Multiple cash entry workstations.
- Diskette and online workstation data entry.
- Statements with past and future aging, late charges, and optional remittance tear strips are prepared monthly.
- Aged Trial Balance and a Customer Account Status Report are available on demand. An option allows the Aged Trial Balance to be sequenced by customer within salesperson.
- Delinquency notices are available.
- Multiprogramming allows for other batch and/or workstation jobs to operate concurrently.
- Deferred statement printing is provided. Data is saved on diskettes for the printing of statements at a more convenient time.
- A zero-balance statement option permits the printing or bypassing of statements for customers with zero amount due, but who had transactions during the latest month.
- Print paid open item proof, and paid item list.

INVENTORY CONTROL (5727-D43)

- Dynamic stock-on-hand balances maintained. Sales, receipts and adjustment are immediately reflected in the quantities available.
- Alpha search on item.
  - Item price, cost, and quantity sold inquiry capability.
- Multiprogramming allows for other batch and/or workstation jobs to operate concurrently.
- A stock status report, stock status review and a variety of other analytical reports can provide stock movement data to assist in the buying process, optimizing inventory investment, and providing a high level of customer service.
- Broken case quantities maintained.
- Accounting for warehouse and drop shipments.
- Multiple warehouse activity supported. Inventory balances can be maintained separately for multiple warehouses. Inventory Analysis reports can show either the items in all warehouses, or only those in a specific warehouse.
- Two costing methods are supported: Average cost, for calculation of profit, and last cost, which usually represents your current replacement cost. Both costs can be displayed during item balance inquiry.
- Backorder release lists, one in item sequence and one in order number sequence, show customer orders being held pending receipt of backordered items.
- Physical inventory lists assist when taking inventory.
- Diskette and online workstation data entry.
- Quantity on reserve and on backorder.
- Interactive File Maintenance permits easy, accurate item master file maintenance, including item price changes by item class, from any workstation.

SALES ANALYSIS (5727-D44)

- Sales analysis reports assist in answering questions like:
  - What is selling and what is not selling?
  - Which profitable items should be promoted and which unprofitable ones should be dropped?
  - Which customers are profitable?

PROGRAM PRODUCTS

S/36 DMAS (cont'd)

- Which salespersons are effective and profitable?
- Depending on other licensed programs installed, reports are sequenced:
  - By item.
  - By item within item class.
  - By item class within customer within salesperson.
  - By customer.
  - By customer within salesperson.
  - By salesperson.
  - Within limits.
- The user can preserve the sales analysis detail data for additional analysis of his own design.
- Deferred printing of reports.
- Comparative Sales Analysis displays show historical data about items and customers at any workstation.
  - Data displayed is dollar sales, dollar profit, and quantity sold (items) or number of orders (customers).
  - Analyses for a sales territory or an item class show four comparisons of latest period data to a variety of comparable previous periods. Quantitative data and the ratio between periods is shown.
  - Analyses for a single customer or item show four comparisons of latest period data to previous time periods. These analyses show quantitative data and ratios for sales, profits, and orders for that item or customer.
  - Trend charts, showing up to 13 months of sales, profit, or order history for a single customer or item are displayed in bar graph form.
  - Comparative Sales Analysis data is collected and retained on file as the result of month-end DMAS processing.

PURCHASING (5727-D45)

- Build order by scan through vendor's line, identifying desired items and accepting or overriding normal order quantity - as alternative to key entry of individual items. Scan can be confined to items with below minimum availability status.\*
  - Item inventory status can be displayed.\*
  - Quantity/price break points can be displayed. Program assigns vendor price appropriate to quantity ordered.
  - Cumulative order weight and cost displayed and updated as order is modified during entry.
- \* If the DMAS Inventory Control application is installed.
- Handles items that are ordered from more than one vendor.
- Orders can be entered for items that are not on the file.
- Orders can be entered for vendors who are not on the file.
- A standard general ledger account number is assigned to the order, but the operator can assign a different number to the order or to any item(s) on it.
- Messages can be entered to be associated with an order or a particular item on the order, and to appear only on the screens and reports destined for specific operating areas (for example, on the purchase order for the vendor, or on receiving reports and displays for the warehouse).
- Total order weight and cost is displayed after order entry, and updated if the order is modified at entry time.
- Orders can be held for later approval and/or can be printed individually or in batches at any time.
- Purchase orders can be printed on the system printer, or on a workstation printer (for example, at the buyer's desk), as predetermined by the user.
- When the purchase order has been entered, it updates Quantity on Order in the item records.\*
- Multiple-warehouse activity is supported.
- Daily purchase order reconciliation report
  - Log of all orders
  - Transaction and status record for each order
  - Summary reconciliation of status changes and activities for all orders
  - Summary of open order dollar value by order status and buyer
- Report of shipments expected, by due date
  - For expediting
  - For warehouse labor scheduling
- Receiving lists and reports, to aid in
  - Warehouse operations and space planning
  - Checking receipts with minimum clerical effort
  - Determining stocking locations for incoming merchandise
  - Maintaining audit trail

- Extensive order status reports and displays - with multiple selection criteria.
- Item purchase order search, and display of status
- Interactive application of receipts to open orders
  - Updates purchase order quantities
  - Dynamically updates quantities available to fill customer orders\*
  - Updates quantity on order and quantity on hand in item records\*
  - Updates open order cash commitments
- Accounts Payable input
  - Interactive reconciliation of vendor invoice quantities and amounts to purchase order and receiving data.
  - Closing report for quantities approved for payment, with cost by assigned General Ledger account numbers.
  - Interactive input of vendor invoice Accounts Payable data, for transfer to the Accounts Payable application.
- Operator can override defaults and information obtained from master file data records.
- Multiprogramming allows for other workstation and/or batch jobs to operate concurrently.
- Multiple workstations can enter purchase orders concurrently.

INVENTORY MANAGEMENT (5727-D46)

When used with the proper information from the buyer and the data processing department, Inventory Management can:

- Generate suggested orders for each vendor line indicating which items should be reordered, and in what quantities. The orders can also be adjusted to meet many different restrictions, such as total order value, volume or weight.
- Project demand forecasts for each item. Once the buyer has reviewed and accepted these forecasts, they will be used in subsequent Inventory Management operations to project future needs.
- Estimate annual costs of various ordering frequencies for each vendor line to aid the buyer in the selection of the best ordering strategy.
- Show the inventory investment needed to operate at specified service levels, while indicating actual inventory performance.
- Prints up to 22 ranking reports which list projected volumes and inventory levels for items and vendors. These reports will highlight items with unusually high or low stock levels and help identify items with profit potential as well as possible problem areas. They also help determine which items or vendor lines should be tracked more closely.
- Notify the buyer and data processing department of exceptional conditions that may require action or review.

The Inventory Management data base and operating mode can be temporarily modified so that users can use varying discount, order frequencies, vendor lead times, and other elements to simulate a wide variety of conditions. They can then run the product functions in this 'what-if' mode and use the resulting analysis to assess the impact of the changing factors. When the system is taken out of this simulation mode, the user may either cancel the 'what-if' conditions that were entered, or retain them in the permanent data base.

The Inventory Management program library also includes two interfaces to System/36 DMAS. The first extracts information from System/36 DMAS Inventory Control files to automatically update the data base. The second interface passes ordering information to System/36 DMAS Purchasing, which then uses this data to print purchase orders, help control outstanding orders, and help receive and pay orders.

GENERAL LEDGER (5727-D47)

- System design based on a suggested account structure provided with the application, but may be tailored to fit user chart of accounts (up to seven-digit number).
- Supports either 13-period or 12-month fiscal year.
- User-defined fiscal year starting month or period.
- Supports up to 20 companies.
- Journal reference numbering system provides clear audit trail from source of entry to period-end closing.
- Accepts pertinent transactions from Accounts Payable, Payroll, Accounts Receivable, and Billing applications if installed.
- Edits input transactions to validate general ledger accounts and checks for debit/credit balance by entry groups.
- Selectively prints journals.
- Prints general ledger financial statement worksheet, and Statement of Changes in Financial Position.

PROGRAM PRODUCTS

S/36 DMAS (cont'd)

- User-specified format for Balance Sheet and Income Statement.
- Combines dollar amount for like account numbers to produce a combined Income Statement and Balance Sheet for multiple companies.
- Formats Income Statement by subdivisions of a company, such as departments.
- Prints a Comparative Income Statement (current versus last year or budget, with percentage of variance).

ACCOUNTS PAYABLE (5727-D48)

- Workstation allows the user to enter transactions, perform an immediate edit, and correct any errors while the source document is still available.
- Online inquiry displays vendor open payables information. Multiple line distribution of invoices.
- Balances total invoice amount to line distribution amounts.
- Data from prewritten checks can be entered for distribution to provide single audit trail.
- Check reversal capability.
- Selects invoices for payment by 'paging' and selects invoices based on date, vendor number, and/or particular invoice (allows partial payments).
- Resets Open Payables File to original condition if operator decides not to proceed from payment selection to checkwriting.
- Places invoices in hold status to prevent inadvertent payment of invoice in question.
- Prints aged open payables report (detail or summary).
- Lists open payables by due date and vendor.
- Prints cash requirements report.
- Prints cash disbursement journal and purchase journal.
- Provides checkwriting and reconciliation.
- Accepts pertinent transactions from the Purchasing Application, if installed and interfacing.
- Distributes to the General Ledger, if installed.
- Supports up to 20 companies.
- Prints vendor analysis report by vendor number or dollar expenditure, and includes year-to-date purchases and discounts taken and lost.

PAYROLL (5727-D49)

- Provides hourly/salary/executive payroll for regular, overtime, premium, vacation and sick pay.
- Payroll frequency specified by employee: Weekly, biweekly, semi-monthly or monthly.
- Shift differential maintained as cents to be added to the appropriate rate or as a percentage of the appropriate that must be added to it.
- If both 'Attendance' and 'Labor' transactions (job-related details) are entered, the system balances the two figures within a user-specified tolerance. Balancing is done by employee for each day and/or each pay period.
- Applies shift pay as either direct or indirect expense.
- Identifies abnormally large gross earning amounts and large check amounts.
- Ability to 'protect' executive pay checks with an extra level of security clearances.
- A standard tax algorithm calculates most present state taxes based on customer-provided data. Local taxes may fit the standard tax algorithm.
- Calculates Federal withholding and FICA taxes.
- Support is provided to calculate most present state disability insurance deductions based upon customer-provided data.
- Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined.
- Miscellaneous deductions by percent, fixed amount, hourly rate, upper limit and cyclic within a user-specified frequency are provided.
- Makes taxable or nontaxable adjustments.
- Makes deductions for multiple unions.
- Union deduction by percent, hourly rate, and fixed amount within a user-specified frequency are provided.

- Union deductions may be employer- or employee-paid and be taxable or non-taxable.
- Vacation/holiday pay may be part of a regular pay check or on a separate check.
- Provides checkwriting and reconciliation.
- A payroll journal provides an audit trail of entries into the General Ledger application, if installed and activated.
- Provides 941-A and W-2 reports.
- Payoff check capability.
- Support is provided to write a separate check for a bonus payment with a flat percentage of income tax deducted.
- Supports up to 20 companies.
- Accrual accounting option relates pay periods to accounting period.
- Accumulated hours (including overtime) for both hourly and salaried employees.
- Supports up to three simultaneous state and local taxing bodies per employee.
- Terminates employee with one transaction.
- Supports nine pay cycles.
- Provides option to print employee address on check.
- Deducts non-FIT taxable pension.

CROSS-APPLICATION SYSTEM SUPPORT (5727-D4A)

The Cross-Application System Support module provides functions that are common to many of the System/36 DMAS applications; and is required to be installed along with the first DMAS application. Instead of including these functions in each of the other DMAS products, they are packaged here in one place - the Cross-Application Support module. Some of the System/36 DMAS areas that are supported by the Cross-Application System Support functions include:

- Installation
- Main menu selection function
- General disk file management
- File backup
- Restart, restore and recovery
- Application or program fixes

DMAS INSTALLATION AIDS

The applications (Billing, Accounts Receivable, Inventory Control, Sales Analysis, Purchasing, Inventory Management, General Ledger, Accounts Payable and Payroll) may be installed in any sequence. However, Inventory Management must have basic inventory accounting information to operate. This information is provided by the Inventory Control module, or the customer's own inventory accounting application (which must be installed and operational prior to installing Inventory Management). The CrossApplication System Support is a prerequisite for any one or all these applications. It is also intended for the experienced DMAS II user who wishes to add a new DMAS II application.

Self-Install Workbooks (*Installation Made Easy*, SH30-0689 and SH30-0730) provide step-by-step guidance through the planning and installation of the above DMAS Customer Service and Financial Applications. File sizing and run time options are explained in the workbooks. The workbooks should be ordered prior to installation. Data entry forms for master files are included that describe the information in the fields of each record type in the files.

A set of programs is included in the product that will assist with the installation tasks. These programs are initiated by one command, and provide prompts for workbook responses, calculate disk/diskette requirements, initialize the required diskettes, load the programs to System/36 DMAS libraries, and back up all of the DMAS files and libraries.

For Inventory Management, installation guidance and procedures are provided in the *Program Description and Operations Manual*.

PTF APPLICATION SERVICE AID

This service aid is available for the Customer Service and Financial Applications, and provides an improved method of support and control for application of PTFs, as well as an automated audit trail of the activity. This service aid has been designed so that customers can increase their self-sufficiency by being able to apply their own PTFs and refreshes.

This aid provides the following features:

- The total or partially automatic replacement of corrected modules in a refresh.

**PROGRAM PRODUCTS****S/36 DMAS (cont'd)**

- Built-in safeguards to prevent inadvertent replacement of modified modules.
- Source code image PTFs additionally provided with refresh diskettes to facilitate manual application to modified modules.
- Cross-reference listings of PTFs contained in refresh.
- Audit trail listing of PTFs applied during refresh session.
- Automatic logging of PTF numbers into the library log.

**Customer Education**

An IBM Guided Learning Center (GLC) or an IBM Customer Center can provide a list of courses available for System/36 and System/36 DMAS. Additionally, interactive self-study courses (S/36 DMAS Operator Instruction), will be available at program availability. The course teaches workstation and system console operators how to use System/36 DMAS. All components of the course can be ordered using the SBOF number or individual components can be ordered by form number.

The self study courses consist of the following:

**Customer Service Applications Operator Instruction (SBOF-1395)**

**System Operator Study Guide (SR30-0269) ... Workstation Operator Advisor Guide (SR30-0270) ... Workstation Operator Study Guide (SR30-0271) ... Four 2D Diskettes (SR30-0526) ... Binder for the above components (SR30-1056).**

**Inventory Management Training Aid (SV30-0527)**

**Financial Applications System Operator Instruction (SBOF-1126)**

**System Operator's Study Guide (SR30-0901) ... 1-inch, 3-ring easel binder (SR30-0324).**

**Financial Applications Workstation Operator Instruction (SBOF-1128)**

**Advisor Guide (SR30-0900) ... Study Guide Volume 1 (SR30-0902) ... Study Guide Volume 2 (SR30-0903) ... Sample Runbook (SR30-0906) ... 2-inch, 3-ring easel binder (SR30-0327) ... Education diskettes (used with Workstation Operator Guide Volume 2) (SV30-0706).**

**CUSTOMER RESPONSIBILITIES**

Installation of System/36 licensed programs is a customer responsibility. IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer. The customer has responsibility for providing data base conversion programs when the conversion is from a system other than a System/34. Implementation of the security procedures provided in this program product is the customer's responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration requirements are an IBM System/36 with:

- 5360 System Unit with a Diskette unit, 30MB of disk storage and 128K bytes of main storage.
- One IBM 5224, 5225, 5226 or 3262 Printer.
- One IBM 5251 Display Station mdl 11 or one IBM 5291 or 5292 Display Station.

Although there is nothing inherent in the design of DMAS to prevent the use of the minimum system configurations stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size and operating requirements.

The amount of disk storage required is influenced by:

- The number of applications installed
- The volume of daily transactions
- The number of customer, item and ship-to records
- The number of open customer orders and unpaid invoices
- The number of purchase orders on file
- The number of contract items and items with quantity discounts
- The number of vendor and vendor/item records
- The number of Accounts Payable entry records stored

Additionally, a main storage capacity greater than the stated minimum required will often provide improved performance. For example, performance is affected by:

- The number of DMAS application tasks operating concurrently.

- The number of workstations operating concurrently on the same or different applications, and
- Any other applications operating concurrently.

**SOFTWARE REQUIREMENTS**

The programs are written in the IBM System/36 RPG II programming language and execute under control of the IBM System/36 System Support Program (5727-SS1). The IBM System/36 RPG II Compiler (5727-RG1), the IBM System/36 Utilities (5727-UT1), as well as the System/36 DMAS source programs, must be available if modifications to the programs are expected.

**DOCUMENTATION**

(available from Mechanicsburg)

The following publications support System/36 DMAS and are available now:

*Executive Brochure (G580-0457) ... Reports and Displays: Customer Service Applications (G230-0245) ... Reports and Displays: Financial Applications (G280-0255) ... Customer Service Applications: General Information Manual (GH30-0690) ... Financial Applications: General Information Manual (GH30-0696) ... Inventory Management Availability Notice (GB30-2559) ... Executive Perspective of Computer-Assisted Inventory Management (GB30-0793).*

The following publications will be available September 16, 1983:

*Installation Made Easy Workbooks: ... Customer Service Applications (SH30-0689) ... Financial Applications (SH30-0730)*

The following publications will be in stock at DMAS availability:

*Licensed Program Specifications (GH30-0695) ... Billing Reference Manual (SH30-0676) ... Accounts Receivable Reference Manual (SH30-0673) ... Inventory Control Reference Manual (SH30-0680) ... Sales Analysis Reference Manual (SH30-0670) ... Purchasing Reference Manual (SH30-0683) ... General Ledger Reference Manual (SH30-0698) ... Accounts Payable Reference Manual (SH30-0722) ... Payroll Reference Manual (SH30-0725) ... Cross-Application System Support: Customer Service Applications Reference Manual (SH30-0686) ... Financial Applications Reference Manual (SH30-0728) ... Program Description and Operations Manual: Inventory Management (SH30-0694) ... Buyers Guide: Inventory Management (GB30-2579) ... Billing Runbook (SH30-0677) ... Accounts Receivable Runbook (SH30-0674) ... Inventory Control Runbook (SH30-0681) ... Sales Analysis Runbook (SH30-0671) ... Purchasing Runbook (SH30-0684) ... Inventory Management Runbook (SH30-0730) ... General Ledger Runbook (SH30-0697) ... Accounts Payable Runbook (SH30-0721) ... Payroll Runbook (SH30-0724) ... Cross-Application System Support: Customer Service Applications Runbook (SH30-0687) ... Financial Applications Runbook (SH30-0727) ... Customer Service Applications Operator Instruction (SBOF-1395) ... System Operator Study Guide (SR30-0269) ... Financial Applications Workstation Operator Instruction (SBOF-1128) ... Financial Applications System Console Operator Instruction (SBOF-1126) ... Inventory Management Training Aid (SBOF-1149) ... Billing Logic Manual (LH30-0678) ... Accounts Receivable Logic Manual (LH30-0675) ... Inventory Control Logic Manual (LH30-0682) ... Sales Analysis Logic Manual (LH30-0672) ... Purchasing Logic Manual (LH30-0685) ... General Ledger Logic Manual (LH30-0699) ... Accounts Payable Logic Manual (LH30-0723) ... Payroll Logic Manual (LH30-0726) ... Cross-Application System Support: Customer Service Applications Logic Manual (LH30-0688) ... Financial Applications Logic Manual (LH30-0729).*

**RPQs ACCEPTED: No**

## PROGRAM PRODUCTS

**SYSTEM/36 FORTRAN IV  
5727-FO1****PURPOSE**

The System/36 FORTRAN IV (X3.10-1966) licensed program processes programs written in the System/36 FORTRAN IV (System/34 compatible) language, producing output suitable for execution with the System/36 System Support Program (5727-SS1).

**HIGHLIGHTS**

- FORTRAN will run concurrently with BASIC on the System/36.
- Up to 255 display formats may be accessed from a program.
- Program versions can be tracked with the modification reference number and date/time stamp in the source member directory entry, the compile listing, and the subroutine/load member directory entry.
- Online programming is supported by the diagnosed source member output option of the compiler. Summary information is placed at the beginning and end of the source member. Diagnostic messages are inserted in front of statements that contain errors. The member may then be viewed/changed by SEU (Source Entry Utility).
- Online programming also provides an automatic cycle that enables you to enter a program, compile it, review/correct errors found by the compiler (using SEU), and recompile the program without leaving the display or using a printer. The inserted diagnostics are ignored during the next compilation or can be removed by SEU.
- Many compilation options such as source/no source, map/no map, text/no text, object/no object, and subroutine/no subroutine library name can be overridden from the online prompts.
- Logical data, logical expressions, and logical IF are supported. Logical elements (constants, variables and arrays) contain true or false values.
- Operation symbols are used in logical expressions:
 

.NOT. (negation)	.LT. (less than)
.AND. (conjunction)	.LE. (less or equal to)
.OR. (union)	.EQ. (equal)
	.GT. (greater than)
	.NE. (not equal)
	.GE. (greater or equal to)
- Logical expressions evaluate elements to obtain true or false values.
- Logical assignment statements define a relationship - placing the value of a logical expression in a variable or array element.
- Support for Local Data Area (LDA) sizes up to 512 bytes to provide more flexibility in passing data between job steps.
- The compiler defaults to the current user library to improve programmer productivity.

**DESCRIPTION**

System/36 FORTRAN IV (X3.10-1966) licensed program processes programs written in the System/36 FORTRAN IV (System/34 compatible) language producing output suitable for execution with the System/36 System Support Program (5727-SS1).

The System/36 FORTRAN IV (System/34 compatible) language contains those features defined in American National Standard Basic FORTRAN X3.10-1966; language extensions supported by System/34 Basic FORTRAN and additional features and capabilities previously available only with certain full FORTRAN compilers.

The System/36 FORTRAN IV library contains mathematical and service subprograms required during execution to perform arithmetic operations, input and output constant conversions and input/output control.

System/36 FORTRAN IV is supplemented by a commercial subroutine package.

**CUSTOMER RESPONSIBILITIES** (not applicable)

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/36 FORTRAN IV (IBM System/34 compatible) licensed program runs on all models of the IBM System/36. FORTRAN IV graphics on the IBM 3262 Printer are provided by any 64-character or 96-character print belt or by the 48-character FORTRAN IV print belt. The IBM 5224 and 5225 Printers provide FORTRAN IV graphics.

**SOFTWARE REQUIREMENTS**

The current release of the IBM System/36 FORTRAN IV (System/34 compatible) licensed program operates under control of the current release of IBM System/36 System Support licensed program (5727-SS1).

**COMPATIBILITY**

System/36 FORTRAN IV language is source compatible with IBM System/34 FORTRAN IV.

Programs must be recompiled to execute on the System/36. Some compiler-supplied procedures, such as 'FORTMOVE', are not supported because the function is provided in another manner with System/36.

**CONVERSION**

No conversion of source programs from System/34 is required.

**SECURITY/INTEGRITY** (not applicable)

**PERFORMANCE** (not applicable)

**SYSTEM INTEGRITY**

The same as the System/36 System Support Program (5727-SS1).

**DOCUMENTATION**

(available from Mechanicsburg)

*Programming With FORTRAN IV (SC21-9005) ... IBM System/36 FORTRAN IV (System/34 Compatible) Licensed Program Specifications (GC21-9010) ... FORTRAN IV (System/34 Compatible) Messages (SC21-9055).*

**RPQs ACCEPTED:** Yes

**PROGRAM PRODUCTS****SYSTEM/34 to SYSTEM/36 MIGRATION AID**  
**5727-MA1****PURPOSE**

The System/34 to System/36 Migration Aid is a set of System/34 and System/36 programs and procedures that assist the user in moving System/34 applications to a System/36. This Migration Aid does not address conversion of MRJE or SRJE communications applications.

The Migration Aid allows a user to do the major part of the migration (the library analysis work) on the installed System/34 prior to the arrival of the System/36. Source program compilations are run on the System/36.

The Migration Aid runs on a 48K minimum System/34 and all models of the System/36. The use of the Migration Aid can relieve the user of many time consuming tasks, ensure greater migration accuracy, and improve user productivity during the migration.

**HIGHLIGHTS**

- Easy to use (menu- and prompt-driven).
- Identifies source and OCL differences in reports.
- Makes limited modifications to OCL statements and command procedures.
- Generates OCL to save/restore the System/34 user files.
- Generates OCL to move user library members from the System/34 to the System/36.
- Generates procedures to compile System/34 source that must be recompiled on the System/36.
- Runs generated recompilation procedures with minimal user intervention.

**DESCRIPTION**

The System/34 to System/36 Migration Aid provides an automated, structured method of moving System/34 source, procedures, and data files to the System/36. The Migration Aid is easy to use. It is structured such that after careful planning of the conversion activities by someone who is familiar with the System/34 installation, the actual running of the Migration Aid may be done by a system console operator. The Migration Aid provides the following functions:

- Create a control file of the names and sizes of libraries and data files installed on the System/34.
- Display a user selection list of the names of those libraries and files.
- Identify load members in a user library without a matching source member.
- Attempt to identify the type of source members in a library.
- Calculate an estimate of the required number of diskettes to save all selected source, procedure members, and data files and, optionally, initialize the estimated number of diskettes.
- Analyze operation control language, procedures and menu commands for specific differences that may require change.
- Create operation control language to save System/34 user libraries (source and procedure members only) and data files on diskette.
- Create operation control language to restore user libraries and data files on the System/36.
- Create operational control language to compile identified source programs on the System/36.
- Copy user data files, source and procedure members from System/34 to the System/36.
- Recompile identified source programs on the System/36.
- Maintain audit trails of migration activities.

The Migration Aid identifies and creates compile OCL for the following source programs:

- RPG II
- RPG II Auto Report
- Display Formats
- Menus
- Message Members
- Data File Utility (DFU) (some manual assistance is required)
- Workstation Utility (WSU)
- FORTRAN
- COBOL
- Assembler

**CUSTOMER RESPONSIBILITIES (not applicable)**

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

A minimum of a 48K IBM System/34 with 26K bytes of user area is required to run the Migration Aid. The Migration Aid runs on any model of the IBM System/36.

On the IBM System/34, disk storage equal to the largest library to be migrated, plus approximately 350 blocks for the Migration Aid library and work files.

A sufficient number of diskettes to store the libraries and files being saved. The Migration Aid estimates the number of diskettes required. On the IBM System/36, approximately 300 blocks of disk storage are required for the Migration Aid library and work files.

**SOFTWARE REQUIREMENTS**

The current version of the IBM System/34 System Support Program (5726-SS1), or the IBM System/34 System Support Program Subset (5726-SS2) is supported.

The IBM System/36 Release 1 System Support Program (5727-SS1).

The IBM System/36 Utilities licensed programs and appropriate language compilers are required to recompile programs being migrated from IBM System/34 to IBM System/36.

**COMPATIBILITY**

The Migration Aid is a stand-alone application. It uses System/34 System Support Program, System/36 System Support Program, and Utilities licensed programs and appropriate language compilers. The Migration Aid has no dependencies on any other related announced programs.

**CONVERSION**

The Migration Aid addresses migration of user applications from System/34 to System/36. The Migration Aid supports System/34 Release 9 migration to System/36. Subsequent enhancements to System/34 will not be addressed directly, but the Migration Aid can be used to migrate to System/36 at any time.

**SECURITY/INTEGRITY**

The Migration Aid accesses user libraries and files on the System/34. The person responsible for running the migration must have access and update security clearance to all libraries and files that will be migrated using the Migration Aid, if security is on the System/34.

**PERFORMANCE**

Overall performance of the Migration Aid is dependent upon the size of the libraries and files to be migrated. Normally, the major portion of the migration time will consist of diskette handling and recompilations on System/36.

**DOCUMENTATION**

(available from Mechanicsburg)

*System/36 Migration Aid Program Description/User's Guide (SC21-9040) ... System/36 Migration Aid Licensed Program Specifications (GC21-9058).*

**SYSTEM INTEGRITY**

The same as the System/36 System Support Program (5727-SS1).

**RPQs ACCEPTED: Yes**

PROGRAM PRODUCTS

**SYSTEM/36 MANUFACTURING ACCOUNTING AND  
PRODUCTION INFORMATION CONTROL SYSTEM  
MAPICS**

PRODUCTION CONTROL AND COSTING ... 5727-M41  
 PAYROLL ... 5727-M42  
 ACCOUNTS PAYABLE ... 5727-M43  
 ACCOUNTS RECEIVABLE ... 5727-M44  
 INVENTORY MANAGEMENT ... 5727-M45  
 PRODUCT DATA MANAGEMENT ... 5727-M46  
 GENERAL LEDGER ... 5727-M47  
 SALES ANALYSIS ... 5727-M48  
 ORDER ENTRY AND INVOICING ... 5727-M49  
 DATA COLLECTION SYSTEM SUPPORT ... 5727-M4A  
 MATERIAL REQUIREMENTS PLANNING ... 5727-M4B  
 CAPACITY REQUIREMENTS PLANNING ... 5727-M4G  
 CROSS-APPLICATION SYSTEM SUPPORT ... 5727-M4X

**PURPOSE**

The System/36 Manufacturing Accounting and Production Information Control System (MAPICS) provides an integrated and comprehensive workstation-oriented accounting, financial, and manufacturing control system for the small-to-medium manufacturer and some of the like process industries.

**HIGHLIGHTS**

- The System/36 hardware and system software functions (spooling, inquiry, multiprogramming) are integral parts of the MAPICS application design.
- Workstation data entry is designed for simplicity and ease-of-use. Screen displays provide guidance for mandatory input and for fields that may be overridden. Error messages signal errors which can then be corrected interactively by the operator.
- Interactive data entry, concurrent edit and correction for multiple applications through multiple workstations while batch programs operate in the background.
- Inquiry into master files concurrent with data entry.
- System tailoring procedures permit the user to select optional functions and reports, and to determine the sizes of all files used by the applications. Functions and file sizing may be modified as the customer environment changes by reexecuting the tailoring procedures.
- Ready-to-execute procedures, and object code are provided.
- Source code is available.
- File load programs for master files are provided.
- Online file maintenance of most master files with optional file maintenance reports.
- Optional system procedures for master file backup and restart.
- Password security helps deter unauthorized use of applications and functions within applications. A higher level of security helps protect selected master file data.
- Documentation for each application includes a reference manual, a runbook, and a logic manual. From an overall MAPICS system perspective, an installation guide, a reference manual, a runbook, and a logic manual are provided. Self-study instructional materials are also available for operator education.
- Sample documents are provided for both data collection and data entry.
- Control features and documents are included to assist in establishing audit trails.

**DESCRIPTION**

MAPICS is a set of 13 independent, but interrelated, ready-to-execute applications for the small-to-medium manufacturer consisting of:

- Cross-Application System Support
- Order Processing and Accounting Applications
  - Order Entry and Invoicing
  - Inventory Management
  - Accounts Receivable
  - Sales Analysis
- Financial Applications
  - General Ledger
  - Accounts Payable
- Manufacturing Applications
  - Inventory Management
  - Product Data Management
  - Material Requirements Planning
  - Production Control and Costing
  - Capacity Requirements Planning

- Data Collection
  - Data Collection System Support

These applications are designed for marketing in any combination and installing in any sequence, with the following exceptions:

- All applications require Cross-Application System Support.
- Sales Analysis requires at least one of the other Order Processing and Accounting applications.
- Material Requirements Planning requires both Inventory Management and Product Data Management.
- Production Control and Costing requires the Inventory Management application. (Although Product Data Management is not an absolute requirement, its use is highly recommended.)
- Capacity Requirements Planning always requires the Inventory Management application and either Product Data Management or Production Control and Costing.

Each application has certain required records within a cross-application control file which contain questionnaire responses. These records allow the users to select report formats, file sizes, and functions to suit their needs. The questionnaire responses are entered during initial installation and may be changed as needed. The System Tailoring Procedures allow these responses to be entered or modified. It provides the following:

- All functions are included in the application programs but only required functions are actually executed.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- Tailors the Operator Control Language (OCL) on-site at installation time.
- File sizes may be expanded or contracted as needed by rerunning the system tailoring procedure.

The *MAPICS Installation Made Easy Workbooks* provides instructions for planning the installation of one or more MAPICS applications. Three separate installation workbooks are provided to cover all the MAPICS applications.

Reference manuals provide an explanation of the system to enable the user to understand the applications from a functional and operational standpoint. Manuals are provided at two levels. A reference manual for MAPICS operations gives guidance to the installation supervisor on managing and running the applications from a total-systems viewpoint. One management operations manual is provided for MAPICS operations covering all applications.

Individual reference manuals for each application instruct the workstation manager on how to conduct day-to-day operations of the application.

Similarly, one system runbook is provided for the systems console operator, and individual application runbooks for the workstation operators. The console operations runbook contains detailed step-by-step instructions for operating MAPICS at the console. Included are an overview of the system and application flow, system considerations, and hints on troubleshooting. All of the error messages that can be generated by any of the applications in the offering are contained in a Systems Messages Manual.

The individual application runbooks provide a summary of the application and workstation operations, application and screen flow, and a detailed description of how to run each procedure in the application.

The MAPICS system logic manual is provided as licensed material for use by the self-sufficient customer, and for the systems engineer in maintaining and modifying MAPICS. Information on system architecture, naming conventions, system controls, system program functions, and specifications, relationship among system files, and other information applicable to all applications is presented in this system manual.

In addition, logic manuals for maintaining and modifying each application are available. Information relevant only to the subject application, such as program descriptions, cross-reference lists, and data dictionary, is presented.

Instructional support is provided to facilitate installation and operation. Self-study instructional material is provided for the systems console operator, and for the application workstation operator to train them in the use of the runbooks. Only one copy of each manual is needed per customer no matter how many applications are to be installed.

Modular Application and Systems Training (MAST) is available to help identify and quantify benefits for top executives. MAST aids the customer in planning an effective implementation and includes techniques to assure top priority and the commitment of all the

PROGRAM PRODUCTS

**System/36 MAPICS (cont'd)**

necessary resources. To assist in determining Management function and fit, there is a MAPICS features course for all MAPICS applications. In addition, for Inventory Management, Product Data Management, Production Control and Costing, and Material Requirements Planning, there are concepts, implementation, and courses that use the system to make the customer more self-sufficient and reduce the effort and time required to install these applications. To learn more about how to use MAST, refer to the *MAST Manufacturing Education Guide* (GH30-0241).

**PRODUCTION CONTROL AND COSTING (5727-M41)**

The Production Control and Costing application provides for shop packet creation and for the tracking and costing of an ordered item as it is manufactured; it also measures work center utilization and efficiency plus queue analysis and control functions. The application also creates, maintains, and updates the operation and miscellaneous charge information associated with jobs within the user's shop. It requires the installation of Inventory Management and has optional interfaces with Accounts Payable, Payroll, and Product Data Management as well as accepting data from Data Collection System Support (Product Data Management is highly recommended). Open operation information may also be passed on to Capacity Requirements Planning.

This application uses information which Inventory Management creates and maintains in conjunction with its own information to produce all necessary reports to track and cost an order. In addition, it produces a prioritized worklist by work center to assist production control in moving work through the shop in the most efficient manner.

The capability of accepting transactions via the workstation and/or diskette is provided in order to support Data Collection System Support diskette output. The transactions passed via the Data Collection System Support interface are labor, (operations) moves, and machine times. The labor transaction depends on the user's request of a Payroll interface. If the Payroll interface has been requested, the labor transactions are passed through Payroll to Production Control and Costing.

Additional functions include inquiry of order status, item status, and work center status, as well as report printing of order status and open order exceptions.

System/36 MAPICS Production Control and Costing requires the use of the MAPICS Inventory Management (5727-M45) application.

**PAYROLL (5727-M42)**

The Payroll application starts with the basic employee time record as input and handles the calculation of wages, taxes, deductions, checkwriting, and file updating for both salaried and hourly pay plans. Employee time data may be entered from a workstation or can be passed from the Data Collection System Support application. Payroll can interface with both the General Ledger and Production Control and Costing applications. Transactions may be passed to General Ledger on either a cash or accrual basis during printing of the payroll distribution journal. Job-related data for both hourly and salaried employees can be passed to the Production Control and Costing application.

Current payroll data is entered from time cards or job reports either daily or weekly, and is edited to validate employee and job information. A user with an incentive payroll must manually calculate gross pay and then enter it into the system. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may fit the standard tax algorithm provided. The state disability insurance deduction also uses a standard algorithm based upon customer-provided data. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined. Deduction programs compute voluntary deductions for a specific pay period as well as one-time and union deductions. All necessary reports are furnished including payroll register, deduction reports, checks, Federal 941-A reports, and W-2 reports.

Support for up to 20 companies, a manual payroll check procedure, and the ability to handle an employee working in multiple states, counties, cities, unions, jobs, or shifts on the same day are provided to give the user wide flexibility. Labor distribution of payroll hours and dollars is done in the same detail as the basic employee time record, that is, department, work center, job number, operation.

Several other reports are printed:

- Vacation, holiday, and sick pay register
- Year-to-date and quarter-to-date earnings register
- State and local tax register
- Check reconciliation register
- Workmen's compensation worksheet
- Union deduction register
- Paychecks (with option to print employee address)
- Governmental reports Federal 941-A, W-2 (and associated registers)

**ACCOUNTS PAYABLE (5727-M43)**

The Accounts Payable application keeps accurate and detailed records of vendor invoices and credit memos from the time they are entered into the system until they are paid and the check reconciled. Although Accounts Payable can be installed on a stand-alone basis, it is frequently used with the General Ledger application to which it can distribute the dollar amounts spent against the proper account numbers. There also exists an interface to Production Control and Costing by which Accounts Payable can pass job-related purchase information.

Transaction auditing is aided by a journal referencing scheme which causes every transaction affecting General Ledger to refer to a particular journal and line number within that journal. A double-entry bookkeeping method keeps transactions in balance.

Procedures for handling manual checks, petty cash, and check reversals are provided, as well as online selection of invoices for payment selection including partial payments, selection by date, and selection by vendor and invoice. Credit memos can be automatically generated, allowing the user to reverse a previously entered invoice without having to rekey all the invoice's indicative information and distribution.

Support is provided for up to 20 companies. Key reports include an aged payables report, two vendor analysis reports, plus normal accounts payable audit trails such as purchase journal, cash requirements reports, and cash disbursements journal. When checks are printed, options are available to make the checks payable to 'assignees' (due to factoring by the vendor) and to print remittance advice 'overflow' data on a separate remittance advice form.

**ACCOUNTS RECEIVABLE (5727-M44)**

The Accounts Receivable application keeps detailed records of customer charges, cash payments, credit and debit memos, and other adjusting entries from the time they are entered into the system until they are paid or otherwise applied. The application allows for a combination of open item and balance-forward handling of individual customer accounts. Interfaces with Order Entry and Invoicing, Sales Analysis, and General Ledger are provided.

Invoices and credit memos can be entered directly and/or received from the Order Entry and Invoicing application. Cash receipts and adjustments are entered into the system directly, update the accounts receivable immediately, and can generate General Ledger transactions via an interface. The application provides optional late charges by customer for both open-item and balance forward accounting and support for up to 20 companies.

As required, the user can generate account status reports for a single customer or a group of customers as well as an aged trial balance in any of the following forms:

- Summary or detail
- Past-due accounts only
- Delinquent accounts only
- Minimum balance
- Aging based on current status
- Aging based on date of next statement
- Future aging of invoices

Additionally, statements and delinquency notices can be printed at user-determined frequency. The following features are provided:

- Option to age unapplied cash/adjustment
- Ability to identify credit memo by a unique number, but still relate the credit memo back to a specific invoice number
- Ability to apply cash, without knowing specific invoice numbers

**INVENTORY MANAGEMENT (5727-M45)**

The Inventory Management application processes all transactions affecting the status of the inventory balances. It is a central application which can interface with Order Entry and Invoicing, Sales Analysis, Product Data Management, and Data Collection System Support applications. Inventory Management is a prerequisite for installing either Material Requirements Planning, Production Control and Costing, or Capacity Requirements Planning.

The basic functions of this application provide the 'in's and out's' of inventory accounting plus the ability to cycle count the physical inventory. The reporting functions include calculating current inventory investment and the annual inventory turns, as well as valuation techniques for tax reporting. Finally, you have the ability to release purchase and manufacturing orders and track their progress until each order is closed out.

The application provides for inventory valuation based on average, last, or standard costs as well as LIFO and FIFO options. Physical inventory checklists can be generated for multiple or selected warehouses, with or without cycle count options. In addition to printing a stock

PROGRAM PRODUCTS

**System/36 MAPICS (cont'd)**

transaction register for audit control, a stock status report can be printed for all items or on an exception basis, and a stock status review can be had by item or by item within vendor.

A component 'availability check' is performed during the release phase, and items and orders with shortages are identified on special exception reports. At order release time, component allocation for manufacturing orders can be done to ensure that component inventory needs are accounted for between order release time and the actual withdrawal from stock.

Transactions can be entered from diskette or workstation; from diskette to go through batch edit and batch update; transactions entered through a workstation are edited immediately and can update balances either immediately or later, (based on a System Tailoring option. In either case, an audit trail of all transactions is produced.

**PRODUCT DATA MANAGEMENT (5727-M46)**

The Product Data Management application maintains bills of material, product options, routing, and work center data bases and provides for costed retrievals and cost simulation. In interfacing with Inventory Management, Material Requirements Planning, Production Control and Costing, and Capacity Requirements Planning, this application is an information point for bills of material and routings. Order Entry and Invoicing also require Product Data Management in order to enter end items with standard options.

The ability to perform inquiry into the product structure and routing files is provided. Application highlights include the capability for multiple screen displays, mass replace, mass delete, and 'same-as-except' functions which facilitate maintenance to the product structure file. In addition to option handling techniques, use of engineering effectivity date simplifies engineering change control procedures. Labor and overhead rate tables can be used for costing in lieu of routing and work center files.

Several reports can be printed:

- Listings of item master, feature/option table and work center master
- Retrievals of product structures and routings
- Cost reports including management cost summary and cost variations

**GENERAL LEDGER (5727-M47)**

The General Ledger application is the terminal point of all accounting entries; it integrates completely with Accounts Payable and Payroll and accepts cash receipts and adjustment entries from Accounts Receivable. Though it can be installed apart from the other applications, a large number of ledger entries result from the distribution of expenses incurred through Accounts Payable. Therefore, a majority of General Ledger users will likely install Accounts Payable and/or Payroll.

Each transaction entered is assigned a journal number and a unique line number within that journal. This journal reference number is kept with the transaction until it is posted to the master record during period-end closing. Transactions coming from other interfacing applications also use this reference numbering scheme. This makes auditability easier throughout the application. Thorough editing of all data at entry time, plus the fact that a double-entry bookkeeping system is used ensures that all credit entries are offset by an equal value of debit entries, and provides for smooth period closings. Diskettes can be used for processing recurring entries. The application gives the user support for up to 20 companies and choice of either a 12-month or 13-period fiscal year. The General Ledger listing displays (by account number) transaction original journal reference numbers, providing a clear and easily used audit trail of all transactions.

The balance sheet and income statement can be formatted to the user's particular requirements by use of a format file which permits special spacing, user-specified columnar printing, user-specified totaling, and up to 73 accounts to be totaled and printed with one line of description. By exploiting the capabilities of the format file, the user can produce departmentalized and/or combined (not consolidated) statements for multiple companies. Both the balance sheet and income statement can be comparative to last year and the income statement can also be comparative to budget figures.

**SALES ANALYSIS (5727-M48)**

The Sales Analysis application consolidates all sales and credit memo transactions affecting customers, salespersons, and items that have been entered into the system. Input can come from Order Entry and Invoicing, Inventory Management, or Accounts Receivable; at least one of these applications must be installed as a prerequisite.

Data is passed to Sales Analysis via interface files as shown:

Customer-related data can come from	Salesperson-related data can come from	Item-related data can come from
OE&I A/R	OE&I A/R	OE&I IM

Either 12-month or 13-period reporting may be selected by the user. These transactions are posted to summary files which provide a historical data base for management reports. Summary files may also be corrected by file maintenance with an entry list providing an audit control.

Provision has been made for multicompany support for up to 20 companies for customer summary analysis, for flagging specific items for inclusion in sales analysis, and for inquiry into the summary files from the workstation. The reports included in the application are sales by customer, salesperson, and item with the option to display comparative data as well.

The System/36 MAPICS Sales Analysis application requires the use of at least one of the following MAPICS applications:

- Order Entry and Invoicing (5727-M49)
- Accounts Receivable (5727-M44)
- Inventory Management (5727-M45)

**ORDER ENTRY AND INVOICING (5727-M49)**

The order entry function is a key starting point for activity in a manufacturing organization. For make-to-order products, this function describes the item to be manufactured and when the item is required. For items shipped from inventory, it streamlines the order processing so items can be shipped promptly. It interfaces with Inventory Management by directly updating quantity on hand data, with Accounts Receivable by providing invoice summary information, and with Sales Analysis by providing item, customer and salesperson data. The data stored in the open order files can also be analyzed by Material Requirements Planning. Customer open orders can be passed to Capacity Requirements Planning.

As orders are entered, customer data is validated and, if accounts receivable is installed, a credit check is performed. Initial ship dates may be established based on inventory availability or manufacturing orders, and item pricing data is checked for validity and completeness. The term 'orders' includes regular and blanket orders. A blanket order specifies a single item with multiple ship dates and specific quantities. Both order types may be entered in a similar manner. Invoicing may be accomplished by either direct entry or from orders previously entered into the system. Invoicing encompasses the computation of prices, taxes, and invoice totals. Pricing can be based on established contract prices, quantity breaks, markup from cost, or discounting from list price. Order acknowledgments, picking lists, invoices, and bills of lading can be printed.

If Product Data Management is installed, orders can be entered for end items which have standard options associated with them. Since these options may be required, they are checked at entry time to make sure the data is sufficient.

As soon as the Open Order files have been updated, the user has immediate access to current information such as:

- All orders for a particular item
- All orders for a particular customer
- Details for a particular order
- Blanket order status
- Customer status

The application also handles credit memo printing and the posting of back orders to the open order files. Support for up to 20 companies is provided as well as the generation of worksheets for general ledger input, commission accounting, and taxing body reporting.

**DATA COLLECTION SYSTEM SUPPORT (5727-M4A)**

The Data Collection System Support application provides an interface between a 5230 Data Collection System and the Payroll, Inventory Management, and Production Control and Costing applications. Inventory and labor transactions can be entered at conveniently located terminals, so information can be entered as it occurs, thereby eliminating many manual steps before this data can be processed on the System/36. Therefore, it provides a link between shop floor reporting and the MAPICS applications, and an integrated labor-reporting, payroll, and production control system.

The Data Collection System Support Application allows customers to define unique shop floor actions which are suited to their requirements. The output from this definition phase is used by the 5231 Contoller. Programs are provided so that data from the shop floor can be transmitted to the System/36, or the diskette can be carried to the System/36. Elapsed time is then calculated (based on user options regarding shift start/stop times, lunch breaks, and other paid/unpaid breaks) and prepared for payroll processing as attendance records or job records. The application will also apportion an employee's time who works on overlapping jobs.

The application produces attendance, absentee, and labor reports, which provide a complete audit trail. Labor transactions may also be entered on the 5251 Display Station, as well as 5230 stations, to utilize

## PROGRAM PRODUCTS

**System/36 MAPICS (cont'd)**

the elapsed time calculations for payroll processing prior to installing a 5230 system.

**MATERIAL REQUIREMENTS PLANNING (5727-M4B)**

The Material Requirements Planning application is divided into three parts: Master Production Scheduling Planning (MPSP), Material Requirements Planning (MRP), and Order Release Planning (ORP). This application interfaces with and requires installation of Inventory Management and Product Data Management. It also interfaces with Order Entry and Invoicing to the extent that it can compare a master production schedule against customer orders. Firm planned and planned orders can be passed to Capacity Requirements Planning. MPSP determines the production schedule for master-level items (designated by a code in the item master record). Master-level requirements can be compared to forecast and/or customer orders to evaluate the manufacturing plan. Typically, planning requirements for master-level items is an interactive process. This process is simplified by various reports and workstation inquiries. The Material Requirements Planning reports include requirements planning, purchase planning, order recommendation, and cash analysis reports. A shortage report can be generated in the order release cycle if the user chooses to do an availability check. In addition, order release/review and requirements by item inquiries are supported.

Material Requirements Planning will take the approved output of MPSP and generate a total material plan to meet this schedule. This new plan can either be rebuilt (generation) or it can consist of differences from a previous plan (net change). Order recommendations produced from MRP become input to order release. The planner can review changes and approve orders scheduled for release.

System/36 MAPICS Material Requirements Planning requires the use of both the MAPICS Inventory Management (5727-M45) and MAPICS Product Data Management (5727-M46) applications.

**CAPACITY REQUIREMENTS PLANNING (5727-M4G)**

The Capacity Requirements Planning Application is designed to analyze a company's production plan in terms of its plant capacity. This is a very useful tool for a company that wishes to identify those work centers and time periods when overload or underload conditions may be expected to develop. The application allows the production manager to meet the short term overload or underload condition by entering a temporary increase or decrease in work center capacity for a specified time period in the future.

Medium term analysis using the capacity planning run can help a company distinguish between scheduling problems and capacity problems that require changes to the base capacity of a work center.

The production plan used by the application is based on capacity requirements from several sources: Open orders, firm planned orders, planned orders, and under some restrictions, customer orders. Accurate start dates and operation durations are imperative for each manufacturing operation whether these operations come from Production Control and Costing or from Product Data Management's standard routings.

When the production plan and plant capacity have both been defined, capacity planning is ready to schedule and accumulate the workload by user-defined time period. This process will produce analysis files for workstation inquiry or report printing, and may be repeated to help users tune their plant capacity to the current production plan.

Capacity Requirements Planning is a dependent application. It requires orders (customer, open, firm planned and/or planned) and specifications (routing and/or open operations). The minimum support for Capacity Requirements Planning is:

Inventory Management (5727-M45) and Product Data Management (5727-M46)

or

Inventory Management (5727-M45) and Production Control and Costing (5727-M41).

**CROSS-APPLICATION SYSTEM SUPPORT (5727-M4X)**

Cross-Application System Support provides the following functions used by all other applications in MAPICS:

- Copy all master files and optionally the data entry files to diskette.
- Compress files and all remaining disk space.
- Reorganize the records within the master files by removing deleted records and repositioning records to improve performance.
- Reformat data entry files.
- Print file sizing and record count information for each file.
- Display the current modification level of each installed application and the PTF level of each module in an application.
- Verify what pointers from one record to another are correct within files and between files.

- Apply programming temporary fixes.
- Indicate the current status of applications on the system.
- Print a listing of all jobs run since the last master file save.
- Copy all master files from save diskettes back to fixed disks.
- Install, tailor or re-tailor an application.
- Maintain security passwords.
- Activate and reactivate application interfaces requested during system tailoring.
- Reset the file record count history.
- Load master files from records created on diskette.
- Display the status of internal system control file data, data entry files, jobs scheduled on the job queue, and system tailoring questionnaire responses.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance and guidance. The responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer. Implementation of the security procedures provided in this program product is the customer's responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

These products are designed to operate with a minimum configuration of an IBM System/36 with:

- 128K bytes of main storage.
- 30 megabytes of disk storage.
- 2D Diskette.
- One IBM printer, either line or serial, with 132 print positions.
- One IBM Display Station with 1920-character display and 83-key Keyboard.

**SOFTWARE REQUIREMENTS**

The IBM Manufacturing Accounting Production Information Control System (MAPICS) programs are written in IBM System/36 RPG II programming language and are designed to execute under control of:

- IBM System/36 System Support Program (5727-SS1).

The following MAPICS program product is required to execute the remaining MAPICS applications:

- IBM System/36 Cross-Application System Support (5727-M4X).

If modifications are made to the application programs, the following product must also be available:

- IBM System/36 RPG II Compiler (5727-RG1)
- IBM System/36 Utilities (5727-UT1).

Although there is nothing inherent in the design of the IBM System/36 MAPICS applications which prevents the use of the minimum system configurations above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data bases and operating requirements.

The amount of disk storage required is influenced by:

- Number of applications installed.
- Volume of daily transactions.
- Number of records in the required master files.

Additionally, a main storage capacity greater than the stated minimum required will often provide improved performance. For example, performance is affected by:

- Number of applications operating concurrently.
- Number of workstations operating concurrently within the same or different applications.

**DOCUMENTATION**  
(available from Mechanicsburg)**Licensed Program Specifications**

*Cross-Application System Support 5727-M4X GH30-8012 ... Order Entry and Invoicing 5727-M49 GH30-8008 ... Accounts Receivable*



## PROGRAM PRODUCTS

## System/36 MAPICS (cont'd)

5727-M44 GH30-8003 ... *Inventory Management* 5727-M45 GH30-8004 ... *Sales Analysis* 5727-M48 GH30-8007 ... *General Ledger* 5727-M47 GH30-8006 ... *Accounts Payable* 5727-M43 GH30-8002 ... *Payroll* 5727-M42 GH30-8001 ... *Data Collection System Support* 5727-M4A GH30-8009 ... *Production Control and Costing* 5727-M41 GH30-8000 ... *Product Data Management* 5727-M46 GH30-8005 ... *Material Requirements Planning* 5727-M4B GH30-8010 ... *Capacity Requirements Planning* 5727-M4G GH30-8011.

*MAPICS Features Education* (SR30-0369) ... *Binder* (SR30-0370) ... *Audio Tapes* (SR30-0371) ... *Customer Education: MAPICS/DFAS II System Operator Instructions* (SBOF-1126) ... *MAPICS/Workstation Operator Instruction* (SBOF-1127) ... *DFAS II Workstation Operator Instruction* (SBOF-1128)

## Unlicensed Publications

*Data Collection System Support Reference Manual* (SB30-3023) ... *Data Collection System Support Runbook* (SB30-3024) ... *Material Requirements Planning Reference Manual* (SB30-3032) ... *Material Requirements Planning Runbook* (SB30-3033) ... *Production Control and Costing Reference Manual* (SB30-3038) ... *Production Control and Costing Runbook* (SB30-3039) ... *Payroll Reference Manual* (SB30-3044) ... *Payroll Runbook* (SB30-3045) ... *Accounts Payable Reference Manual* (SB30-3014) ... *Accounts Payable Runbook* (SB30-3015) ... *Accounts Receivable Reference Manual* (SB30-3017) ... *Accounts Receivable Runbook* (SB30-3018) ... *Inventory Management Reference Manual* (SB30-3029) ... *Inventory Management Runbook* (SB30-3030) ... *Product Data Management Reference Manual* (SB30-3041) ... *Product Data Management Runbook* (SB30-3042) ... *General Ledger Reference Manual* (SB30-3026) ... *General Ledger Runbook* (SB30-3027) ... *Sales Analysis Reference Manual* (SB30-3047) ... *Sales Analysis Runbook* (SB30-3048) ... *Order Entry and Invoicing Reference Manual* (SB30-3035) ... *Order Entry and Invoicing Runbook* (SB30-3036) ... *Capacity Requirements Planning Reference Manual* (SB30-3020) ... *Capacity Requirements Planning Runbook* (SB30-3021) ... *Cross-Application System Support Reference Manual* (SB30-3011) ... *Cross-Application System Support Runbook* (SB30-3012) ... *System Messages Manual* (SB39-3010) ... *Installation Made Easy Workbooks: Financial Applications* (SB30-3007) ... *Order Processing and Accounting Applications* (SB30-3008) ... *Manufacturing Applications* (SB30-3009).

## Licensed Publications

*Data Collection System Support Logic Manual* (LB30-3025) ... *Material Requirements Planning Logic Manual* (LB30-3034) ... *Production Control and Costing Logic Manual* (LB30-3040) ... *Payroll Logic Manual* (LB30-3046) ... *Accounts Payable Logic Manual* (LB30-3016) ... *Accounts Receivable Logic Manual* (LB30-3019) ... *Inventory Management Logic Manual* (LB30-3031) ... *Product Data Management Logic Manual* (LB30-3043) ... *General Ledger Logic Manual* (LB30-3028) ... *Sales Analysis Logic Manual* (LB30-3049) ... *Order Entry and Invoicing Logic Manual* (LB30-3037) ... *Capacity Requirements Planning Logic Manual* (LB30-3022) ... *Cross-Application System Support Logic Manual* (SB30-3013).

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**SYSTEM/36 CONSTRUCTION MANAGEMENT and  
ACCOUNTING SYSTEM (CMAS)**

**JOB COSTING ... 5727-M66  
GENERAL LEDGER ... 5727-M67  
ACCOUNTS PAYABLE ... 5727-M68  
PAYROLL AND LABOR COSTING ... 5727-M69  
REVENUE ACCOUNTING ... 5727-M6A  
CROSS-APPLICATION SYSTEM SUPPORT ... 5727-M6X**

**PURPOSE**

The System/36 Construction Management and Accounting System (CMAS) provides an integrated and comprehensive workstation-oriented accounting and financial control system for the small-to-medium size construction firm and related project-oriented business. The Payroll and Labor Costing, Accounts Payable, Job Costing, Revenue Accounting, and General Ledger applications are designed to meet the needs of the construction industry.

**HIGHLIGHTS**

- Incorporates the results of successful experience with CMAS, CMAS/34, and feedback from the field.
- Uses an improved installation and tailoring procedure which reduces the decisions and actions required of the user, and makes the entire install/tailor process easier.
- Provides easy online access to system control information to assist in problem determination.
- Complete documentation facilitates faster installation - spooling, inquiry, multiprogramming - are integral parts of the System/36 CMAS application design.
- The System/36 hardware and system software functions - spooling, inquiry, multiprogramming - are integral parts of the System/36 CMAS/ application design.
- Workstation data entry is designed for simplicity and ease-of-use. Screen displays provide guidance for mandatory input and for fields that may be overridden. Messages signal errors which can be corrected interactively by the operator.
- Interactive data entry allows concurrent edit and correction for multiple applications and multiple workstations while batch programs operate in the background.
- Offline input of transactions from diskettes prepared on a 3740 Data Entry System is supported except for the Revenue Accounting application and the Committed Cost/Cost History feature. Diskette support does not include file loading and maintenance transactions to any master files.
- Special inquiries are provided for the job cost, labor cost, open payable, subcontract status, contract status, and open receivables files.
- System tailoring procedures permit the user to select optional functions and reports and to determine the sizes of all files used by the applications. Functions and file sizing may be modified as the customer environment changes by re-executing the tailoring procedures.
- All applications require Cross-Application System Support.
- All object programs and procedures are resident with the exception of system tailoring programs, security file change programs, and file sizing programs.
- Source code is available at no additional charge. Ready-to-execute procedures, and object code are provided. Although no additional systems design, programming, or compiling is required, the application design incorporates features to assist the user in the modification of source code. These features include user interface branches in procedures, reserved user space in master file records, and detailed program documentation.
- Provides the file maintenance of all master files with audit reports.
- Procedure documentation reflects restart/no-restart capability of each of the main line procedures.
- Password security helps deter unauthorized use of workstations, applications, and functions within applications.
- Sample input forms are provided for data entry.
- Control features and sample control documents are included to assist in establishing audit trails.
- Multiple company support for up to 99 companies.

**DESCRIPTION**

System/36 CMAS is a set of five interrelated, ready-to-execute applications for small-to-medium size contractors. Four of the applications (Payroll and Labor Costing, Accounts Payable, Job Costing, and General Ledger) are independent and can be marketed in any combination and installed in any sequence.

Revenue Accounting is a dependent application. The Job Costing application must be installed prior to installing Revenue Accounting.

Cross-Application System Support is required to execute the System/36 CMAS application.

Each application has certain required records within a cross-application control file which contain questionnaire responses. These records allow the users to select report formats, file sizes and functions to suit their needs. The questionnaire responses are entered during initial installation and may be changed as needed. The System Tailoring Procedures in Cross-Application System Support allow these responses to be entered or modified. It provides the following:

- All functions are included in the application programs but only required functions are actually executed.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- Tailors the Operator Control Language (OCL) on-site at installation time.
- File sizes may be expanded or contracted as needed through the system tailoring procedure.

The *System/36 CMAS Installation Made Easy Workbook* provides instructions for planning the installation of one or more System/36 CMAS applications.

Reference manuals provide an explanation of the system to enable the user to understand the applications from a functional and operational standpoint. Manuals are provided at two levels. A System Reference Manual for System/36 CMAS operations gives guidance to the installation supervisor on managing and running the applications from a total systems viewpoint. One management operations manual is provided for System/36 CMAS operations covering all applications.

Individual reference manuals for each application instruct the workstation manager on how to conduct day-to-day operations of the application.

Similarly, one system runbook is provided for the systems console operator and individual application runbooks for the workstation operators. The console operations runbook contains detailed step-by-step instructions for operating System/36 CMAS at the console. Included is an overview of the system and application flow, system considerations and hints on troubleshooting. All of the error messages that can be generated by any of the applications in the offering are included in a messages manual.

The individual application runbooks provide a summary of the application and workstation operations, application and screen flow, and a detailed description of how to run each procedure in the application.

The *System/36 CMAS System Logic Manual* is provided as licensed material for use by the self-sufficient customer, and for the systems engineer in maintaining and modifying System/36 CMAS. Information on system architecture, naming conventions, system controls, system program functions, and specifications, relationship among system files, and other information applicable to all applications is presented in this system manual.

In addition, logic manuals for maintaining and modifying each application are available. Information relevant only to the subject application, such as program descriptions, cross-reference lists, and data dictionary, is presented.

Instructional support is provided to facilitate installation and operation. Self-study instructional material is provided for the systems console operator and for the application workstation operator to train them in the use of the runbooks. Only one copy of each manual is needed per customer no matter how many applications are to be installed.

**JOB COSTING (5727-M66)**

Costing journal entries with cost distribution may be entered with distribution by company, job, pay item, cost code, and cost type. Job Costing passes transactions to the General Ledger, if installed. General Ledger is then updated on a monthly basis. Job Costing is automatically updated by the Accounts Payable and Revenue Accounting applications if installed. Payroll and Revenue Accounting reports, when used with the Job Cost reports, provide a total perspective of job status.

Job Cost management reports are provided with unit costs, budget comparison, and projected profit or loss based on field reporting of percent complete or quantity 'put-in-place'. Income reporting with distribution provides the basis for cash flow reports by company and by job. If the Committed Cost/Cost History feature (#6021) of the Accounts Payable application (5727-M68) is installed, Job Cost Management reports are available which optionally can include committed cost. Also, a cost history report is available which optionally can include all detail cost and income records for a project. You can select which projects to accumulate cost history when you establish a record in the Job Name file. Special inquiry into the job cost and labor

**System/36 CMAS (cont'd)**

cost files (if available) provides immediate access to job cost information.

Special emphasis is given to providing a complete audit of transactions affecting the job costing file and general ledger. A job cost detail transaction register (optional) highlights items posted to the general ledger by cost distribution for the accounting month close.

Jobs indicated as Time-and-Material jobs (jobs without estimates) will be processed without cost projections. Without this feature, these jobs would always project cost coverage equal to actual costs incurred, which is inaccurate. Change orders and revised estimates can be accounted for via an optional change order file which is processed against the original estimates. Up to 99 change orders per cost distribution record may be maintained. The costing reports will show change order detail or optionally net the change orders against the original estimate and print a revised estimate summary line per cost item.

A standard master job costing file enables users to store frequently used cost items which can be duplicated into the job cost file when those cost items are used on a new job. This is especially useful to a home builder for storing the cost descriptions and estimates for a standard house plan and copying that plan to the costing file without having to retype all the details.

**GENERAL LEDGER (5727-M67)**

The General Ledger application is the terminal point of all accounting entries; it interfaces with Payroll and Labor Costing, Revenue Accounting, and Accounts Payable, and accepts journal entries from Job Costing. Though it can be installed apart from the other applications, a large number of ledger entries result from the distribution of expenses incurred through Accounts Payable and Payroll and Labor Costing. Therefore, a majority of General Ledger users will likely install Accounts Payable and/or Payroll and Labor Costing.

Each transaction entered is assigned a journal number and a unique line number within that journal. This journal reference number is kept with the transaction until it is posted to the master record during period-end closing. Transactions coming from other interfacing applications also use this reference numbering scheme. This makes auditability easier throughout the application. Thorough editing of all data at entry time plus the fact that a double-entry bookkeeping system is used, ensures that all credit entries are offset by an equal value of debit entries and provides for smooth month-end closing. The application gives the user support for up to 99 companies and supports a 12-month fiscal year. The general ledger listing displays (by account number) transaction original journal reference numbers, providing a clear and easily used audit trail of all transactions.

The balance sheet and income statement can be formatted to the user's particular requirements by use of a format file which permits special spacing, user-specified columnar printing, user-specified totaling, and up to 118 accounts to be totaled and printed with one line of description. By exploiting the capabilities of the format file, the user can produce combined statements for multiple companies. The balance sheet and income statement can be comparative to last year and to budget figures.

**ACCOUNTS PAYABLE (5727-M68)**

The Accounts Payable application keeps accurate and detailed records of vendor invoices and credit memos from the time they are entered into the system until they are paid and the check reconciled. Although Accounts Payable can be installed on a stand-alone basis, it is frequently used with the General Ledger application to which it can distribute the dollar amounts spent against the proper account numbers. There also exists an interface to Job Costing by which Accounts Payable can pass subcontract or material purchase costs to specific jobs. In addition, equipment repair parts or services processed through Accounts Payable can be distributed to the equipment cost file in the Payroll and Labor Costing application, if installed. Job expenses, disbursements, and subcontract retention are passed to Revenue Accounting, if installed.

Transaction auditing is aided by a journal referencing scheme which causes every transaction affecting General Ledger to refer to a particular journal and line number within that journal. A double-entry bookkeeping method keeps transactions in balance.

Procedures for handling manual checks (partial as well as fully prepaid), petty cash, and check reversals are provided. Selection of invoices for payment includes partial payments, selection by date, and selection by vendor and invoice. Credit memos can be automatically generated, allowing the user to reverse a previously entered open invoice without having to retype all the invoice's indicative information and distribution.

Support is provided for up to 99 companies. Key reports include an aged open payables report, vendor analysis report, plus normal accounts payable audit trails such as purchase journal, cash requirements report, and cash disbursements journal. When checks are printed, options are available for reconciliation and to print remittance advice 'overflow' data on a separate remittance advice form.

Subcontractor accounting is a subsystem within the Accounts Payable application. It provides for automatic movement and accountability of

retainage and taxes. Subcontracts can be maintained on either a balance forward or open item basis. Subcontract status reports by job and by vendor specify the contract amounts, change orders and/or revisions, billed amounts to date (by date, if open item), payment amount to date (by date, if open item), retention and taxes. Controls help insure that the subcontract status file remains in balance with the job costing file if the Job Costing application is installed.

**Committed Cost/Cost History Feature (#6007)**

The optional Committed Cost/Cost History feature to Accounts Payable adds the capability to enter and track purchase order activity and pass the information to the Accounts Payable data entry function when the invoice is received. It provides the ability to analyze future cash requirements for committed purchase orders. Inquiries can be made into the Open Purchase Order file to check the status of any purchase order or purchase order line item. Reports can be run in Purchase Order, Vendor, or Job sequence. Committed costs can be optionally included on applicable job costing reports if the Job Costing application (5727-M66) is installed. This feature does not support diskette data entry.

**PAYROLL AND LABOR COSTING (5727-M69)**

The Payroll application starts with the basic employee time record as input and handles the calculation of wages, taxes, direct burden, deductions, checkwriting, and file updating for both salaried and hourly pay plans. Employee time data may be entered from a workstation or can be entered via diskettes on a 3740 Data Entry System. Payroll can interface with the System/36 CMAS General Ledger, Job Costing, and Revenue Accounting applications. Transactions may be passed on to General Ledger during printing of the payroll distribution journal. Job-related data for both hourly and salaried employees can be passed to the Job Costing application. Labor costs are used by the Revenue Accounting application.

Current payroll data is entered from time cards or job reports either daily or weekly, and is edited to validate employee and job information.

In addition to calculating present federal income and FICA taxes, a standard tax algorithm is provided to calculate most present state income taxes based upon customer-provided data. Local income taxes may also fit the standard tax algorithm provided.

The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Wages subject to Federal Unemployment Tax Act (FUTA) and State Unemployment Tax Act (SUTA) are also determined.

Deduction programs compute voluntary deductions for a specific pay period as well as one-time and union deductions. Included at customer option are employer-paid union fringes, workmen's compensation, Federal Unemployment Tax Act (FUTA), and State Unemployment Tax Act (SUTA). Employer-paid direct burden (FICA, FUTA, SUTA, workmen's compensation, and union benefits) is calculated automatically and optionally costed to jobs based on several methods which are tailored at install. The calculated burden may be distributed to a standard cost code selected by the contractor or distributed to each individual labor cost record. The appropriate accounts in the General Ledger are also updated if the General Ledger application is installed. Any additional burden required for local codes can be calculated by a user-written program and interfaced to the system via procedure interface and an 'other burden' field in the current hours record.

Support for up to 99 companies, a manual payoff check procedure, and the ability to handle an employee working in multiple states, localities, unions, jobs, at different rates on the same day are provided to give the user wide flexibility. Labor distribution of payroll hours and dollars is done in the same detail as the basic employee time record; that is, job number, pay item, cost code, cost type, and job class by company.

Reports furnished include payroll register, deduction reports, monthly union reports, certified payroll register, checks, 941-A reports, and W-2 reports.

Several other reports are printed:

- Year-to-date and quarter-to-date earnings register
- Check reconciliation register
- State and local tax register
- Workmen's compensation earnings worksheet
- Workmen's compensation premium worksheet
- Workmen's compensation and insurance report
- Union calculation register
- Union stamp report
- Two paycheck formats are provided - one format provides options to print employee address and the amount of the check printed in words. It also provides a free-form check stub which shows deduction detail and hours worked at each rate of pay.

**REVENUE ACCOUNTING (5727-M6A)**

PROGRAM PRODUCTS

**System/36 CMAS (cont'd)**

The Revenue Accounting application performs normal accounts receivable functions such as entry of invoice and cash receipts information, posting to open receivables and the Temporary General Ledger Work File (TEMGEN), printing statements and delinquency notices, printing management reports, calculating late charges, and allowing discounts for prompt payment. Job Costing (5727-M66) is a prerequisite application.

In addition, Revenue Accounting has added functions specifically addressing the requirements of the construction industry. These functions are:

- Entry of detail line items for job invoices so that Job Costing income records are updated.
- Defining eight invoice types (Job, Retention, Work Order, Equipment, Employee, Material, Standard, and Cash), each one with associated General Ledger account numbers, to reduce coding requirements for source documents.
- Cash can be applied by customer, job, or invoice, so manual coding of cash receipts is minimized.
- The ability to process statements 'as of' a certain date so that priority work can proceed without interruption; for example, payroll processing.
- The ability to request Open Receivables Analysis reports by customer, job, or non-job to aid in managing receivables.
- Capturing retention information in invoice processing to aid in managing retention accounts receivable.
- Printing of a Retention Due listing to aid in tracking and billing of retention.
- A Progress Billing subsystem that includes interactive review and change as an aid to determining billable amounts for completed work.
- Conforming to System/36 CMAS conventions with one exception - diskette data entry is not supported.
- Interfacing with Job Costing, Accounts Payable, Payroll and Labor Costing, and General Ledger, if these applications are installed.

A significant feature of this application is Progress Billing. Progress Billing assists the contractor in preparing monthly invoices. It accumulates costs from the Job Cost file and calculates the preliminary billable amount based on job progress. The contractor can adjust the billable amounts at the workstation before printing a final report. The format of the final report is similar to that of the American Institute of Architecture's (AIA) billing form.

**CROSS-APPLICATION SYSTEM SUPPORT (5727-M6X)**

The Cross-Application System Support program product is required to execute the System/36 CMAS application.

Cross-Application System Support provides the following functions used by all applications in System/36 CMAS:

- Copy all master files and optionally the data entry files to diskette.
- Compress files and all remaining disk space.
- Reorganize the records within the master files by removing deleted records and repositioning records to improve performance.
- Reformat data entry files.
- Print file sizing and record count information for each file.
- Display the current modification level of each installed application and the PTF level of each module in an application.
- Verify that pointers from one record to another are correct within files and between files.
- Apply programming temporary fixes.
- Indicate the current status of applications on the system.
- Print a listing of all jobs run since the last master file save.
- Copy all master files from save diskettes back to fixed disk.
- Install, tailor or re-tailor an application.
- Maintain security passwords.
- Activate and deactivate application interfaces requested during system tailoring.
- Reset the file record count history.
- Display the status of internal system control file data, data entry file, jobs scheduled on the job queue, and system tailoring questionnaire responses.

**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance and guidance. However, the responsibility for providing accurate ordering information, personnel

selection and training, installation, and continued day-to-day operation lies solely with the customer. Implementation of the security procedures provided in this program product is the customer's responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

These products are designed to operate with a minimum configuration of an IBM System/36 CMAS with:

- 128K bytes of main storage.
- 30 megabytes of disk storage.
- 2D Diskette.
- One IBM Printer, either line or serial, with 132 print positions.
- One IBM 1,920-character Display Station.

**SOFTWARE REQUIREMENTS**

IBM System/36 CMAS program product was written in System/36 CMAS RPG II programming language and was designed to execute under control of:

- IBM System/36 System Support Program (5727-SS1)
- IBM System/36 Workstation Utility (5727-UT1)
- IBM System/36 Cross-Application System Support (5727-M6X).

If modifications are made to the application programs, the following products must also be available:

- IBM System/36 RPG II Compiler (5727-RG1).
- IBM System/36 Utilities (5727-UT1).

Although there is nothing inherent in the design of the System/36 CMAS applications which prevents the use of the minimum system configuration stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size, and operating requirements.

The amount of disk storage required is influenced by the:

- Number of workstations attached
- Library sizes (number of applications installed - all programs resident)
- Number of records in the required master files
- Volume of daily transactions
- System tailoring options taken

Installation of System/36 CMAS applications concurrently may require more disk capacity than the minimum disk configuration of 30 megabytes.

**DOCUMENTATION**

(available from Mechanicsburg)

Licensed Program Specifications (available at FCS)

*Job Costing (5727-M66)* GH30-8013 ... *Payroll and Labor Costing (5727-M69)* GH30-8017 ... *Accounts Payable (5727-M68)* GH30-8015 ... *Accounts Payable (5727-M68) Committed Cost/Cost History Feature* GH30-8016 ... *General Ledger (5727-M67)* GH30-8014 ... *Cross Application System Support (5727-M6X)* GH30-8019 ... *Revenue Accounting (5727-M6A)*.

*Application General Information Manual* (GH30-0707) ... *Construction Industry Flyer* (G580-0186) ... *Reports Brochure* (G280-0085).

**CMAS Education Features**

*Binders* (SR30-0324) ... 1" - 3-ring (SR30-0327) ... 2" - 3-ring (SR30-0156) ... *Cassette/Diskette* ... *Cassettes* (SV30-0709) ... *Diskettes* (SV30-0710).

**Customer Education**

*System Console Operator* (SBOF-1129) ... *Workstation Operator* (SBOF-1130).

**Unlicensed Publications**

*CMAS Messages Manual* (SB30-3051) ... *CMAS System Reference Manual* (SB30-3052) ... *CMAS System Runbook* (SB30-3053) ... *Job Costing Application Reference Manual* (SB30-3061) ... *Job Costing Application Runbook* (SB30-3062) ... *Payroll and Labor Costing Application Reference Manual* (SB30-3064) ... *Payroll and Labor Costing Application Runbook* (SB30-3065) ... *Accounts Payable Application Reference Manual* (SB30-3055) ... *Accounts Payable Application Runbook* (SB30-3056) ... *General Ledger Application Reference Manual* (SB30-3058) ... *General Ledger Application Runbook* (SB30-3059) ... *Revenue Accounting Application Reference Manual* (SB30-3067) ... *Revenue Accounting Application Runbook* (SB30-3068) ... *CMAS Installation Made Easy Workbook* (SB30-3050).



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Jul 83

PROGRAM PRODUCTS

**System/36 CMAS (cont'd)**

**Licensed Publications**

*CMAS System Logic Manual (LB30-3054) ... Job Costing Application Logic Manual (LB30-3063) ... Payroll and Labor Costing Application Logic Manual (LB30-3066) ... Accounts Payable Application Logic Manual (LB30-3057) ... General Ledger Application Logic Manual (LB30-3060) ... Revenue Accounting Application Logic Manual (LB30-3069) ... Committed Cost/Cost History Logic Manual (LB30-3070).*

PROGRAM PRODUCTS

**5727-OS1 - SYSTEM/36 OFFICE MANAGEMENT SYSTEM**

**PURPOSE**

The System/36 Office Management System (OMS/36) is a set of related office functions which can be used by principals and secretaries to improve their productivity. OMS/36 complements the text handling functions provided by the System/36 Text Management System.

**HIGHLIGHTS**

- File and find documents (Text Management System licensed program required).
- Process documents (Text Management System licensed program required).
- Local document distribution.
- Open mail.
- Check outgoing mail.
- Maintain name, address and telephone directory.
- A calendar function to create, maintain and print calendars.
- File offline correspondence.
- Maintain user profiles.
- Menu linkage to Text Management System and Advanced Printer Function.
- Label printing.

**DESCRIPTION**

OMS/36 functions are easy to use and are menu driven. They contain extensive help text for users and are designed to be used without the need for special training or hard-copy reference manuals. It runs under the System Support Program (SSP) of the System/36, and requires the Text Management System to be installed. Both system and text printers will be supported for output.

OMS/36 provides menu access to the Text Management System and other related functions such as Advanced Printer Function and problem solving in BASIC.

The major functions provided are:

- File and find documents.
- Local document distribution.

Document Distribution provides local document distribution services to users of the System/36. A user at any workstation can prepare documents using the Text Management System and distribute them to other office users on the same system. The distribution facilities provide mail services with a private online in-basket and out-basket for each user. Documents may be sent to another user even if the recipient is not currently using the system.

Related services provided by Document Distribution include:

- Stored distribution lists (multiple recipients of a document).
- Message handling (for short, immediate communications).
- Hard-copy printout of documents sent to nonusers of office services (electronic mail basket does not exist).
- Tracking of outgoing mail until delivery.

- Open mail.

All incoming documents are placed in the user's online in-basket file. The Open Mail function allows a user to review the contents of his in-basket. An item may be viewed, filed, printed, kept or deleted.

- Check outgoing mail.

Office Services maintains a record of documents sent to other users that have not been acknowledged. This function provides the user with a list of documents mailed to OMS/36 users on a single scrollable screen.

- Maintain directory.

The directory function allows a user to develop a name, address, and telephone directory that may be used for inquiry, document distribution, labels and telephone directories.

- Calendar Function.

The Office Management System (OMS/36) calendar function allows the user to create, maintain, view and print calendars. Various levels of access can be selected.

The user can:

- Schedule appointments on calendars. Add, update, delete, copy, add notes to and reschedule appointments.

- View your calendar and other calendars by day or by week. The user can also view the free time (unscheduled time) on a calendar for a specified date.
- Print calendars for specified days or weeks.
- Select access levels for each calendar. Assign access (no access, read access, or update access) for all users (public access), or for a specific user.
- Select how times will be entered, shown, and printed in either AM/PM or in 24-hour (international) time.
- Select whether a message is given when someone tries to schedule an appointment in a time slot that is already occupied or that is outside the normal scheduling period.

- Filing of offline correspondence.

Document information can be entered and used later to locate a filed document.

- Maintain user profiles.

The user profile allows the user to customize or tailor his operating environment. Entries may be changed at any time. Default values are taken from the user's profile by both the Text Management System and Office Management System functions.

- Menu linkage is also provided to System/36 BASIC. If System/36 BASIC is installed, the user will have a BASIC session started in which BASIC programming can be done.
- Menu linkage to Advanced Printer Function. This provides menu access to APF/36 from the OMS/36 menus.

**CUSTOMER RESPONSIBILITIES (not applicable)**

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum hardware requirements are:

- IBM System/36, any model.
- One IBM Printer (3262, 5219 mdl D01 or D02, 5224, 5225 or 5256). If an IBM 3262 Printer is used, a print belt with upper and lower characters should be considered.
- One IBM 5251 mdl 11, 5291 or 5292 Display Station.
- The IBM System/36 Office Management System requires a minimum of 2,500 blocks of disk space.

**SOFTWARE REQUIREMENTS**

IBM System/36 System Support Program (5727-SS1), Release 1 or later, and the Text Management System licensed program. The licensed program requires 64K bytes of user memory to execute.

**SECURITY/INTEGRITY**

Same as the System/36 System Support Program (5727-SS1).

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM System/36 Office Management System Licensed Program Specifications (GC21-7980) ... IBM System/36 Office Management System User's Guide (SC21-7983).*

**SYSTEM INTEGRITY**

Same as the IBM System/36 System Support Program (5727-SS1).

RPQs ACCEPTED: Yes

PROGRAM PRODUCTS

**SYSTEM/36 RPG II  
5727-RG1**

**PURPOSE**

The System/36 RPG II Compiler is a licensed program that operates under control of the System/36 System Support Program (5727-SS1). It provides the following capabilities:

- RPG II Language Compiler.
- Auto-Report.
- Support for System/36 devices including WORKSTN (workstation) device and Interactive Communications feature SSP-ICF.
- RPG II support for Binary Synchronous Communications (BSC).

**HIGHLIGHTS**

- Full procedural files that combine sequential and random disk access methods into one file definition statement. This can simplify programs by eliminating the need to have two file statements that access the same physical file in order to process randomly, sequentially, and add records.
- Exception output by name enables output statements to be given a name instead of an indicator, and allows that name to appear in Factor 2 of an EXCPT operation. This simplifies programming and debugging by eliminating the use of a unique set of indicators with EXCPT to control the output statements.
- When the performance of accessing and large index file can be improved, a storage index will automatically be allocated. Coding of the index in the program is eliminated.
- Up to 255 display formats can be accessed from a program.
- Alternative index paths are supported for indexed files. The paths are dynamically maintained. Program coding for an alternate index path is the same as for the indexed file. Alternate index paths must be created by BLDINDEX.
- Multiple Requesting Terminal (MRT) programs can continue processing when a permanent I/O error is caused by turning the power off at a display station or by the failure of a communications line to a remote display station.
- Program versions can be tracked with the modification reference number and date/time stamp in the source member directory entry, the compile listings and the subroutine/load member directory entry.
- Online programming is supported by the diagnosed source member output option of the compiler. Diagnostic messages and summary information are inserted into appropriate places of the source member. The member can then be viewed/changed by SEU (Source Entry Utility).
- Online programming also provides an automatic cycle that enables you to enter a program, compile it, review/correct errors (using SEU) and recompile the program without leaving the display or using a printer. The inserted diagnostics are ignored during the next compile or can be removed by SEU.
- Many compile options such as print/noprint source, program size, debug/nodebug can be overridden from the online prompts.
- The RPG II device names are DISK, PRINTER, CRT, CONSOLE, SPECIAL, KEYBOARD, BSCA and WORKSTN.
- Support is provided for SSP-ICF using the WORKSTN file support.
- The external indicators (U1-U8) may be tested and turned on and off in the RPG II program. The status of these indicators may then be tested by OCL. The indicators can also be set on or off using OCL.
- The user program may access a Local Data Area of up to 512 bytes which provides program-to-program or program-to-OCL data interchange.
- Data structures can be defined for the Local Data Area or used to redefine other fields without allocating additional storage.
- A program using a WORKSTN file can support multiple workstations or communication sessions with specified unique data fields and indicators saved and restored automatically for the currently active workstation or communication sessions.
- The TIME operation can be used to obtain time-of-day and date from the system.
- Field end position may be omitted and the compiler will calculate the end position within an output record.
- The user can control spacing and skipping of the compiler listing.
- A subroutine to retrieve message text from a message member is provided.
- RPG uses the System Overlay Linkage Editor (OLE). The flexibility of user-determined overlays may improve performance.

- The compiler defaults to the current user library to improve programmer productivity.

**DESCRIPTION**

The System/36 RPG II Compiler is a licensed program that operates under control of the System/36 System Support Program (5727-SS1). It provides the following capabilities:

- RPG II language compiler.
- Auto-report.
- Support for System/36 devices including WORKSTN (workstation) device and Interactive Communications feature SSP-ICF.
- RPG II support for Binary Synchronous Communications (BSC).

**SYSTEM/36 DEVICE SUPPORT**

System/36 RPG II supports all the devices available on the System/36 except the diskette drive and 8809 tape (8809 Tape hardware will not be available until May 1984. Disk files can be shared by more than one program. The following expanded device support is provided:

- **WORKSTN File Support** - System/36 RPG II supports one or more display stations or SSP-ICF communication sessions as a primary or demand file. The WORKSTN device support allows the programmer to treat the display station or communication session as a sequential combined file using the normal RPG II logic. Multiple display stations and/or multiple communications sessions may be attached to the WORKSTN file. The programmer need only be concerned with the single user (display station or communications session) logic. Data fields and indicators that are unique to each user are so indicated by the programmer and RPG II saves and restores those fields and indicators automatically.
- **Display formats for use with the WORKSTN file** must be created using the Screen Design Aid (SDA) which is part of the Utilities licensed program. The system facility for compiling existing source code for screen formats, SSP Screen Format Generator Routine (SFGR), can also be used.
- **CONSOLE File Support** - Through the use of normally coded file description and input specifications, the CONSOLE file is supported in a buffered interactive mode. The operator is prompted record-by-record with display formats generated by the compiler. Keying of one record is buffered and overlapped with processing of the previous record. The program is coded to process records as from any other sequential input device.
- **KEYBOARD and CRT File Support** - The display formats used for these files will use 6 lines of 40 characters each or 24 lines of 79 characters each depending on the maximum record length specified in the program for the file. The KEYBOARD support includes support of 24 command function keys.
- **PRINTER File Support** - Multiple printer files may be specified in a single program. The System/36 OCL is used to assign an RPG II printer file to the natively attached printer or a workstation printer at run time.

**AUTO-REPORT**

Auto-Report is included with the System/36 RPG II compiler and includes the following features:

**Copy** - Specifications may be cataloged in a library and included in any RPG II program via the COPY statement. A copy statement is especially useful for cataloging the file description and input specifications for which overrides may be coded to specify such things as control levels. By using the COPY statement, only one description of the file need be cataloged and maintained for all programs using the file.

**Page Headings** - Page headings can easily be specified on output specifications without the need for output indicators or end positions. The heading is centered over the report complete with page numbers and date.

**Simplified Report Specifications** - A report can be produced by listing on output specifications the fields in the order desired. On one output specification, the field, column heading, and an indication for column totals can be entered. The column headings, fields, and column totals are automatically generated.

**BINARY SYNCHRONOUS COMMUNICATIONS (BSC)**

The telecommunications specification is supported in System/36 RPG II. Support of binary synchronous communications will be provided by System/36 to communicate with:

- Another System/36 with RPG II, Assembler or SSP-ICF BSCSEL subsystem
- System/34 with RPG II, Assembler or SSP-ICF BSCSEL subsystem
- System/32 with RPG II or Assembler

## PROGRAM PRODUCTS

**System/36 RPG II (cont'd)**

- System/3 with (MLMP) CCP, or RPG II
- System/7 with MSP/7
- System/38 (CPF)
- System/360 with BTAM\*
- System/370 with any of the following:
  - BTAM\*
  - VTAM/NCP
  - CICS/VS\*
  - IMS/VS\*
- 3741 mdl 2 or 4
- 3747
- 5231 mdl 2 (supported as 3741 mdl 2 or 4 in transmit mode only)
- 5280 distributed data system
- Series/1 (supported as a System/3)
- 5110 or 5120 (as a 3741)
- 6640 Document Writer
- Office Systems/6 Information Processor
- 6240 Magnetic Card Typewriter - Communicating
- 6670 Information Distributor
- 6580 Displaywriter System
- POWER/VS (as a 2780 or 3780)

\* Note: The 3704/3705 Emulation Program (EP) or the Partitioned Emulation Program (PEP) extension to 3704/3705 NCP can be used to emulate the 2701.

The BSC host support for System/36 is generated on the host system as System/3 BSC.

**System/34 RPG II Considerations:** If any System/34 assembler subroutines are called via EXIT or SPECIAL files, those assembler subroutines must be reviewed and modified as required to execute correctly on System/36.

**CUSTOMER RESPONSIBILITIES (not applicable)****SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The IBM System/36 RPG II licensed program runs on all models of IBM System/36 and supports the communications adapters (#2500 and #4500) in BSC mode.

**SOFTWARE REQUIREMENTS**

The current release of the IBM System/36 RPG II licensed program operates under control of the current release of the IBM System/36 System Support licensed program (5727-SS1).

**COMPATIBILITY**

The System/36 RPG II source programs are source compatible with System/34 RPG II. System/34 RPG II programs and screen formats must be recompiled to execute on the System/36.

**CONVERSION**

No conversion of source programs from System/34 is required.

**SECURITY/INTEGRITY (not applicable)****PERFORMANCE (not applicable)****DOCUMENTATION**  
(available from Mechanicsburg)

*Programming With RPG II (SC21-9006) ... IBM System/36 RPG II Licensed Program Specifications (GC21-9008) ... RPG II Messages (SC21-7940).*

**RPGs ACCEPTED: Yes**

PROGRAM PRODUCTS

**SYSTEM/36 SYSTEM SUPPORT PROGRAM (SSP)  
5727-SS1**

**PURPOSE**

The System/36 System Support Program (SSP) provides control programming functions for the System/36. These functions support user application programs and IBM licensed programs and provide a number of independent general system integrity and ease-of-use facilities.

System/36 SSP is layered to enhance productivity for all of its users. HELP menus and text, prompted procedures, and Operations Control Language are all available. Procedure Control Expressions allow building additional user procedures with full job stream control using substitution, branching, and some arithmetic functions.

**HIGHLIGHTS**

The System/36 SSP and SSP features provide the following control program capabilities:

- System Guided Operation.
- Over 2,000 Screens of Online HELP Text.
- User Application Help Support.
- Simple Configuration.
- Alternate Index Support on Disk.
- System/34 Source Code Compatibility.
- Multiple Program Mode.
- Input Job Queue
- Main Storage Management
- Operation Control Language (OCL) and Procedure Control Expressions.
- Sort/Merge Facility.
- System Utilities.
- Data Management for Disk and Diskette, plus Local and Remote Displays and Printers.
- Inquiry (Interrupt) Function.
- User/Resource Security.
- System History Facility.
- Spooling.
- Overlay Linkage Editor.
- Online Programming Support.
- Elastic Workload Management.
- Auto Response for System and User Messages.
- System Measurement Facility.
- Support for Diagnostic Operations.
- Support for Batch BSC.
- Remote Workstation Protocol.

**Special Features (optional):**

- Support for Communications Products.
  - BSC, SNA/SDLC, and X.21 (#6001)
  - Interactive Communications Feature SSP-ICF (#6002)
  - Multiple Session Remote Job Entry (MSRJE) (#6004)
  - 3270 Device Emulation (#6003)
  - Data Encryption Standard (DES) Subroutine for Banking (#6005)
  - Distributed Disk File Facility (#6006)
- Extended SSP Feature (#6000).
  - Diskette I-Format Support
  - Multinational Character Set.
  - Tape Save/Restore and Data Interchange Support (available 2Q84)
  - 1255 Magnetic Character Reader Support (available 2Q84).

**DESCRIPTION**

**System Guided Operation:** The System/36 SSP is built to generally work without the need of publications. After signing on to the system, the operator can see the MAIN HELP menu. Options are chosen based on what the user wants to do. Each menu screen leads to another screen with additional options or to the execution of some command or procedure. There are about 140 Help menus supplied, but the path taken for any specific task uses only a few. Each operator can use a

command key to set any one of these as a sign-on help menu depending on individual experience level.

In addition, the Help menus can be bypassed by displaying a user-defined menu for specific applications. Also, each operator can use a command key to set the default sign-on application menu. The user need only define the menu and the job associated with each menu option. When the operator selects an option from the menu, the system displays it and runs the procedure or command associated with the selected option.

**Over 2,000 Screens of Help Text:** Help text is available to make the execution of system commands and procedures easy for the users, whether they are programmers or operators. This additional support can be removed from disk if/when it is not needed. When available, it gives an explanation of all the Help available on the system, describes the function of each selected procedure, and tells what command keys are active. Thus, the system can be operated without keying any commands.

**User Application Help Support:** Help text support similar to that used by system functions is available for programming use. Each menu and its option can be easily described using the Screen Design Aid (SDA) utility. No other programming is required.

Application help text, describing areas on the screen, can also be defined on screen formats using SDA. Different help text screens can be displayed based on cursor location at the time the help key is pressed. Using this facility, operator instructions can easily be added to existing applications by simply changing screen formats used by the application.

**Simple Configuration:** Configuration of the system involves an interactive process of responding to displayed prompts to tailor hardware and software definitions. Configuration is typically performed immediately following initial installation of the SSP on the system, but may be repeated later to change specified options or values. The system is tailored to the user's definitions by updating the master configuration record and doing an Initial Program Load (IPL) of the system. Careful and complete planning will ease system configuration.

Meaningful configuration defaults are provided for several system variables and system files based on the size of the system (main storage and disk capacity). Local workstations can be automatically configured. Workstation IDs and default values for display station and printer characteristics are assigned for the user.

Each menu and prompt is supported by an extensive set of defaults and automatic functions as well as Help text.

**Alternate Index Support on Disk:** This facility makes it possible to save disk storage and improve performance with applications that require multiple access paths to the same data. Alternate index files can be built for indexed files as necessary. Each alternate index file contains keys and pointers. An alternate index file can also contain duplicate keys. These files are used like any other indexed file and are maintained automatically by the SSP disk data management for all applications.

**System/34 Source Code Compatibility:** Any assembler or high-level language source program or procedure can be saved on diskette at a System/34 and restored to the System/36. RPG, COBOL or FORTRAN programs are simply recompiled to take advantage of System/36 object generation improvements in storage use or run-time performance. Some changes necessary in Assembler macros and procedure statements to take advantage of the System/36 architecture are documented in a Conversion manual, *Converting from IBM System/34 to IBM System/36*.

**Multiple Program Mode:** The SSP is designed to allow the System/36 to operate in the multiple program (multiprogramming) mode. Operators at multiple command-capable display stations may concurrently start control commands, OCL, and procedures. Multiple jobs and programs can execute concurrently.

**Input Job Queue:** The SSP also provides a job queue facility. This queue contains a list of jobs that are to be processed in sequence concurrently with other batch or operator-interactive jobs. The jobs in the queue can be placed there by an operator at any command-capable display station or by a procedure. The display station that places the job on the queue is released from that job and, therefore, becomes available for other work. Job queue priorities can be specified to control a job's position in the job queue.

**Main Storage Management:** The System/36 manages main storage as a pool of separate (noncontiguous) 2,048-byte segments and 'swaps' programs to and from disk as required to fit an active program into main storage (a program that is inactive might, for example, be waiting for data input or a message response from a display station).

System/36 main storage management allows the total main storage required by all active tasks to exceed actual user main storage, allowing the system to support a very elastic workload. Performance considerations will dictate to what extent user main storage may be overcommitted.

## PROGRAM PRODUCTS

**System/36 SSP (cont'd)**

The System/36 SSP occupies a minimum of 36K bytes of main storage. This value may be automatically increased in 2K-byte increments to include printer spool support, increase number of active tasks, or optimize system performance. This resident nucleus area contains SSP functions such as data management for disk, printer and display stations; buffers for workstation I/O and printer spooling; and an SSP work area used for task control. When remote workstations are active, an additional area of main storage is dynamically reserved for line buffers and SDLC data management.

**Operation Control Language (OCL) and Procedure Control Expressions:** OCL is the user interface to run jobs and programs. It allows specification of job control information which is easy to use and keyword driven.

Procedures consist of one or more OCL statements. They allow up to 255 levels of nesting, up to 64 variable-length parameters, and control of the inquiry options allowed if the procedure is interrupted with the ATTN key.

Normally, OCL statements are written in procedure form, stored in a user library, and provided to the application operator as options to be selected from a user menu.

Procedures can be very flexible using Procedure Control Expressions which are provided. Functions include conditional processing of statements, simple arithmetic, character string comparisons, parameter substitutions, branching, message display, and disk/diskette file existence tests. Special OCL statements provide debugging assistance to programmers.

**Sort/Merge Facility:** This facility includes the same sort/merge functions available with the System/34 Utilities program product, only it is part of the System/36 base SSP. Support includes multiple record type sort with record selection dependent on field contents. Records may be sorted in any sequence. Addrout, tag along, and summary tag along sort are allowed. All data fields, except binary, are supported. Work file space is automatically allocated and multiple input files are allowed. Up to eight files can be merged together, and both equal control field and alternating sequence by field are allowed.

**Systems Utilities:** System/36 SSP also provides enhanced function to create, copy, save, restore, and rename files; build display formats, build menus and other common functions.

Enhancements to the library support include new directory fields to contain date/time of creation and subtype, easier to use library listings along with new information (such as number of diskettes needed to make a copy), and library extension when required to complete a job.

The SSP provides data management support for the disk, diskette, display stations and printers. The display and printer workstation data management supports multiple direct and remote units of the workstation devices which can be attached. The display station data management manages all input and output to the display stations including the retrieval of display formats from a disk library, and merging program data prior to displaying the format on the display, and displaying associated application help text based on cursor position.

Disk data files on System/36 may be accessed concurrently by multiple programs for input, update, or add operations. Protection of data against concurrent update by two programs is provided by locking disk records until released by the accessing program. An OCL parameter is provided to allow various levels of file sharing for any file. Also, files are optionally allocated by the system to the disk drive currently being used least.

Disk files can be designated as extendable at file creation. In addition, immediate access is provided for all records that are added by a user program, regardless of file organization.

The System/36 SSP includes utility programs to support the diskette unit and the diskette magazine drive as a save/restore and data interchange device. The diskette 1 in 128- or 512-byte sector formats are supported. In addition, the diskette 2D (2-sided double-density) is supported in 256- or 1,024-byte sector formats.

The diskette magazine support allows input/output operations to begin on any one of 23 specified diskettes and overflow automatically to the next diskette in the magazine, to the next magazine, or from individual slot to the next.

**Inquiry (Interrupt) Function:** The operator may interrupt a processing program, start another job, such as inquiry into a file, and return to the processing program. Processing of the interrupted program will resume when the operator indicates the completion of interrupting activity. An OCL option will suppress this capability to prevent operators from accidentally changing their job environment.

**User/Resource Security:** Each operator who signs on at a System/36 display station is prompted for a user identification and, optionally, a password. This data is then checked by the SSP before allowing the operator any further access to the system. For each user, there is a profile that can contain a default sign-on HELP menu and a default user menu. This user profile contains additional information, like a password, when security is active.

Also files and program libraries can be restricted to authorized users. These users can be further restricted by type of use. An SSP option allows the creation of audit entries in the system history file for each use of a secured file or library.

Security permits the additional check of operator badge identification at sign-on if the display station has an attached 5250 Magnetic Stripe Reader.

**System History Facility:** System/36 provides a history area on disk which optionally contains all recently executed OCL statements and all messages issued to the logging device. The messages and data may be retrieved and redisplayed on the display station, printed, or copied to a disk file. The system history facility gives an operator flexibility in selecting the segment of the history area to display, print or copy. For example, an individual display operator is able to select entries created at a single workstation. If the history area is displayed, the operator also has the capability of scrolling backward and forward through the history entries.

Entries are time stamped and include the job identification generated by the SSP to assist in determining the sequence of activity on the system. A configuration option allows the user to automatically save the system history area in a disk file when the system history area becomes full. This option can be overridden at IPL time.

**Print Spooling:** Print spooling is supported by the SSP for all printers, whether local or remote. When spooling is active, printer output requests are intercepted and stored on disk. Spool writers are used to retrieve the print records from disk for printing. A print queue is maintained of job names whose printer data is yet to be printed, or specified as 'retained after printing'. System console commands are provided to start/stop, restart (at a page number), cancel, hold/release, change priority of and display jobs in the print queue. Print spooling is supported for any and all printers attached to the system simultaneously. In addition, multiple logical print files from a single program may be directed to one printer or separate printers.

A specified display station can be configured to be the controlling display station for a spooled workstation printer. The spool control commands and spool-issued messages are available to the display station operator to control the output directed to the printers associated with that display station.

The size of the primary spool disk file is specified when the SSP is configured. Defaults vary depending on the disk storage ordered. The spool intercept routine will allocate up to five additional extents if necessary. These specific extents will be the same size as the primary spool file and will be freed up by the spool writer as they become empty.

Spooled data may also be copied to a data file, viewed or printed or transferred to another System/36.

**Overlay Linkage Editor:** The Overlay Linkage Editor facility combines object modules, produced by RPG II, COBOL or FORTRAN and the Assembler program, to create an executable load module. Overlay structures may be created automatically or as designated by the user.

**Online Programming Support:** System/36 provides a procedure which allows automatic chaining from the Source Entry Utility to a compiler and optionally back to the Source Entry Utility for corrections, if necessary. This programming aid allows routing the compiler output to a display.

**Elastic Workload Management:** On System/36, assign/free space can access 2K of storage anywhere in main storage. The allocation algorithm looks for space on a quick-fit basis. The allocation of this space has been designed to provide the most efficient usage.

A user's Local Data Area (LDA) is placed in the system assign/free space during initiation of a job step. Each LDA includes 512 bytes for passing information from one job step to another. The system will never change any of the user's LDA during a job.

**Auto Response for System and User Messages:** The System/36 Auto Response Facility allows users to specify response options to be taken automatically when system messages are displayed. Normally, processing stops until the operator responds to a message with an option value. Auto response allows a user to select a message to which the system will respond with a user-defined option value and then continue processing.

Auto response values are supplied for selected messages and these values may be changed by the user. In addition, responses to other messages can be added to the auto response list.

The use of this facility is particularly valuable when a system must run without an operator in attendance.

A NOHALT facility allows the user to easily manage what severity levels to activate for auto response depending on the types of jobs running.

**System Measurement Facility:** System/36 includes System Measurement Facility (SMF) routines which, in conjunction with control storage routines, maybe started to monitor system activity, system device, and SSP work area utilization, and record this data in a disk file. A report

PROGRAM PRODUCTS

**System/36 SSP (cont'd)**

program is provided so that the file may be listed to provide information useful in analysis of system performance with the current application workload or in anticipation of added application workload.

**Remote Operations and Support Facility:** It is possible to designate a local or remote display station as a system service device. When this is done via a command from an authorized operator, the designated display station can be signed-on and used to run most of the console diagnostic-type programs.

**Support for Batch BSC:** The SSP provides Binary Synchronous Communications (BSC) data management for System/36 RPG II and Assembler and Macro Processor programs. A system utility is also provided to select certain communications characteristics as program processing time such as: Line type, terminal address, line speed, and error retry count. The Assembler licensed program includes BSC macro support.

**Remote Workstation Protocol:** The System/36 may be configured to support models of display stations (5251 mdls 11 and 12, 5291 mdl 1, 5292 mdl 1) and printers (5219 mdl D01 and D02, 5224 mdls 1 and 2, 5225 mdls 1, 2, 3 and 4, 5256 mdls 1, 2 and 3) attached to the System/36, and communicate with 5251 mdl 12. Remote workstations may be used to perform most of the same functions as the directly-attached stations.

Application programs and IBM program products which support directly-attached models of 5251 mdl 11, 5291 mdl 1, 5292 mdl 1, 5224 mdls 1 and 2, 5225 mdls 1, 2, 3 and 4, 5219 mdls D01 and D02, and 5256 mdls 1, 2 and 3 devices will also support the remotely-attached devices without change. However, the system console function may not be assigned to a remote display station.

**Special Features (Optional):** See individual pages for:

- Extended SSP feature (#6000)
- SSP Communications feature (#6001)
- Interactive Communications feature (#6002)
- 3270 Device Emulation feature (#6003)
- Multiple Session Remote Job Entry feature (#6004)
- Data Encryption Standard Subroutine for Banking feature (#6005)
- Distributed File Facility feature (#6006)

**CUSTOMER RESPONSIBILITIES** (not applicable)

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM System/36 System Support Program runs on all models of System/36 and supports all features.

**SOFTWARE REQUIREMENTS**

All IBM licensed programs for System/36 are designed to operate in an environment that includes the System/36 System Support licensed program (5727-SS1) or its equivalent. The SSP order should be entered via AAS at the same time as the system order. IBM's ability to provide concurrent hardware maintenance is dependent upon functions provided by the SSP or its equivalent.

**COMPATIBILITY**

Due to the broad base acceptance of the System/34, a high degree of compatibility has been maintained. The high-level languages need only be recompiled to run on System/36. Also, most procedures written for the System/34 will run unchanged on System/36. Differences in the SSP are documented in *Converting from System/34 to System/36* (SC21-9053). Also see compatibility statements within the individual System/36 System Support Program "Feature" pages.

**CONVERSION**

Conversion from System/34 is addressed in a conversion manual (SC21-9053) and via a System/34 to System/36 Migration Aid licensed program (5727-MA1). Also see compatibility statements within the individual System/36 System Support Program "Feature" pages.

**SECURITY**

User and resource security are provided as part of the base SSP. Usage is optional. The customer can limit user access with passwords plus menu and badge reader restrictions. He can also limit read/write access for files and libraries. In addition, the keylock on the service panel can be used to restrict its use. The tools are provided but the selection and application of security controls is the customer's responsibility.

**PERFORMANCE CONSIDERATIONS**

Performance depends on many features. A major consideration is the number of users. The System/36 was designed to provide satisfactory response time as the number of display stations increases. Priority is given to interactive jobs by default.

Disk data management considerations are very important and include file organization, the use of in-storage indexes, multiple indexes, and file placement. System/36 keeps usage counters to automatically build files on the least-used disk spindle. The System Measurement Facility is designed to help a customer identify potential areas for improving job throughput and response time. There are also many other factors discussed in the *System/36 Concepts and Programmer's Guide* if performance is a critical factor and tailoring for performance is necessary.

**DOCUMENTATION**  
(available from Mechanicsburg)

*What to Do Before Your Computer Arrives* (SBOF-4773) includes:

*One 2-inch Horizontal Binder* (SC21-7988) ... *Binder Insert* (SX21-9447) ... *Contents Insert* (SX21-9448) ... *Your Guide to Planning* (SA21-9438) ... *Planning to Set Up Your Computer* (SA21-9439) ... *Planning for System Configuration* (SA21-9440) ... *Planning for Data Communications* (SA21-9441) ... *Preparing to Receive Your Computer* (SA21-9442) ... *General Planning Activities* (SA21-9443) ... *Preparing a Place for Your Computer* (SA21-9444) ... *Planning for System Security* (SA21-9445) ... *Forms for Planning* (SA21-9446)

*Guide to Publications* (GC21-9015) ... *Presenting System/36* (GC21-9016) ... *System Support Licensed Program Specifications* (GC21-9021) ... *SORT Guide* (SC21-7903) ... *System Messages* (SC21-7938) ... *Learning about Your Computer* (SC21-9018) ... *Concepts and Programmer's Guide* (SC21-9019) ... *System Reference* (SC21-9020) ... *Performing the First System Configuration for Your System* (SC21-9022) ... *Procedures and Commands Summary* (SC21-9024) ... *System Measurement Facility Guide* (SC21-9025) ... *Operating Your Computer* (SC21-9026) ... *Overlay Linkage Editor Guide* (SC21-9041) ... *System Security Guide* (SC21-9042) ... *Changing Your System Configuration* (SC21-9052) ... *Converting from System/34 to System/36* (SC21-9053) ... *System Problem Determination* (SC21-7919) ... *Creating Displays: Screen Design Aid and System Support Program* (SC21-7902).

**SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where the installation of the System/36 System Support program product (5727-SS1) causes an exposure to the system integrity of the SSP. System integrity, in this context, is defined to mean control of user authorization to the system or its files and libraries.

RPQs ACCEPTED: Yes

## PROGRAM PRODUCTS

**SYSTEM/36 EXTENDED SYSTEM SUPPORT PROGRAM  
FEATURE #6000 - 5727-SS1****PURPOSE**

The System/36 Extended System Support feature provides support for:

- Diskette I Format
- Multinational Character Set
- Tape Save/Restore and Data Interchange
- 1255 Magnetic Character Reader Attachment

**DESCRIPTION**

This feature supports I-Format diskette recording and multinational character sets. Use of the I-Format feature allows reading and writing of information on a System/36 diskette in a blocked and spanned format for better utilization of diskette space. This format allows a common exchange format for the System/34, System/38 and 5280 systems.

The second function of Extended SSP is Multinational Character Set support. This means the ability to display the 188 characters not supported in the specified base SSP 96-character code set. The keyboards do not include the additional characters, but they may be entered with single or multiple key sequences.

Another function of the Extended SSP is subroutines (SUBR08 and SUBR25) to interface to the 1255 Attachment feature. These subroutines allow RPG II, COBOL or the Assembler to read data from documents (checks). They can also return to the program the stacker selection that was made and indicators that tell field validity and document type (available 2Q84).

Also the 8809 Magnetic Tape Attachment hardware feature will be supported by an Extended SSP feature enhancement (available 2Q84).

System/36 will support 1/2-inch magnetic tape in addition to diskette as a save/restore or data interchange device. Tape provides a larger capacity media for backing up applications and data files, in addition to providing a high capacity data interchange media. Programming support is at the system utility level and has the following characteristics:

- Save/Restore
  - Files
  - Libraries (except #LIBRARY)
- Data Interchange Utility Support
  - EBCDIC data format
  - Label support
    - 1) IBM standard labeled tapes
    - 2) Nonstandard labeled tapes
    - 3) Nonlabeled tapes
  - Logical record lengths of 18 to 4,096 bytes
  - Read/write fixed-length blocked records with block length of 18 to 32,767 bytes
  - Read only of variable-length unblocked records
  - Multivolume files
  - Multifile volumes
- Additional Utility Support
  - Catalog files/libraries of a selected tape
  - Initialize tape labels and/or CLEAR a selected tape
  - List contents of a selected tape file

Save/Restore operations may be done in 'streaming' mode at normal 100-inches per second. In this mode, the user is capable of backing up files of up to 43 megabytes of data on a standard 2400-foot reel of tape (equivalent to 36 2D diskettes). The actual performance depends on factors such as system activity, task priority and media condition.

Data Interchange support provides the user with support to interchange data between systems on 1/2-inch magnetic tape with either IBM standard labels or as unlabeled tapes (nonstandard labels are bypassed). Nonstandard label support allows only the reading of a tape's first file. Interchange processing is done in a 'start/stop' mode at normal 12.5 inches per second.

**CUSTOMER RESPONSIBILITIES** (not applicable)

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM System/36 Extended System Support Program runs on all models of IBM System/36 and supports all features.

**SOFTWARE REQUIREMENTS**

All IBM licensed programs for System/36 are designed to operate in an environment that includes the IBM System/36 System Support licensed program (5727-SS1) or its equivalent. The SSP order should be entered via AAS at the same time as the system order. IBM's ability to provide concurrent hardware maintenance is dependent upon functions provided by the SSP or its equivalent.

Prerequisite for the IBM System/36 Extended SSP is IBM System/36 System Support Program (5727-SS1).

**COMPATIBILITY** (not applicable)

**CONVERSION** (not applicable)

**SECURITY**

User and resource security are provided as part of the base SSP. Usage is optional. The customer can limit user access with passwords plus menu and badge reader restrictions. He can also limit read/write access for files and libraries. The tools are provided but the selection and application of security controls is the customer's responsibility.

**PERFORMANCE CONSIDERATIONS**

Performance depends on many features. A major consideration is the number of users. The System/36 was designed to provide satisfactory response time as the number of display stations increases. Priority is given to interactive tasks by default.

Disk data management considerations are very important and include file organization, the use of in-storage indexes, multiple indexes, and file placement. System/36 keeps usage counters to automatically build files on the disk spindle being used the least. The System Measurement Facility is designed to help the customer identify potential areas for improving job throughput and response time. There are many other factors discussed in the *System/36 Concepts and Programmer's Guide* if performance is a critical factor and tailoring for performance is necessary.

**DOCUMENTATION**

(available from Mechanicsburg)

See pages for System Support Program (5727-SS1).!

**SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where the installation of the System/36 System Support Program (5727-SS1) causes an exposure to the system integrity of the SSP. System integrity, in this context, is defined to mean control of user authorization to the system or its files and libraries.

**RPQs ACCEPTED:** Yes

## PROGRAM PRODUCTS

**SYSTEM/36 SYSTEM SUPPORT PROGRAM  
COMMUNICATIONS FEATURE #6001 - 5727-SS1****PURPOSE**

The Communications feature supports the autocal adapter and the X.21 line adapter in the MLCA. The logic base for Multiple Session Remote Job Entry (MSRJE), 3270 Device Emulation (3270 DE) and Interactive Communications feature (SSP-ICF) is contained in the Communications feature; this includes CNFIGICF, ENABLE/DISABLE and data management.

**HIGHLIGHTS**

- Autocall Support.
- X.21 Support.
- Base support for MSRJE, 3270 DE and SSP-ICF.

**DESCRIPTION****Autocall**

The support for the System/36 autocall feature of the Multiple Line Communications Adapter (MLCA) allows the user to have the system automatically attempt phone calls on a switched line to another device or system. This support is provided external to the user programs such that no change to user source code is necessary. Phone numbers are referenced through OCL parameters and configuration records.

The following functions are available:

- Ability to call multiple locations from a single batch BSC program by looping through the OCL without operator intervention
- Ability to define lists of phone numbers.
- Ability to specify a wait time between calls and a retry count for incomplete calls.
- Up to 22 characters per phone number (international calls), including separator (SEP) characters for dialing delays and an end of number (EON) character.
- Autocall is supported in MSRJE, batch BSC, 3270 DE (SNA) and SSP-ICF (BSCCL, CICS, CCP, SNUF, SNA Peer).

**X.21**

This feature provides an interface for attachment to either an X.21 switched or X.21 nonswitched network. Both BSC and SDLC communications are supported. Refer to Facilities L3 to L6 (switched) or N3 to N6 (nonswitched) in the M2700 pages for the networks and data circuit-terminating equipment (DCE) that are supported. The network establishes the data rate and supplies the clock. The System/36 can communicate via the X.21 Adapter with devices that do not have native X.21 Adapters. These devices must be attached to the network via an X.21bis DCE. This method of attachment uses the CCITT V.24/28 interface. Refer to facilities K3 to K5 (switched) and M3 to M5 (nonswitched) in the M2700 pages for the list of devices that can be attached via an X.21bis DCE.

**Switched Networks:** Communications at 2400, 4800, 9600 and 48,000 bps are supported. Autocall function is provided for switched lines.

**Note:** X.21 switched requires the MLCA Expansion feature (#4501).

**Nonswitched Networks:** Transmission may be at speeds of 2400, 4800, 9600 bps for multipoint operations. Some X.21 networks may not support multipoint operations. The installation of these features is dependent on the availability of an X.21 network that is compatible with IBM's implementation of an X.21 as described in the *IBM Implementation of X.21 Interface General Information Manual (GA27-3287)*. The no-charge codes that specify the type of network attachment must be accurately entered with the order. Limitations: Cannot be installed with an integrated modem, CCITT Interface, DDS Adapter, or Analog Wideband Adapter on the same Line Base Adapter. **Note:** The X.21 Adapter cannot be configured to support switched lines on a System/36 that has an Autocall Adapter installed. When an X.21 Adapter is operating at 48,000 bps, the other lines cannot exceed an aggregate rate of 9600 bps. Maximum: One per Line Base Adapter, four total for nonswitched, three total for switched. Field Installation: Yes. Prerequisites: Line Base corresponding to the line using the X.21 Adapter. See *Multiline Communications Adapter Configurator* for possible combinations of features.

**Base support for MSRJE, 3270 DE and SSP-ICF**

**CNFIGICF:** The configuration and definition process for MSRJE, 3270 DE, and SSP-ICF is provided. This procedure allows the user to define the specific communications environment for each subsystem and line. This procedure is similar to the one on the System/34; however, it has been simplified and made easier to use by asking fewer questions about an environment and by having help text with each screen.

**ENABLE/DISABLE:** The ENABLE/DISABLE commands control the starting and stopping of MSRJE, 3270 DE and the subsystems of SSP-ICF.

**Data Management:** ICFDM, ICFCTL, and a common SNA for MSRJE (SNA), 3270 DE (SNA), and SSP-ICF (SNUF) is provided.

**CUSTOMER RESPONSIBILITIES** (not applicable)

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment.

**HARDWARE REQUIREMENTS**

The IBM System/36 Communications feature runs on all models of IBM System/36. Communications to another system or device requires a communications adapter on the System/36, either the Single-Line Communications Adapter (#2500) or the Multiple-Line Communications Adapter (#4500).

**SOFTWARE REQUIREMENTS**

The IBM System/36 Communications feature will operate under control of the current release of the IBM System/36 System Support Program (5727-SS1).

**COMPATIBILITY**

The Communications feature provides the base support for MSRJE, 3270 DE, SSP-ICF, autocall and X.21. It can coexist with the remote workstation support and batch BSC.

**CONVERSION**

Autocall phone lists must be reentered into the system when converting from a System/34. X.21 lists must also be reentered. SSP-ICF configurations must be reentered and are divided into two areas: Line environment and subsystem environment.

**SECURITY/INTEGRITY** (not applicable)**PERFORMANCE CONSIDERATIONS** (not applicable)**DOCUMENTATION**

(available from Mechanicsburg)

*Interactive Communications Feature: Reference (SC21-7910) ...  
Interactive Communications Feature: Guide and Examples (SC21-7911) ...  
Multiple Session Remote Job Entry Guide (SC21-7909) ...  
Multiple Session Remote Job Entry Messages (SC21-7944) ...  
3270 Device Emulation Guide (SC21-7912) ...  
3270 Device Emulation Messages (SC21-7945)*

**SYSTEM INTEGRITY:** (not applicable)

**RPOs ACCEPTED:** Yes

PROGRAM PRODUCTS

**SYSTEM/36 SYSTEM SUPPORT PROGRAM  
INTERACTIVE COMMUNICATIONS FEATURE (SSP-ICF)  
FEATURE #6002 - 5727-SS1**

**PURPOSE**

System/36 SSP Interactive Communications feature SSP-ICF provides support for:

- Interactive communications between application programs.
- Multiple concurrent communication sessions over the same data link.
- Multiple concurrent user application programs which use communications.
- An application program interface which is substantially independent of the link and logical protocols (BSC and SNA/SDLC).

**HIGHLIGHTS**

System/36 SSP-ICF consists of:

- A common user interface for application programs.
- Several subsystems.
  - INTRA - allows application program-to-program communications within the same System/36.
- BSC Subsystems.
  - CCP - System/3 mdl 15D CCP
  - CICS - CICS/OS/VSE and CICS/DOS/VSE
  - IMS - IMS/VSE IRSS (BTAM)
  - BSCEL - System/3 Batch BSC, 3740 BSC, Office Systems BSC, System/34 and System/36 BSC.
- SNA Subsystems.
  - SNA Upline Facility (SNUF) - CICS/VSE (LU-0) and IMS/VSE (LU-P).
  - SNA Peer - System/34 and System/36 (LU-6.0).
  - SNA Finance Subsystems - 4701 and 3601, 3694 (LU-0).

**Note:** The SNA Upline and Finance Subsystems use different LU-0 command sets.

**DESCRIPTION**

Interactive communications differs conceptually from batch communications in that the sequence of messages is not necessarily predetermined or scheduled. Either party in the communications session can logically start, alter or terminate the conversation. The logical communication path connecting two programs which are exchanging messages is called a session. SSP-ICF allows for multiple concurrent sessions to be used by one or more application programs in the System/36.

The application program access to SSP-ICF is available at two levels. Both are logical extensions of the System/36 workstation interface. The first is through special predefined 'screen format' names that serve as operation codes to control evoking programs, sending data, and issuing special commands to SSP-ICF. The second is through assembler programming and supports all of the functions in the first level plus the added flexibility of supporting situations that may occur when communicating to systems which are not part of the standard SSP-ICF support.

The application program interface allows the user program to be shielded from most of the uniqueness of the communications protocols (BSC or SNA/SDLC) and the communications support for the remote systems (e.g., IMS/VSE, CICS/VSE, or CCP). With proper design, users can develop programs for their current BSC network and then easily move to an SNA network without significant change to the communications interface within existing application programs.

An SRT program started by an EVOKE operation can send or receive on the first operation. This capability applies only to SRT programs; system restrictions for MRT processing require the first operation to be input.

Included with SSP-ICF is support for languages, devices, and communications systems as listed below:

**Note:** System/36 data link connections are either point-to-point or multipoint tributary only (except for connection to 5250 devices, System/36, System/34 or Finance terminal products using the Finance Subsystem).

- **BSC protocols:**
  - IMS/VSE (Version 1.1.6) via IRSS (BTAM) (System/36 as a System/3).
  - CICS/OS/VSE (Version 1.6.0 and subsequent releases) using BTAM or CICS/DOS/VSE (Version 1.6.0 and subsequent releases) with BTAM-ES (System/36 as a System/3).
  - System/36 with SSP-ICF, RPG II, COBOL, BASIC, or Assembler\*
  - System/34 with SSP-ICF, RPG II, COBOL, BASIC or Assembler\*

- System/3 mdl 15D CCP
- System/3 mdl 15D RPG II\*
- System/38 (as a System/3)
- System/32 (as a System/3)\*
- 3741 mdl 2 or 4 (point-to-point only)\*
- 3747 (point-to-point only)\*
- 5110 (as a 3741)\*
- 3780 (as a System/34)\*
- 5120 (as a 3741)\*
- 5231 mdl 2 (as a 3741)\*
- 5260 (as a 3741)\*
- 5280 (as a 3741)\*
- System/23 Datamaster (as a 3741)\*
- 6580 Displaywriter\*
- 5520\*
- Office Systems/6, 6640, 6670\*
- Series/1 (as a System/3)\*
- System/7 (as a System/3)\*
- S/370 with System/36 (as a System/3)
- OS/VSE, DOS/VSE BTAM\*

\* These devices are only supported for a single session over a data link.

- **SNA/SDLC**
  - System/36 using SSP-ICF
  - System/34 using SSP-ICF
  - ACF/NCP/VSE (Version 1 Release 3) and ACF/VTAM (Version 2)
  - ACF/VTAME on VSE
  - IMS/VSE (Version 1.1.6) (as a 3790) using ACF/NCP/VSE, ACF/VTAM
  - CICS/OS/VSE (Version 1 Release 6.0 and subsequent releases) (as a 3790) using ACF/NCP/VSE, ACF/VTAM
  - CICS/DOS/VSE (Version 1 Release 6.0 and subsequent releases) (as a 3790) using ACF/VTAME on VSE
  - 4701, 3601, 3694
- **Internal Protocol**
  - System/36 using SSP-ICF (INTRA) for application program-to-program communications within the same system.

**CUSTOMER RESPONSIBILITIES (not applicable)**

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment.

**HARDWARE REQUIREMENTS**

The IBM System/36 Interactive Communications feature (SSP-ICF) runs on all models of IBM System/36. SSP-ICF support for communications between programs residing in the same System/36 does not require a communications adapter. Communications to another system or device requires a communications adapter on the System/36, either the Single-Line Communications Adapter (#2500) or the Multiple-Line Communications Adapter (#4500).

**SOFTWARE REQUIREMENTS**

The IBM System/36 Interactive Communications feature (SSP-ICF) will operate under control of the current release of the IBM System/36 System Support Program (5727-SS1) and the Communications feature (#6001).

**COMPATIBILITY**

SSP-ICF communication support can coexist with other communication support (that is, programs using remote 5250s, batch BSC or 3270 Device Emulation or Multiple Session Remote Job Entry).

**CONVERSION**

Programs written for the System/34 using SSP-ICF need to be recompiled. Some of the error return codes have been dropped under some of the subsystems. Review *Converting from the System/34 to the System/36* for details. System/34 configuration members for the subsystems must be re-entered. On the System/34, there is one configuration member per subsystem definition. For System/36, there are two members: 1) a line member describing the link attributes; and 2) a subsystem member defining the subsystem attributes. This allows sharing of common link definitions.

**SECURITY (not applicable)**

**PERFORMANCE CONSIDERATIONS (not applicable)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*Interactive Communications Feature: Reference (SC21-7910) ...  
Interactive Communications Feature: Guide and Examples (SC21-7911)*

**SYSTEM INTEGRITY: (not applicable)**



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PP 5727 SS1.7  
Nov 83

PROGRAM PRODUCTS

System/36 SSP-ICF (feature #6002) (cont'd)

RPQs ACCEPTED: Yes

PROGRAM PRODUCTS

**SYSTEM/36 SYSTEM SUPPORT PROGRAM  
3270 DEVICE EMULATION FEATURE #6003 - 5727-SS1**

**PURPOSE**

The 3270 Device Emulation feature is a utility program that supports both BSC and SNA/SDLC 3270 line protocols. No user code is required.

**HIGHLIGHTS**

- System/36 appears as a 3271 mdl 2 under BSC or as a 3274 mdl 1C under SNA.
- A locally-attached display (5251 mdl 11, 5291, 5292) appears as a 3277 mdl 2 Display.
- Any attached printer (3262, 5219, 5224, 5225, 5256) appears as a 3288 mdl 2 Printer, including spooled remote printers.
- One BSC line and/or up to four SNA lines are supported.

**DESCRIPTION**

The 3270 Device Emulation feature allows the System/36 to appear to a host system as a 3271 mdl 2 (BSC) or a 3274 mdl 1C (SNA) Control Unit. It also allows the 5251 mdl 11, the 5291, and the 5292 Display Stations, and 5150 PC with 5250 Emulation mode, that are locally attached to a System/36, to appear to a host system as a 3277 mdl 2 Display Station. The Keyboard Numeric Lock (#4690) on 3277 Displays is optionally supported. The 5256, 5219, 5224, 5225 and 3262 Printers attached to a System/36 will appear to the host system as a 3288 mdl 2 printer. Spooled remote printers are also supported.

Only the EBCDIC typewriter keyboards and EBCDIC transmission code are supported. Certain keys are in different locations on the 3277 and the 5251, 5291 and 5292 keyboards. Function keys on the 3277 are mapped onto the 5251, 5291 and 5292 keyboards to provide the same functions. These keys are Field Mark, Erase Input, PA and PF keys. The copy command is not supported. However, the 5251, 5291, 5292 Print Key can provide an equivalent function in many cases. The light-pen and magnetic stripe reader are not supported.

Emulation of the 3270 devices allows the System/36 to reside on a multipoint communications link that supports a 3270. Since this program translates the data stream, host application programs will, generally, require no changes to support the System/36 running under this device emulation. 'Screen wrap' is not supported. If the last position (24,80) on the screen is a field attribute character, it will be repeated in the first position (1,1).

A maximum of 127 input fields per screen is supported. If a 3270 screen has more than 127 input-capable fields, it will be rejected by 3270 Device Emulation. When using BSC, the 5250 character set is translated into the 3277 BSC standard character set. The 3278 SNA standard character set is used when the host link is SNA. 3270 DE, MSRJE, and SSP-ICF (SNUF) can share one communications port on the System/36.

The following host subsystems are supported: IMS/VS (ACF/VTAM), CICS/VS (OS, ACF/VTAM and VSE, ACF/VTAME), TSO (ACF/VTAM), and System/3 mdl 15D CCP. The 3270 Keyboard Numeric Lock feature is supported. This provides the capability of locking out all characters in a numeric field except 0-9, decimal sign, minus sign, plus sign, comma, space and the dup key.

**BSC Considerations:** For BSC, the 3270 Device Emulation feature emulates the 3271 mdl 2 Control Unit, the 1920-character 3277 mdl 2 Display Station, and the 3288 mdl 2 Printer. The System/36 acts as the 3271 mdl 2 Control Unit; the 5251 mdl 11, 5291 and 5292 Displays serve as the 3277; and the 5256, 3262, 5219, 5224 and 5225 Printers serve as the 3288.

Automatic calling is not supported. Only one point-to-point non-switched or one multipoint line is supported.

The maximum receive buffer size supported is 4,096 bytes. This includes all line control characters. The 3270 Device Emulation feature may generate BSC error status to the host under somewhat different conditions than the 3271. Customer host programs dependent on such specific link level 3270 BSC error status may require modification. The reference manual describes these conditions.

**SNA Considerations:** For SNA, the 3270 Device Emulation feature emulates the 3274 mdl 1C Control Unit, the 1,920-character 3277 mdl 2 Display Station, and the 3288 mdl 2 Printer. The System/36 acts as the 3274 control unit; the 5251 mdl 11, 5291, 5292 and 5150 PC Displays serve as the 3277; and the 5256, 3262, 5224, 5225 and 5219 Printers serve as the 3288 (or 3287 in SNA Character String (SCS) mode only). Up to 16 devices (logical units) are supported per line. Up to four lines can be used concurrently. Point-to-point, switched or nonswitched, and multipoint (nonswitched) lines are supported.

**CUSTOMER RESPONSIBILITIES (not applicable)**

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this program when it is operated in the following specified operating environment.

**HARDWARE REQUIREMENTS**

The IBM System/36 Device Emulation feature (3270 DE) runs on all models of the System/36. Communications to another system requires a communications adapter on the System/36, either the Single-Line Adapter (#2500) or the Multiple-Line Communications Adapter (#4500) and Workstation Controller Expansion (#4900).

**SOFTWARE REQUIREMENTS**

The IBM System/36 Device Emulation feature (3270 DE) will operate under control of the current release of the System/36 System Support Program (5727-SS1) and its Communications feature (#6003).

**COMPATIBILITY**

The 3270 Device Emulation can coexist in a System/36 with other communications support (that is, programs using remote 5250s, batch BSC, MSRJE or SSP-ICF).

**CONVERSION**

System/36 3270 Device Emulation is compatible with the System/34 3270 Device Emulation (3270 DE) program product (5726-EM1). The 3270 DE is a utility program which means that the System/36 version should be loaded onto a System/36 and not the System/34 version. System/34 configuration members for the subsystem must be reentered. For the System/34, there is one configuration member per subsystem definition. For System/36, there are two members: 1) a line member describing the link attributes, and 2) a subsystem member defining the subsystem attributes. This allows sharing of common link definitions.

**SECURITY (not applicable)**

**PERFORMANCE CONSIDERATIONS (not applicable)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*3270 Device Emulation Guide (SC21-7912) ... 3270 Device Emulation Messages (SC21-7945).*

**RPOs ACCEPTED:** Yes



PROGRAM PRODUCTS

**SYSTEM/36 SYSTEM SUPPORT PROGRAM  
MULTIPLE SESSION REMOTE JOB ENTRY  
FEATURE #6004 - 5727-SS1**

**PURPOSE**

System/36 Multiple Session Remote Job Entry (MSRJE) provides a common user interface for performing the RJE function to a host system running RES, JES2, JES3, RSCS and POWER/VSE. Multiple readers, writers, punches (disk files), and a console are supported. The maximum number of devices are supported.

**HIGHLIGHTS**

- Multiple sessions supported:
    - Up to 15 Readers\*
    - Up to 15 Printers\*
    - Up to 15 Punches\*
  - For SNA protocols, one line can be shared with 3270 DE and SSP-ICF (SNUF subsystem).
  - Consistent and common user interface regardless of the line protocols.
- \* Note: 7 sessions when using BSC protocols, 15 for SNA.

**DESCRIPTION**

The MSRJE feature provides functional support as a remote job entry workstation. Both BSC (multileaving) and SNA line protocols are supported. RES, JES2, JES3, RSCS (BSC only), and POWER/VSE (SNA only) are the host subsystems supported.

Multiple devices are supported and can run concurrently. The maximum number of devices is (Note: Some host subsystems support fewer devices than the maximum shown):

For Hosts Connected:	SNA	BSC
Readers	15	7
Printers	15	7
Punches	15	7
Console	1	1

In addition, the Reader is supported with an input queue of up to 32 requests. The first 15 (7 BSC) entries will be assigned to a Reader. The remaining entries will be queued until a Reader becomes available. A user may request a reader, submit some work to it, and then ask to be released from the Reader.

Printers and Punches are supported with an extensive and powerful Forms Control Table. All of the System/36 printer functions are supported. Disk files can be built directly from the RJE Punch data stream. All file types are supported. At the conclusion of building a file, a System/36 user procedure may be started.

Both Printer and Punch data streams can be received as compressed data without further processing at time of receipt. Another utility is provided to allow processing of the compressed data streams.

Autocall is supported in both BSC and SNA. MSRJE uses the multileaving BSC protocols and can be defined as either a System/3 or a System/360. In SNA, MSRJE is defined as an 'SNA Terminal' with Multiple Logical Units (MLU).

**CUSTOMER RESPONSIBILITIES (not applicable)**

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment.

**HARDWARE REQUIREMENTS**

The IBM System/36 Multiple Session Remote Job Entry (MSRJE) feature runs on all models of IBM System/36. Communications to a host system requires a communications adapter on the System/36, either the Single-Line Communications Adapter (#2500) or the Multiple-Line Communications Adapter (#4500).

**SOFTWARE REQUIREMENTS**

The IBM System/36 Multiple Session Remote Job Entry (MSRJE) feature will operate under control of the current release of the IBM System/36 System Support Program (5727-SS1) and the Communications feature (#6001).

**COMPATIBILITY**

MRJE communication support can coexist in a System/36 with other communication support (that is, programs using remote 5250s, batch BSC, or 3270 Device Emulation or SSP-ICF).

**CONVERSION**

MSRJE is not compatible with either MRJE or SRJE on the System/34 and must be converted by performing the following:

- Use CNFIGICF to define the operating environment.
- Reenter the forms control table (FCT). (The System/34 FCT can be used as a starting point, but not all printer functions were support-

ed. There also was not any definition for building disk files; this is a new function).

- Convert any data files or library members which contain the RJE utility control statement.
- Educate the System/36 end users on the operation of both the System/36 MSRJE and SSP and the Host subsystem.

**SECURITY/INTEGRITY (not applicable)**

**PERFORMANCE CONSIDERATIONS (not applicable)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*Multiple Session Remote Job Entry Guide (SC21-7909) ... Multiple Session Remote Job Entry Messages (SC21-7944).*

**SYSTEM INTEGRITY: (not applicable)**

**RPQs ACCEPTED: Yes**

## PROGRAM PRODUCTS

**SYSTEM/36 SYSTEM SUPPORT PROGRAM  
DATA ENCRYPTION STANDARD (DES)  
SUBROUTINE FOR BANKING FEATURE #6005 - 5727-SS1****PURPOSE**

The DES subroutine can be used to encrypt or decrypt sensitive data or to generate personal identification numbers (PINs). Typically, DES is used to generate PINs for use with the 3624 Consumer Transaction Facility.

**HIGHLIGHTS**

The DES subroutine can be used in an RPG II, COBOL or Assembler application program. It cannot be used in a BASIC program.

**DESCRIPTION**

The encryption/decryption subroutine complies with the United States Federal Information Processing Data Encryption Standard (DES) algorithm (National Bureau of Standards FIPS 46). It also complies with the American National Standards Institute Data Encryption Algorithm (ANSI X3.92-1981).

**CUSTOMER RESPONSIBILITIES**

The DES algorithm is implemented in software. Security of the key that is used by the algorithm is a user responsibility. For more information about data security and cryptography, see the *IBM Data Security Through Cryptography Manual* (GC22-9062).

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment.

**HARDWARE REQUIREMENTS**

The IBM System/36 Data Encryption Standard (DES) Subroutine for Banking can be used on all models of IBM System/36.

**SOFTWARE REQUIREMENTS**

The IBM System/36 Data Encryption Standard (DES) Subroutine for Banking requires the current release of the IBM System/36 System Support Program (5727-SS1). Other prerequisites include the following SSP features: Communications feature (#6001) and Interactive Communications feature (#6002).

**COMPATIBILITY**

This feature is compatible with the DES subroutine that is included in the System/34 Finance Subsystem (5726-SS1, feature #6010/#6011).

**CONVERSION (not applicable)****SECURITY/INTEGRITY**

Security of the key that is used by the algorithm is a user responsibility. For more information about key security and cryptography, see the *IBM Data Security Through Cryptography Manual* (GC22-9062).

**PERFORMANCE CONSIDERATIONS (not applicable)****DOCUMENTATION**

(available from Mechanicsburg)

The Data Encryption Standard (DES) Subroutine for Banking is covered in the Finance Subsystem chapter of the *IBM Interactive Communications Feature Reference Manual* (SC21-7910).

**SYSTEM INTEGRITY:** (not applicable)

**RPQs ACCEPTED:** Yes



PROGRAM PRODUCTS

**SYSTEM/36 SYSTEM SUPPORT PROGRAM  
DISTRIBUTED DISK FILE FACILITY (DDFF)  
FEATURE #6006 - 5727-SS1**

**PURPOSE**

DDFF target data manager allows System/34 application programs to access System/36 data files without changing any user code. The user programs use standard data management in RPG II, Assembler and COBOL to access a disk file. Just as the physical location on the disk is not contained in the user programs, neither is the physical system location. Programs running on a System/34 may access data files on that System/34, another System/34, a System/36 or a System/3 mid 15D.

**HIGHLIGHTS**

- DDFF target data manager.
- Uses SNA peer (PEER) subsystem of SSP-ICF.
- Allows a System/34 running a user program to access System/36 disk data files.

**DESCRIPTION**

The Distributed Disk File Facility (DDFF) target data manager allows a System/34 RPG II or COBOL program to access a disk file located on a System/36. A System/34 Assembler program can access remote files if the program conforms to standard coding techniques (that is, if no special data management techniques are used).

The DDFF program is designed to be a companion program to another DDFF program running on a System/34 (5799-BCP). The System/36 DDFF target supports all of the System/34 access methods for remote file access except:

- Consecutive Output (CO)
- Direct Output (DO)
- Indexed Sequential/Random Input (ISRI)
- Indexed Output (IO/IOU)
- Dummy Open
- Sector Mode Data Management (ZPAM)

**CUSTOMER RESPONSIBILITIES** (not applicable)

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment.

**HARDWARE REQUIREMENTS**

The IBM System/36 Distributed Data File Facility (DDFF) runs on all models of IBM System/36. Communications to another system requires a communications adapter on the System/36, either the Single-Line Communications Adapter (#2500) or the Multiple-Line Communications Adapter (#4500).

**SOFTWARE REQUIREMENTS**

The IBM System/36 Distributed Disk File Facility (#6006) will operate under control of the current release of the IBM System/36 System Support licensed program (5727-SS1), the Communications feature (#6001), and the Interactive Communications feature (#6002).

**COMPATIBILITY**

DDFF uses the SNA Peer subsystem of SSP-ICF and does not restrict the use of any of the System/36 communications support.

**CONVERSION** (not applicable)

**SECURITY** (not applicable)

**PERFORMANCE CONSIDERATIONS** (not applicable)

**DOCUMENTATION**  
(available from Mechanicsburg)

*Distributed Disk File Facility Reference Manual (SC21-7869).*

**SYSTEM INTEGRITY:** (not applicable)

**RPGs ACCEPTED:** Yes

PROGRAM PRODUCTS

5727-TX1 - SYSTEM/36 TEXT MANAGEMENT SYSTEM

PURPOSE

The System/36 Text Management System (TMS/36) provides the user with a library of programs for document creation, revision, viewing, merging user data files, spelling aids, and printing functions. Data processing and document processing can be performed concurrently using the multiprogramming capabilities of the System/36. These functions are performed through a 1,920-character, multipurpose 5251, 5291 or 5292 Display Station. The same display station can be used for both data processing and document processing.

HIGHLIGHTS

- A high level of ease-of-use characteristics:
  - Menu-driven access to all functions.
    - Help text at all levels
    - Self-guided operation for the novice user
  - Online documentation of all major functions.
  - Online exercises to familiarize the user with the Text Editor functions.
- Document library functions provide the means to:
  - Show index of document names.
  - Show list of document names and subjects.
  - Document processing options:
    - View
    - Delete
    - Revise
    - Create a new document
    - Copy a document
    - Print a document
    - Find a document
    - Merging user data into a document
    - Spelling aids
  - Find documents through various search options.
  - Support individual document libraries for each user or sharing of document libraries.
- Document maintenance functions:
  - Automatically generated defaults for each user provide ready-to-use formats for each document.
  - Specify, recall, and modify document profile information such as:
    - Description
    - Headings
    - Footings
    - Print control
    - Editing options
  - 13 or 20 lines can be keyed or displayed at one time.
  - Add or insert words, lines and paragraphs of text within a document. Text affected is shown in reverse image before completing the function.
  - 'Find' character function to assist in locating the end of the area to move, copy or delete.
  - Include lines of text from another document in the same or a different library.
  - Adjust one or more paragraphs for margin setting, words continued on the next line, and alignment to the right-hand margin.
  - Find words of text and optionally replace with new words. Each word found may be optionally viewed prior to replace.
  - GOTO function to move forward or backward within a document or to a specific line.
  - Format controls (margins and tab settings) can be changed any time and are saved in the document profile.
  - Center text within the current margin settings on one or more lines.
  - Shift columns of information.
  - End options to save and optionally print the document.
  - User-defined symbols to identify lines of changed text in the printed output.
  - 110-character line length with left-to-right windowing.
- Spelling Support:
  - Supports English dictionaries for general, medical and legal uses. The general dictionary contains 130,000 English words and acronyms.

- Addendum dictionary for user-supplied acronyms and words (including non-English).
- Spelling verification. Misspelled words shown in reverse image.
- Spelling assistance will show up to five possible alternate words for each active dictionary.
- Synonym support will show as many synonyms as will fit in the display area.
- Flexible Document Printing Options:
  - Quality print on the 5219 mdl D01 and D02 Print Wheel Printer, providing font selection, cut sheet paper drawer selection, envelope hopper selection, and ribbon-saving option.
  - Single or multiple documents at one time. Multiple copies of each document can also be obtained.
  - Override default printer device.
  - Special spacing and skipping for the 5224/5225 Printers.
  - Standard headings/footings per page.
  - Floating data and page numbers in headings and footings.
  - Page numbering options.
  - Draft of final printing.
  - Cover page option.
  - Print on Office Systems products (6580 Displaywriter, 6670, 6640) when binary synchronous communications are used.
  - Print text with data merged from user files.
  - Print table of contents.
  - Standard or special forms.
  - Large character printing for foils when APF/36 is installed.
- Recoverability:
  - Integral part of the Text Management System design.
  - Recovery option screen is presented to the user if work files are found on disk. User can return to last page worked on.
  - Automatic user library reorganization/expansion if required.
- Data File Support:
  - Interactive data definition and record definition list.
  - Simple interface for:
    - Data entry/update (Data File Utility required)
    - Data list (Data File utility required)
  - Data selection and sort with data merge prior to print.

DESCRIPTION

TMS/36 gives the user a library of programs that provide document creation, revision, viewing, merging user data files, spelling aids, and print functions. Data processing and document processing can be performed concurrently using the multiprogramming capabilities of the System/36. The same display station can alternately be used for data processing and document processing.

With the implementation of System/36 security support, users can control access to documents containing sensitive information on a document library basis.

TMS/36 is designed for ease-of-installation and use. After the library is copied to the system, it is ready for execution. A user who is familiar with the System/36 and the 5251, 5291 and 5292 Display Stations should be able to use the TMS/36 application program without referring to any documentation other than the online information and HELP text.

Online information is provided to aid the inexperienced user or to provide a quick review of a function. Pressing the HELP key within programs will cause information about the current screen to be displayed.

All TMS/36 functions are requested from menus. The application prompts the operator for information only as needed. Where appropriate, defaults to these prompts are indicated for ease-of-use. HELP screens are available through the HELP key.

Documents are kept in a document library for each user. This allows duplicate document names by different users.

Various text functions are available to manipulate the document, through the use of cursor location and pressing command keys.

Printing can be directed to various printers on the system including the letter quality, cut sheet feed, 5219 (mdl D01 or D02) Printer. Through binary synchronous communications, the 6670, 6640 and 6580 Displaywriter products are also supported.



PROGRAM PRODUCTS

**TMS/36 (cont'd)**

TMS/36 utilizes features available in the System/36 System Support Program. These features include multiple user library support, multiprogramming, local and remote transparency of display stations, print spooling, security, and binary synchronous communications.

**CUSTOMER RESPONSIBILITIES**

The responsibility for providing accurate ordering information, personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum hardware requirements are:

- IBM System/36, any model.
- One IBM Printer (3262, 5219 mdl D01 or D02, 5224, 5225 or 5256). For maximum readability, an upper/lower case print belt is recommended if using the 3262 Printer with TMS/36.
- One IBM 5251 mdl 11, 5291, or 5292 Display Station.

The TMS/36 library requires 2,500 blocks of disk space. For each user-id, a minimum document library of 50 blocks will be reserved. The user document library can increase. In addition to permanent disk space, a minimum of 40 blocks of temporary work file space will be used for each user when creating or revising a document. If file expansion is necessary, the work files will automatically be increased.

The option of sending to a letter quality printer (such as the 6670, 6640, or the 6580 Displaywriter) requires the appropriate communications features.

**SOFTWARE REQUIREMENTS**

The IBM System/36 System Support Program (5727-SS1), Release 1 or later. The largest program requires 60K bytes of user memory to execute. BSC communications support is not required to use the basic functions. DFU is required if the facilities of data file list, update, and creation are used (merging data with documents does not require DFU). The printing of large characters for foils requires that the Advanced Printer Function licensed program be installed.

**COMPATIBILITY** (not applicable)

**CONVERSION**

A utility procedure is provided to convert System/34 Text Editor PRPQ documents into a format that can be processed by TMS/36.

**SECURITY/INTEGRITY**

Same as the System/36 System Support Program (5727-SS1).

**PERFORMANCE** (not applicable)

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM System/36 Text Management System Licensed Program Specifications (GC21-7978) ... IBM System/36 Text Management System User's Guide (SC21-7979).*

**SYSTEM INTEGRITY**

Same as the System/36 System Support Program (5727-SS1).

**RPQs ACCEPTED:** Yes

PROGRAM PRODUCTS

**SYSTEM/36 UTILITIES  
5727-UT1**

**PURPOSE**

The following utilities are provided with the System/36 Utilities licensed program:

- Data File Utility (DFU)
- Source Entry Utility (SEU)
- Workstation Utility (WSU)
- Screen Design Aid (SDA)

Each display station using DFU, SEU, and SDA has its own copy of the utility (multiple copies can be executing at one time). Only one copy of a specific WSU-created program can be executing at a time; however, one WSU program can service multiple display stations. All display stations supported by System/36 are supported by these utilities. All the utilities are supplemented by help text for improved easy-of-use.

**DESCRIPTION**

**DATA FILE UTILITY (DFU)**

The following DFU disk data file functions are provided to handle indexed, sequential or direct files as part of the DFU:

- Data file creation and maintenance
- Data file inquiry
- Data file list

All functions of DFU use stored RPG II file definition and input specifications. DFU defaults to the current user library. To use any of the functions, the user needs to know the name of the file, a name to be assigned to the job description, and the name of the stored RPG II file definition specifications. The functions prompt for all the other information necessary to tailor the job to the user's task. Field names are included with the prompts to aid the user in selecting the data fields to be used.

**Data File Creation and Maintenance: (Enter/Update)** This function provides the necessary capabilities to create and maintain indexed, sequential, or direct data files on disk. Maximum use is made of the display to prompt the operator by field name for the data to be entered. For update, the data currently in the record is displayed. Highlights include:

- Creation of indexed, sequential, and direct files.
- Support of alternate access paths for indexed files.
- Support for 99 record types.
- Support for 1,024-byte record length.
- No limit on print lines of data.
- Support for up to 200 display formats.
- Auto duplication of fields or portions of fields.
- Formatted report for an audit trail.
- Roll function key support.
- Control totals.
- Generated keys.
- Modulus 10 and 11 self-check digit.
- Record sequencing.

**Data File Inquiry:** This function provides the necessary capabilities to allow inquiry into any indexed, sequential, or direct file. The records are displayed showing the current information in the file. Highlights include:

- Retrieval by record key for indexed files and relative record number for direct files and sequential files
- The ability to roll randomly through a file or roll forward or backward through the file by key sequence for indexed files, and by relative record number for direct files and sequential files
- Support for alternate access paths for indexed files
- The ability to print selected records with the 'PRINT REC' command key
- All displayed fields include column headings for easy identification

**Data File List:** This function provides the necessary capability to list and summarize selected information from any indexed, direct or sequential file on disk. The function is useful for obtaining one-time reports and for creating recurring management reports. Highlights include:

- Support of alternate access paths for indexed files.
- Page headings including date and page number
- Column headings

- Edit data fields
- Column totals - both final and subtotals
- Selection based on record codes and/or field values
- Sort, ascending or descending, on up to five fields
- Summary list with totals only
- Retrieve and print data from a related index master file
- Calculate and print additional result fields

**SOURCE ENTRY UTILITY (SEU)**

SEU can be used to create and maintain OCL procedures, messages, display formats, RPG II, auto-report, WSU, FORTRAN, Assembler, SORT, BASIC and COBOL source statements. Highlights include:

- Default to current user library.
- Display formats are provided for the fixed-format statements (for example, RPG II, WSU) to aid in key entry of fields.
- Prompted SORT specifications.
- Time-stamp and reference number in member.
- Upper and lower case scan and scan/replace capability.
- Subtype support to identify members.
- Free-form display format for any statements to be entered.
- User-defined display formats may be used.
- Support for diagnostic source file.
- Use of display to show member name and library name being entered or updated.
- Scan capability controlled by character mask.
- Global replace option.
- Change member name and library.
- Optional RPG II and auto-report syntax checking.
- Optional resequencing of statements in a member.
- The ability to move and/or copy statements in a member.
- The ability to include statements from any source or procedure library member in any library.
- The ability to delete statements.
- Statement insertion.
- Rolling forward or backward through statements.
- Optional listing of statements.
- Use of display to show statement being entered or updated.

**WORKSTATION UTILITY (WSU)**

WSU provides an easy-to-use set of specifications for defining interactive data entry programs which support one or more display stations. Specifications describe the following program variables:

- Job (name, number of workstations, region size)
- Optional transaction file (a special direct organization disk file created and managed by WSU to contain key entered records)
- Optional master files (up to 20 disk files accessed or updated by the program)
- Display formats (formats to be displayed on the display stations supported on the System/36, to prompt for data entry, display user-defined help text and/or display error messages)
- Optional execution arrays (up to 75 single dimension arrays or tables can be specified).
- Processing (the arithmetic, logical edit, or I/O operations to be performed in conjunction with the entry of data in response to display format.
- RPG II file description and input specifications are referenced for a description of the transaction and master files.

The WSU specifications are processed by the WSU generator and the SSP screen format generator routine (\$SFGR utility) to produce:

- An object definition module to be executed by WSU when the job is invoked.
- Display formats.
- System/36 OCL procedures to control execution of the job when invoked.

Highlights include:

**System/36 Utilities (cont'd)**

- RPG II compatible execution time array support.
- NOHALT options on WSU errors for unattended operations.
- Generation produced load members are time stamped and reference numbered.
- Logical combination of display format description and processing specifications.
- Support of alternate access paths for indexed files.
- Management of the transaction file with each workstation's records logically separate.
- Up to 245 user-defined display formats.
- Operator review, correction, deletion and insertion of transactions.
- Independent operator sign-on, sign-off, and resume entry support.
- Subtype support to identify WSU members in a library.
- Recovery of the transaction file after system failure.
- Different WSU-generated programs running concurrently.
- WSU programs running as MRT (Multiple Requester Terminal) programs to optimize performance.
- WSU programs that dynamically adjust to a larger user-specified region size to reduce overlay fetches from disk or to a smaller user-specified region size if memory needs to be constrained.
- Support for display formats using a variable starting line number.
- Masking of command and function keys.
- Capability to access the originating workstation ID for a transaction.
- Options at generation to replace existing programs, control portions of the output listing, and suppress OCL generation.
- Random additions to indexed master files.
- Online debugging via DEBUG operation code.
- WSU transaction file update capability via RPG II SUBR22.
- WSU edit date fields greater than six characters.
- WSU optional 'SR' in subroutines.

**SCREEN DESIGN AID (SDA)**

SDA provides an interactive easy-to-use method of designing, creating and maintaining display formats and job menus. Increased productivity can result by eliminating the amount of clerical work associated with coding specification sheets, transcribing source code, and correcting transcription or coding errors. Highlights include:

- Member selection display at setup.
- Print format images and source specifications.
- Creation of a new WSU/\$SFGR source specification member.
- Subtype support to identify members.
- Adding new WSU \$SFGR source specifications to an existing member.
- End of job functions.
- Viewing formats in a \$SFGR load member.
- Updating, inserting and deleting individual source specifications using SEU.
- Creating, updating and deleting menus and their associated source members and help text.
- Updating formats in an existing WSU \$SFGR source member regardless of order of 'D' specifications.
- Block move and field change length operations in update mode.
- Deleting formats from a source member.
- Up to 255 display formats in a \$SFGR LOAD member.
- Creation of an RPG II skeleton program to use \$SFGR formats.
- Help specification and comment statement recognition.
- Help function which displays text describing the use of SDA and information being prompted for.
- Generating WSU programs for master file inquiry, maintenance, or transaction file creation.
- Field level syntax checking.
- Time stamping and reference numbering source members and load members.
- Optional source specification sequencing.
- Support for the 5292 mdl 001 color display.

- Recover from interrupted SDA run.
- Compiling a \$SFGR format source member.

**CUSTOMER RESPONSIBILITIES (not applicable)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM System/36 Utilities licensed program (5727-UT1) runs on all models of the IBM System/36. DFU, SEU, and WSU require a minimum 18K (18,432) bytes of main storage. SDA requires 24K (24,576) bytes of main storage. DFU and WSU will take advantage of additional main storage if it is available.

**SOFTWARE REQUIREMENTS**

The current release of the IBM System/36 Utilities licensed program operates under control of the current release of IBM System/36 System Support licensed program (5727-SS1).

**COMPATIBILITY**

The System/36 Utilities licensed program is a functional superset of the System/34 Utilities program product except SORT. SORT is packaged with the System Support licensed program. Some user interfaces have been changed to improve ease-of-use. The default library has been changed on System/36 from #LIBRARY to the current user library. DFU and WSU source programs are completely upward compatible.

**CONVERSION**

The Screen Design Aid (SDA) and the Source Entry Utility (SEU) are interactive utilities that require no conversion from System/34 to System/36. The user interfaces have been changed to improve ease-of-use. The default library has been changed for System/36. Source maintained by SDA and SEU on System/34 is compatible with System/36. The Data File Utility (DFU) and the Workstation Utility (WSU) source programs from System/34 must be recompiled to run on System/36. No other changes to source programs are necessary to migrate System/34 DFU and WSU programs to System/36.

**SECURITY/INTEGRITY (not applicable)****PERFORMANCE CONSIDERATIONS (not applicable)****DOCUMENTATION**

(available from Mechanicsburg)

*Workstation Utility Introduction (SC21-7904) ... Workstation Utility Guide (SC21-7905) ... Data File Utility Guide (SC21-7900) ... Source Entry Utility Guide (SC21-7901) ... Utility Messages (SC21-7939) ... Utility Licensed Program Specifications (GC21-7895) ... Creating Displays (SC21-7902).*

**RPQs ACCEPTED:** Yes

## SYSTEM/36 BUSINESS MANAGEMENT ACCOUNTING SYSTEM

General Ledger ... 5727-XB2  
 Accounts Payable ... 5727-XB3  
 Accounts Receivable ... 5727-XB4  
 Payroll ... 5727-XB5  
 Inventory Accounting ... 5727-XB6  
 Billing ... 5727-XB7

### PURPOSE

These multi-industry licensed programs are written in System/36 BASIC programming language and are an extension of the Business Management Accounting System programs with accounting functions that are identical to those available for the System/34. The System/36 Business Management Accounting System licensed programs provide the user with powerful tools to perform business accounting while providing additional management information. The programs contain functions applicable to a wide range of industry classifications.

### HIGHLIGHTS

- Master Menu displays all applications installed.
- Applications feature either stand-alone or co-resident installation with other IBM System/36 Business Management Accounting System applications.
- Programs and procedures required to run the applications will reside in the application library on disk. Master files, interface files, data entry files and work files will also be disk resident.
- Built-in auditability and control characteristics through the use of familiar 5-column journals, sequential journal numbering and inter-application data integrity.
- Program documentation is designed to promote customer self-sufficiency during installation and operation.
- Ease-of-use is emphasized through:
  - Menu-driven task selection
  - Consistent data entry programs and procedures for all applications
  - Common file maintenance techniques including user-defined field defaults
  - Use of generally accepted accounting terminology
- Installation-time tailoring options allow the user to select key functions and perform file sizing.
- System/36 BRADS file definitions are provided with the applications for selected master files.
- Optional security code by application for each company.
- Multi-company support.
- File sharing capability supporting concurrent operations from any workstation signed on to that company.
- A file load facility is provided for selected large volume master files from multiple workstations.

### DESCRIPTION

#### SYSTEM/36 GENERAL LEDGER (5727-XB2)

The System/36 General Ledger application is a multi-industry application designed to accomplish the basic accounting functions of posting journal entries to the General Ledger, generating financial statements, and producing special journals. The programs are based on double entry accounting principles in accordance with generally accepted accounting practices. Transactions may be directly entered as general journal entries and also received as summary entries from the System/36 Billing, Accounts Receivable, Payroll and Accounts Payable applications, if installed.

#### Functions and Features

- Calendar-driven 1 to 13 period support
- User-defined fiscal year
- Optionally combined financial statements for multiple companies
- User-defined statement formatting
- Special journal capabilities which allow the user to tailor journal formats
- Previous year history maintained for comparative statements
- Budget and encumbrance support
- Annual ledger capability
- Page width option allowing statements on 8-1/2" x 11" paper
- Future fiscal year posting
- Automatic year-end closing.

#### SYSTEM/36 ACCOUNTS PAYABLE (5727-XB3)

The System/36 Accounts Payable application is a multi-industry offering designed to assist the user in controlling the outflow of cash and maintaining accurate records of liabilities to trade and other vendors. Payable items are handled on an accrual basis and vendor analysis reporting allows the user to determine key purchase volumes and discounts taken or lost for the current and previous year. Summarized journal information can be passed to the System/36 General Ledger application, if installed.

#### Functions and Features

- Allows one-time vendor checks
- Cash discount by percent or amount on invoice total or line items
- Supports multiple General Ledger distributions by vendor
- Payment selection by due date and/or by vendor/invoice
- Partial payment support
- User-defined excessive check amount warning
- Debit memos available
- Vendor open-item inquiry
- Manual checks
- User-tailorable 5-column Purchase and Cash Disbursement Journals
- Default General Ledger distribution by vendor
- Default vendor cash discount percent
- Check reversals

#### SYSTEM/36 ACCOUNTS RECEIVABLE (5727-XB4)

The System/36 Accounts Receivable application is designed to assist the user in managing one of the most important assets of a business-- the money owed by its customers. This multi-industry offering provides timely information to help improve cash flow, and reduce bad debt losses through control of accounts receivable. Invoice transactions can be entered directly into the Accounts Receivable application and also received from the System/36 Billing Application. Cash Receipts and Adjustment transactions are entered through the Accounts Receivable data entry menu option. Accounts Receivable can also pass summarized accounting information to the System/36 General Ledger Application, if installed.

#### Functions and Features

- Supports entry of non-Accounts Receivable cash such as vending machine receipts
- Open Item or Balance Forward account type selection by customer
- Cash and COD sales support
- Partial and over payment of invoices
- Statement selection by customer
- Supports invoices with future due dates
- Current plus four past due periods
- Optional late charges by customer
- Consolidated statements for multi-branch companies
- Interactive cash entry for open item customers
- User-tailorable 5-column Sales and Cash Receipts and Adjustment Journals
- Full screen file load is provided to support loading a large volume Customer Master file.

#### SYSTEM/36 PAYROLL (5727-XB5)

The System/36 Payroll application is a multi-industry solution that performs basic payroll computations and produces payroll checks with earnings statements and supporting reports. Both hourly and salaried payroll processing is supported. Individual earnings may be taxed for up to three taxing jurisdictions, and can be transferred to the System/36 General Ledger application, if installed.

#### Features and Functions

- Weekly, bi-weekly, semi-monthly and monthly pay frequency
- Shift differentials as a percent of employees hourly rate or a fixed dollar amount
- Hourly, exempt and non-exempt salaried employees
- Payroll calculations provided for:

Gross Pay  
 Federal Income Tax (FIT)

**System/36 Business Management Accounting Sys. (cont'd)**

Federal Insurance Contributions Act (FICA)  
 State and Local Taxes  
 State Disability Insurance (SDI)  
 Federal Unemployment Tax Act (FUTA)  
 Earned Income Credit (EIC)  
 Net Pay

- Taxable and non-taxable adjustments
- Automatic deduction based on:
  - Percent of taxable gross
  - Rate per hour worked
  - Flat dollar amount per pay period
- Resetting deductions (i.e., bonds)
- Automatic benefits (with optional maximums) can be calculated using the same algorithms used for automatic deductions
- Separate checks available for vacation and bonus payments
- Workmen's compensation worksheet
- Detailed earnings and deductions shown on earnings statement

**SYSTEM/36 INVENTORY ACCOUNTING (5727-XB6)**

The System/36 Inventory Accounting Application offers management reports which help the user to optimize inventory levels. Up-to-date reports reflecting stock movement, on-hand positions, sales and cost information enhance purchasing decisions. The Inventory Accounting application can receive summarized sales information from the System/36 Billing application.

**Features and Functions**

- Support for up to three warehouses per item
- Broken-case handling
- Pricing conversion
- Both returns and allowances supported
- Maintains both average and last cost for an item
- Both stock movement and financial information maintained
- Suggested reorder quantities based on user supplied:
  - Minimum balance
  - Maximum balance
  - Lead time
  - Pack size
  - Vendor minimum
- Item inquiry including both item master and item balance information
- Inventory analysis based on sales, cost and profit amounts
- Full screen file load is provided to support loading large volume Item Master and Item Balance files.

**SYSTEM/36 BILLING (5727-XB7)**

The System/36 Billing Application is a multi-industry billing application providing the user with the ability to create invoices for customer orders already picked and shipped. Customer and item names, prices and tax information are automatically retrieved from the Billing Application master files during invoice entry. Summarized data is optionally available to the System/36 Accounts Receivable, General Ledger and Inventory Accounting applications, if installed.

**Features and Functions**

- Post billing
- Selective printing of invoices
- Five standard prices
- Pricing conversion
- Broken-case pricing
- Flexible terms and invoice discounts
- Federal excise tax
- Special charges and comments
- Credit memo support with returns and allowances
- Billing on non-inventory items
- Cash and COD sales
- Invoices for one-time customers
- Up to three sales taxes per invoice, maximum of 50 taxing bodies
- Optional profit tear strip on invoices
- User-tailorable 5-column Sales Journal

- Data entry overrides of master file data
- Full screen file load is provided to support loading large volume Customer Master and Item Master files.

**PROGRAM DOCUMENTATION**

The documentation provided for each application is designed to help the user understand, install and operate the application. The materials are consistent in size and format with the System/34 publications and:

- Introduce new application users to automating typical business tasks in a way that invites use, reinforces efforts to learn and use, and builds confidence and willingness to reuse after learning
- Are written in 'friendly', user-oriented language
- Are visually attractive with multi-color printing
- Are small in size to be usable in a space-limited work area
- Are presented in a step-by-step task fashion that guides the user through installation and operation
- Are designed to be helpful when used with telephone support
- Provide tables of contents along with master indexes (one per application) for convenient information location

The following materials are available for each application:

**Introducing**

This book is intended for all users of the application. The owner/executive, installer, operator, user department, programmer and consultant can use this book as their first source of information about the application. The book is designed to be a general introduction to how the application fits within the user's business.

**Learning**

This learning package consists of a book, cassettes, and a sample data files diskette. The learning consists of separate exercises which guide the operator through all aspects of daily operations in a step-by-step fashion. The learning package also refers the operator to specific sections of the Running book so that, in addition to application training, the operator becomes familiar with the format of the Running book.

**Installing**

This book details the steps to follow in installing and tailoring the application, collecting and recording the data, entering it, and scheduling operator training.

**Running**

This book contains information the operator needs in order to run the application.

**Using**

This package contains a book and a forms pack. The book is intended primarily for user department personnel who are not System/36 operators. It has the information required by the user to:

- Prepare input for submission to the operator
- Analyze reports
- Submit changes to files
- Aid in using the reports to help manage the business
- Understand alternative uses of the reports

The forms pack contains reproducible camera ready copies of all input forms, preprinted IBM forms, and any control logs peculiar to that application that are required to install and run the application. Instructions for using the forms are printed on the back of each form. The forms in the forms pack are on 8-1/2" x 11" paper. The customer can order additional forms from a printer or IBM's System Supplies Division. Preprinted forms will be documented in actual size for the user to provide to his printer.

**Messages**

Messages for each application are printed as separate pages which are delivered with each application library.

**Application Program Manual**

A separate application program manual is available as optional material. It contains record formats, logic flows, and other technical information to be used primarily by the experienced BASIC programmer interested in understanding the detail design of the application.

**System/36 BRADS (5727-BR1)**

System/36 BRADS licensed program provides the facility for a non-programmer to define files, create and maintain the files, build file inquiries and generate reports from the file data. The System/36 Business Management Accounting System programs will support the capability by providing selected System/36 BRADS file definitions with the applications. Thus, the task of definition, file creation and maintenance is accomplished as part of the application. A user who has System/36 BRADS can build inquiries and develop additional

## PROGRAM PRODUCTS

**System/36 Business Management Accounting Sys. (cont'd)**

reports for the defined files to help meet requirements, unique to the user, not contained in the applications.

**CUSTOMER RESPONSIBILITIES**

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer. Implementation of the security procedures provided in this program product are the customer's responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

These products are designed to operate with a minimum configuration of an IBM System/36 with:

- 128K bytes of main storage.
- 30 megabytes of disk storage.
- 2D Diskette.
- One IBM Printer, either line or serial with 132 print positions.
- One IBM Display Station with 1,920-character Display and 83-key Keyboard.

**SOFTWARE REQUIREMENTS**

The System/36 Business Management Accounting System (BMAS) programs are written in IBM System/36 BASIC programming language, and execute under control of:

- System/36 System Support Program (5727-SS1)
- System/36 BASIC (5727-BA1)
- System/36 Utilities (5727-UT1)

**DOCUMENTATION**

(available from Mechanicsburg)

**Marketing Publications**

*Introducing Billing* (GB30-2700) ... *Introducing Accounts Receivable* (GB30-2722) ... *Introducing Inventory Accounting* (GB30-2711) ... *Introducing General Ledger* (GB30-2733) ... *Introducing Accounts Payable* (GB30-2744) ... *Introducing Payroll* (GB30-2755).

**Licensed Program Specifications**

*General Ledger* (GH30-0493) ... *Accounts Payable* (GH30-0494) ... *Accounts Receivable* (GH30-0491) ... *Payroll* (GH30-0495) ... *Inventory Accounting* (GH30-0492) ... *Billing* (GH30-0490).

**Unlicensed Publications**

*Learning General Ledger* (SB30-3099) ... *Installing General Ledger* (SB30-3100) ... *Running General Ledger* (SB30-3101) ... *Using General Ledger* (SB30-3102) ... *Messages General Ledger* (SB30-3103) ... *Forms Pack General Ledger* (SB30-3104) ... *Cassettes General Ledger* (SV30-0715) ... *Intro Booklet General Ledger* (GB30-2733) ... *Learning Accounts Payable* (SB30-3078) ... *Installing Accounts Payable* (SB30-3079) ... *Running Accounts Payable* (SB30-3080) ... *Using Accounts Payable* (SB30-3081) ... *Messages Accounts Payable* (SB30-3082) ... *Forms Pack Accounts Payable* (SB30-3083) ... *Cassettes Accounts Payable* (SV30-0712) ... *Intro Booklet Accounts Payable* (GB30-2744) ... *Learning Accounts Receivable* (SB30-3085) ... *Installing Accounts Receivable* (SB30-3086) ... *Running Accounts Receivable* (SB30-3087) ... *Using Accounts Receivable* (SB30-3088) ... *Messages Accounts Receivable* (SB30-3089) ... *Forms Pack Accounts Receivable* (SB30-3090) ... *Cassettes Accounts Receivable* (SV30-0713) ... *Intro Booklet Accounts Receivable* (GB30-2722) ... *Learning Payroll* (SB30-3113) ... *Installing Payroll* (SB30-3114) ... *Running Payroll* (SB30-3115) ... *Using Payroll* (SB30-3116) ... *Messages Payroll* (SB30-3117) ... *Forms Pack Payroll* (SB30-3118) ... *Cassettes Payroll* (SV30-0717) ... *Intro Booklet Payroll* (GB30-2755) ... *Learning Inventory Accounting* (SB30-3106) ... *Installing Inventory Accounting* (SB30-3107) ... *Running Inventory Accounting* (SB30-3108) ... *Using Inventory Accounting* (SB30-3109) ... *Messages Inventory Accounting* (SB30-3110) ... *Forms Pack Inventory Accounting* (SB30-3111) ... *Cassettes Inventory Accounting* (SV30-0716) ... *Intro Booklet Inventory Accounting* (GB30-2711) ... *Learning Billing* (SB30-3092) ... *Installing Billing* (SB30-3093) ... *Running Billing* (SB30-3094) ... *Using Billing* (SB30-3095) ... *Messages Billing* (SB30-3096) ... *Forms Pack Billing* (SB30-3097) ... *Cassettes Billing* (SV30-0714) ... *Intro Booklet Billing* (GB30-2700).

**Licensed Publications**

*Billing* (LB30-3098) ... *Accounts Receivable* (LB30-3091) ... *Inventory Accounting* (LB30-3112) ... *General Ledger* (LB30-3105) ... *Accounts Payable* (LB30-3084) ... *Payroll* (LB30-3119).

RPQs ACCEPTED: No

## PROGRAM PRODUCTS

**SYSTEM/36 WORKSTATION SEARCH FACILITY  
5727-XR1****PURPOSE**

The System/36 Workstation Search Facility provides the workstation user with a powerful, yet easy-to-use, tool to display records from disk files based on display station user-selected search criteria. This System/36 product is based on the proven System/34 Workstation Search Facility. The product applies to any industry classification.

**HIGHLIGHTS**

- Ease-of-operation allows personnel without data processing experience to search and display information from their data files.
- Keyword in Context (KWIC) technique provides the capability to select words and character strings within alphabetic fields.
- An 8-character search argument allows null characters to be inserted in those cases where the exact spelling of the search criteria is unknown.
- Any combination of six logical search operators (equal, less than, etc.) can be used.
- The operator may combine AND/OR logic to define the relationship between the three search argument fields.
- Optional user-defined security passwords prevent unauthorized use of searches.
- Creates up to 13 cross-reference indices based on keywords for each master file. This provides fast searching of high use data fields.
- Displays up to 20 selected records at a time and allows forward and backward paging through selected records.
- Second level display on a selected line provides additional data from the selected master record. This screen displays unformatted data directly from the record.
- Reduces the need for alphabetically sorted master file listings.
- User-oriented tailoring procedure will allow the user to easily define the required searches, generate the required RPG II source programs and required OCL, and invoke the required compiles and execution of the index creation program.
- All standard System/36 data file organizations are supported.

This product offers a full-function, user-oriented aid for searching data files based on operator-entered criteria. This offering is applicable in any industry classification and is usable with all IBM-supported System/36 file organization techniques.

Each industry has unique requirements for searching master files. Additionally, each user will have specific needs over and above common industry needs. The offering supports up to three search arguments which allows the operator to minimize the number of potential matches by entering as much information as is available.

As the requirements of the business change, searches can be recreated to support the new business requirements.

**DESCRIPTION**

This product (5727-XR1) is designed to process System/36 disk records. It is a cross-industry offering and will execute in conjunction with most licensed programs.

The operator will define through an interactive workstation session the search required, with up to 75 characters of information to be displayed on matching master records. Additionally, information about library and file name will be required. The *Application Installation Guide/Reference Manual/Runbook* will provide the operator with an explanation of the required and optional fields to be entered during the session. Each response will be edited as the information is entered.

The offering can reduce the need for referencing voluminous printed reports by displaying up to 20 records at a time that meet search criteria. If more than 20 records meet the criteria, the screen display can be paged forward or backward to allow a review of all matched records. Also, when the desired record is displayed, the entire contents of the record can be selected, as it appears on disk, to be further displayed.

The product application consists of four RPG II programs: An interactive entry/edit program, a tailoring program, and two skeletal programs which, when copied and modified by the tailoring program, provide user-unique index-build and search programs.

The *Application Installation Guide/Reference Manual/Runbook* provides the user with the information necessary to install the product and execute tailoring of searches. This document provides step-by-step instructions for operating the application. Instructional information regarding the execution of the sample problem is provided. The sample program will include a master file and tailoring instructions so that a user becomes self-educated on the tailoring and search programs and procedures.

The *Application Logic Manual* is provided as licensed documentation. Information on naming conventions, application program functions and specifications and other information pertaining to the application is presented.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for error detection and analysis. If assistance in correcting the problem is required, the customer must submit the request to IBM on the Authorized Program Analysis Report (APAR). IBM is responsible for developing and distributing program updates, but the customer has the responsibility to apply the update to the program.

Implementation of the security procedures provided in this program product is the customer's responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

Support will be provided for this licensed program when it is operated in the following specified operating environment:

**HARDWARE REQUIREMENTS**

The minimum system configuration for this product application is an IBM System/36 with:

- 5360 System Unit, 30 megabytes of disk storage and 128K bytes of main storage.
- One IBM printer (either a line printer or serial printer)
- One IBM Display Station

**SOFTWARE REQUIREMENTS**

The program is written in IBM System/36 RPG II and executed under control of the IBM System/36 System Support Program (5727-SS1). The IBM System/36 RPG II Compiler (5727-RG1) is also required.

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (GH30-8020) ... Application Installation Guide/Reference Manual/Runbook (SB30-3075) ... Application Logic Manual (LB30-3076) ... Promotional Flyer.*

RPQs ACCEPTED: No

## PROGRAM PRODUCTS

**OS ASSEMBLER H  
5734 - AS1****DESCRIPTION**

This two-pass assembler provides a significant improvement in performance on any OS MFT or MVT system having a region size of at least 180K or any VS1 or VS2 system with 192K of virtual memory given to the assembler.

Default options, instruction set selection (Standard, Scientific, Commercial or Universal) and modifications to ddnames can be made at the time the assembler is added to an installation's OS system. Assembler H has functional extensions to OS/MFT/MVT Assembler F and the OS/VS System Assembler, supports all features of these two processors and is upward compatible.

**Features**

- Ability to compile two or more assemblies in one job-step.
- Can specify default and lock-out options at SYSGEN time.
- Ability to suppress all error messages below a specified level of severity.
- Up to nine continuation lines may be used for a statement.
- Previous definition requirements are relaxed for EQU, ORG, CNOP, DC and DS statements.
- Literals are cross-referenced.
- Macro definitions may occur anywhere in the source stream and macros may be redefined at any point.
- Dictionary sizes are not artificially limited and will expand to occupy all space available in a region.
- New system variable symbols &SYSTIME, &SYSDATE and &SYSPARM are available for use. The latter is a read-only SECT variable whose character value is specified in the PARM field of the EXEC JCL card.
- New assembler operations LOCTR, PUSH, POP and AREAD are provided. In addition, the use of OPSYN is much less restricted than in assembler F.
- Support for the new machine instructions announced for the S/370 mdls are included in an extension to Assembler H.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Assembler H uses the Standard Instruction Set. User programs may use any instruction set -- the set to be used is specified at SYSGEN time. Assembler H will operate on any S/360 mdl supported under OS (Release 17 or later, PCP, MFT and MVT) or on S/370 with MFT, MVT, VS1 or VS2 satisfying the following requirements:

Minimum region size for MFT or MVT is 180K.

Minimum virtual storage in VS1 or VS2 is 192K.

In addition to the standard OS requirements, Assembler H requires space in auxiliary storage for the following data sets: System input (selectable through JCL) ... Macro instruction library, either system or private or both ... One intermediate workfile which must be Direct Access (2301, 2303, 2305, 2311, 2314, or 3330/3333) ... Print output (selectable through JCL). Of these data sets, the system input and the single workfile are required. Any, or all, of the remainder may be omitted if the corresponding function is not used; e.g., no punch output data set is needed if the NODECK option is specified.

**Note:** Distribution of Assembler H is via tape. Therefore, access to at least one 2400/3400 magnetic tape unit is required for installation.

**SOFTWARE REQUIREMENTS**

A simplified installation procedure for including Assembler H in an OS system is provided. PARM field options, ddnames for required data sets and the Instruction Set (Standard, Scientific, Commercial or Universal) may be specified or the standard default values may be used.

The OS System requirements are: Release 17 (or later) for OS, OS Utilities, Linkage Editor E or F and the Sequential and Partitioned Access Methods are required.

**DOCUMENTATION**

(available from Mechanicsburg)

*Specifications* (GC26-3743)



PROGRAM PRODUCTS

**COBOL INTERACTIVE DEBUG (5734-CB4)**

**PURPOSE**

COBOL Interactive Debug provides COBOL programmers the ability to debug programs conversationally at a terminal using high-level language.

COBOL Interactive Debug operates under TSO or CMS through a comprehensive set of subcommands which enable the programmer to modify, dynamically monitor, and completely control the execution of his COBOL object program.

**HIGHLIGHTS**

Using COBOL Interactive Debug subcommands, the COBOL programmer can dynamically and symbolically:

- Establish points (*breakpoints*) in the procedure division at which program execution is to be unconditionally suspended and control returned to the user at the terminal.
- Establish *conditional* breakpoints in the procedure division which are effective only when certain conditions are detected by the debug monitor. Such conditions might be, for example, any change in value of a data field, or a change to a specified value.
- Specify that at breakpoints certain actions automatically take place (for example, changing or displaying the value of a data item), after which execution will automatically be resumed, or, control returned to the terminal.
- Remove/list established breakpoints.
- Resume execution at a specified source statement.
- Trace the execution of the COBOL object program by requesting a display of the names/line-numbers of all executed COBOL source procedures.
- Display selected COBOL source statements.
- List the status of COBOL files.
- Manipulate (display/modify/compare) the contents of COBOL data items.
- Obtain a system dump of the region in which the COBOL program is executing.
- Request information about the function, syntax, or operands of the Interactive Debug subcommands (TSO only).

A powerful feature is the WHEN subcommand which allows the user to specify data fields to be continuously monitored for either a change in value or a change to a prespecified value.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

COBOL Interactive Debug operates on all hardware/system configurations supported by TSO (the Time Sharing Option of OS and OS/VS2).

COBOL Interactive Debug requires approximately 46K bytes of main storage. All data set and main storage requirements of the COBOL object module itself must be met, as well as sufficient storage to hold the debug dictionary and tables, and working storage space. As an example, a typical session may require 14K of main storage for table and working storage space. A program with 450 entries in the data division may require 12,000 bytes for the dictionary.

Under TSO of OS and OS/VS2: The Time Shared region must provide approximately 12K bytes of main storage for use by TSO itself. The TSO Monitor Program, Command Scan, and the service routine PUTGET and PUTLINE are assumed to reside in the time sharing link pack area (LPA) and do not figure into the user region requirement. The TSO PARSE service routine requires 20K bytes of main storage and may reside in the LPA. If no LPA resident, it must be figured into the user region requirement. OS Releases 20.1, 20.6, 21.0 and 21.6 must apply PTF US00969 of PARSE and Release 1 of OS/VS2 must apply PTF UY70023.

COBOL Interactive Debug operates on the minimum CMS virtual machine configuration.

Under CMS, the TESTCOB command and its largest subcommand modules require approximately 241K bytes of user storage. An additional 25K bytes of table space is GETMAINed by TESTCOB.

In a 320K virtual machine, approximately 53K bytes will be available for the user program and its associated library modules.

In a 512K virtual machine, approximately 241K bytes will be available for the user program and associated library modules.

**SOFTWARE REQUIREMENTS**

COBOL Interactive Debug operates as a Command Processor under TSO or CMS. It is designed for use with specially generated object modules as produced by either the OS/VS COBOL Compiler (5740-CB1) or the OS Full American National Standard COBOL Compiler, Version 4 (5734-CB2). Operation under CMS requires VM/370 Release 2 or later for use with OS/VS COBOL; VM/370 Release 1 with

Programming Level Change (PLC) 13 or later for use with OS COBOL Version 4.

When the COBOL Interactive Debug program is to be used, a fifth data set is needed to compile a COBOL source program. This data set is the interactive debug data set, which must be also available at execution time if debugging is to be done. To display source statements during debugging sessions, the compiler output listing must be saved at compile time on a sixth data set.

**COMPATIBILITY**

No COBOL source changes are required to use the COBOL Interactive Debug. The user merely indicates via a compile time parameter (TEST) that the program may be executed with COBOL Interactive Debug.

A COBOL object program compiled with the interactive debugging option can be executed in a background environment without recompilation. Generated code will require more space.

When executing OS/VS COBOL or Version 4 object code under CMS, there are execution time restrictions in the following areas:

- ISAM, VSAM\*
- SORT
- Segmentation
- TCAM
- Various I/O-related restrictions

\* The CMS restriction against VSAM in OS/VS COBOL object execution is removed as of VM/370 Release 3. Operation of the OS/VS COBOL under CMS is described in the *IBM OS/VS COBOL Compiler and Library General Information* (GC28-6470).

Detailed information on the operation of Version 4 COBOL under the CMS component of VM/370 can be found in the *IBM VM/370, OS Full American National Standard COBOL Compiler and Library, Version 4, CMS User's Guide* (SC28-6469).

Intermixing of COBOL and Assembler object modules is allowed when using COBOL Interactive Debug.

The COBOL Interactive Debug program product adheres to the syntactic conventions of the TSO Command Language. Commands which are common with TSO TEST have the same meaning.

**PERFORMANCE CHARACTERISTICS**

*Compile Time* -- Compile Time performance of the IBM OS Full American National Standard COBOL Compiler, Version 4, which supports the TEST/NOTEST option, will not be affected when NOTEST is specified. When the TEST option is selected, compiler speed degradation will not exceed 5%.

*Execution Time* -- Execution time CPU requirements depend on the type and frequency of the debugging functions selected by the terminal user. Since monitoring is performed at every statement boundary, there will be a uniform execution time overhead in the absence of debugging subcommands.

A COBOL object program compiled with the Interactive Debug option will execute in a background environment in approximately the same time as if NOTEST were specified at compile time.

**DOCUMENTATION** (available from Mechanicsburg)

*Specifications* (GC28-6485) ... *General Information Manual* (GC28-6454).





PROGRAM PRODUCTS

**TSO COBOL PROMPTER  
5734-CP1**

**PURPOSE**

The TSO COBOL Prompter provides TSO COBOL users with the capability of conversationally entering the required job parameters to execute a COBOL compilation.

**HIGHLIGHTS**

The COBOL Prompter conversationally interacts with the terminal user and prompts for job parameter information which has been omitted or incorrectly entered.

Dynamically allocates required data sets for compilation in the TSO foreground.

Invokes the following COBOL Compilers:

OS Full American National Standard COBOL Version 3 (5734-CB1)

OS Full American National Standard COBOL Version 4 (5734-CB2)

OS/VS COBOL (5740-CB1)

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Operation of the COBOL Prompter under TSO requires the minimum TSO configuration.

**DOCUMENTATION:** (available from Mechanicsburg)

*Time Sharing Option Guide (GC28-6698) ... COBOL Interactive Debug and (TSO) COBOL Prompter General Information (GC28-6454) ... Specifications (GC28-6435).*





PROGRAM PRODUCTS

**TSO ASSEMBLER PROMPTER  
5734-CP2**

**PURPOSE**

The TSO Assembler Prompter operates as a command processing program under the control of the Time Sharing Option of the IBM Operating System. The Prompter is a means for the programmer to invoke the System Assembler to process source data sets and to produce object modules. The prompter returns to the programmer any error and informational messages that are generated, allowing the programmer to correct his error at the terminal.

**HIGHLIGHTS**

The programmer creates, modifies, saves and retrieves his source data set at his terminal, using the TSO command EDIT. He then uses the prompter command ASM to process the data set and obtain his object module. The ASM command invokes the assembler prompter, which in turn invokes the assembler. The prompter makes sure that the programmer has specified appropriate data set names. If he has not, the prompter requests him to do so. Through the ASM command, the programmer can specify the assembler options and request any assembly listing to be printed at the terminal.

**DOCUMENTATION:** (available from Mechanicsburg)

*OS/360 Time Sharing Option, Planning for TSO (GC28-6698)*

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Requires the minimum TSO configuration.





PROGRAM PRODUCTS

**TSO FORTRAN PROMPTER  
5734-CP3**

**PURPOSE**

TSO FORTRAN Prompter (5734-CP3) aids in conversationally entering the required job parameters to initiate a FORTRAN (G1) compilation.

**HIGHLIGHTS**

The FORTRAN Prompter conversationally interacts with the terminal user and prompts for job parameter information which has been omitted or incorrectly entered.

Dynamically allocates required data sets for the compilation.

Invokes the FORTRAN IV (G1) Compiler (5734-FO1) to execute in the TSO foreground.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Requires the minimum TSO Configuration.

**DOCUMENTATION:** (available from Mechanicsburg)

*OS Time Sharing Option, Planning for TSO (GC28-6698) ... Specifications (GC28-6857) ... OS Program Products for OS and OS with TSO (GC28-6824).*



PROGRAM PRODUCTS

**CONSUMER GOODS SYSTEM (COGS)  
ALLOCATION - OS (5734-D32)  
ALLOCATION - DOS (5736-D31)**

**PURPOSE**

COGS-Allocation provides the consumer goods processor with the ability to determine how much of various finished products to make and ship to stocking locations to satisfy service and inventory objectives while satisfying shipping incentives and restrictions. Simulation of the ordering process is included to allow a preview of the effects of management policy alternatives.

**DESCRIPTION**

The processor of consumer goods not only produces his wares, but must efficiently distribute these to the marketplace. The trend is to stock merchandise as close as possible to the major markets which results in complicated distribution processes (i.e., remote distribution centers to manage and multiple inventories to control).

This program addresses the distribution and inventory control problems. It also allows the user to tailor an order and allocation system to his needs. The following modules are included:

- **Service Point Order Review:** The decision of when to order a shipment of products for a distribution center or when to order production for replenishment of the distribution network is made. Considerations are present stock status, forecasted future requirements, management service objectives, lead times and other related factors.
- **Service Point Printout:** Produces an online listing substantiating the decisions made in order review. Output can be detailed or an exception (i.e., all items or only those items designated for order). Items failing special service tests, as well as programmed diagnostic messages, are always printed.
- **Production/Order Quantity Calculation:** Employs a technique called variable interval allocation which determines how much of a finished product to ship to each distribution center to satisfy management inventory objectives and meet shipping constraints. Management has three basic allocation policies to choose from:
  1. Item service specified - minimize item inventory.
  2. Item group service specified - minimize item group inventory.
  3. Item group inventory budget specified - maximum item group service.

COGS - Allocation supports both push and pull type distribution systems. In the pull environment, the program determines the proper mix of products ordered for a distribution center to balance inventory according to inventory and service objectives while satisfying shipment size constraints. In the push environment, the program decides how best to distribute batches of lots of manufactured products throughout the distribution network to achieve balance among the centers.

- **Allocation Print:** Prints in detail the results of the production/order quantity calculation mode. Recommended item and item group quantities are shown as are specified minimum and maximum order sizes. Parameters established by users are included in print-out to assist evaluation.
- **Simulation:** Provides the capability to view the ordering process for up to 52 time periods in the future. The output is in the form of a plot by item. This useful feature allows the consumer goods processor to evaluate alternative inventory and service policies before selecting the ones best for his business.
- **Card to File Processor:** Provided to expedite preparation of data for running the sample problem included with program material. It can be used in present form for normal COGS - Allocation data preparation. However, the user will most likely want to prepare his own.

**CUSTOMER RESPONSIBILITIES**

The program requires specific information about the products and stocking locations it will be servicing. Knowledge of the areas of the company influencing its decisions (i.e., distribution, production, marketing and finance) is also needed.

Consequently, the person responsible for implementing and controlling this program should be familiar with the policies and objectives of the company, as well as the individual functions mentioned and should be aware of existing interrelationships.

**Data Requirements**

- COGS - Allocation assumes the customer has an inventory record keeping system carrying current inventory information (e.g., on-hand, on-order, back-order, price, lead-time, etc.) by item by stocking location. Item and item group production/order/shipping minimums and maximums are also required.
- The program further requires that a customer has a forecasting method or system capable of supplying item/location forecasted usage with projections of future needs plus a measure of forecast error (MAD).

- The customer must supply his own program to collect the necessary information from the inventory and forecast files and assemble data into the format specified by COGS - Allocation.

**Processing Requirements:** Control parameters necessary to tailor the program to the customer's needs (e.g., service objectives, review time intervals, allocation policy choice, simulation options, etc.) must be supplied and properly formatted.

**Output Considerations:** As described earlier, the program prints out an allocation listing showing quantities to order. This same information is supplied on magnetic tape (except when operating in simulation mode) for input to the customer's order/production/shipping document writing program.

**Use:** The COGS - Allocation program becomes part of a company's distribution control system consisting of inventory record keeping (stock status), forecasting, ordering and updating (file maintenance).

This program controls the ordering process, deciding when and how much to order for the distribution network to satisfy customer service, inventory investment and order size objectives. It also provides management with the means, through simulation, to test the effectiveness of these objectives.

Being only part of a system, it relies upon the user to provide the necessary linkages to and from other parts of the system.

**SPECIFIED OPERATING ENVIRONMENT**

**COGS ALLOCATION - OS**

**HARDWARE REQUIREMENTS**

The OS version of COGS - Allocation requires an IBM S/360 mdl G40 (128K) or larger Processing Unit with decimal and floating-point arithmetic ... a card read punch ... a printer ... four 2311 Disk Storage Drives ... two magnetic tape drives ... a 1052 console printer.

COGS - Allocation requires a 100K region under MVT or a 100K partition under MFT. It can be executed on the minimum machine configuration with a PCP nucleus that does not exceed 28K.

**SOFTWARE REQUIREMENTS**

All routines in COGS - Allocation are written in PL/I. The OS version of COGS - Allocation will function with PCP, MFT or MVT control programs. These programs are:

- OSPrimary Control Program (PCP) (360S-CI-566)
- Multi-programming with a Fixed Number of Tasks (MFT) (360S-CI-505)
- OSMultiprogramming with a Variable Number of Tasks (MVT) (360S-CI-535)

In addition to one of the control programs listed above, preparation and operation of the OS version of COGS - Allocation require the following programs:

- OS Sequential and Partitioned Access Method (360S-DM-508)
- OS Linkage Editor E (360S-ED-510)
- OS PL/I F (360S-NL-511)
- OS PL/I Subroutine Library (360S-LM-512)
- OS Utilities (360S-UT-506)
- OS Sort/Merge (360S-SM-023)

In addition, this program product runs under OS/VS1 or OS/VS2.1. The program is not supported under OS/VS2.2. The program also operates in a VM/370 environment under control of one of the supported OS or OS/VS systems, excluding OS/VS2.2.

**COGS ALLOCATION - DOS**

**HARDWARE REQUIREMENTS**

Minimum S/360 Configuration: S/360 mdl 30F (65K) with Decimal Arithmetic (#3237)\*\* ... Floating Point Arithmetic (#4427) ... 1051 Attachment (#7915) ... 1051 Control Unit mdl N1 ... CPU Attachment (#3130) ... 1442 Card Read Punch mdl N1 ... 1052 Printer Keyboard mdl 8 ... 1443 Printer mdl N1 (with Selective character set #6042 with 63 character set typebar (#9089)) ... 24 Additional Print Positions (#5558) ... 2311 Disk Units mdl 1 (3 required including system residence) ... 2415 Tape Unit mdl 1 (2 required).

\*\* A partition with a minimum of 54K bytes is required for execution of COGS Allocation.

**SOFTWARE REQUIREMENTS**

COGS - Allocation operates under the control of Disk Operating System/360 or Disk Operating System/VS. In addition, this program product also operates in a VM/370 environment under the control of DOS/360 or DOS/VS. Source code is written in PL/I. DOS features used are:



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PP 5734-D32.2

Jul 83

Major Revision

PROGRAM PRODUCTS

**COGS - Allocation (cont'd)**

Supervisor - 2311 (6K)	360N-SV-474
System Control and Basic IOCS	360N-CL-453
Direct Access Method	360N-IO-454
Consecutive Processing Macros (Disk)	360N-IO-455
Consecutive Processing Macros (Tape)	360N-IO-456
Group 1 Utilities (Unit Record and Disk)	360N-UT-461
Group 2 Utilities (Magnetic Tape)	360N-UT-462
Disk Sort/Merge (or S/370 equivalent)	360N-SM-450
Basic PL/I (or PL/I Optimizing Compiler)	360N-PL-464

When using a 65K machine the supervisor may not exceed 8K. A 10K supervisor may be used on larger machines.

**DOCUMENTATION :** (available from Mechanicsburg)

*Application Description Manual* (GH20-0721) ... *Boosting Net Profit through Improved Inventory Management Brochure* (G520-2343).

PROGRAM PRODUCTS

**CONSUMER GOODS SYSTEM - S/360 and S/370  
COGS - FORECASTING OS (5734-D33)  
COGS - FORECASTING DOS (5736-D32)**

**PURPOSE**

This program is designed to give the consumer goods processor the ability to select a proper forecasting model for a provided set of data and the facility to monitor the model's forecasting reliability.

**DESCRIPTION**

The program, when provided with the proper input data, is able to produce short term (one year or less) forecasts, using a technique called adaptive forecasting. A simulator phase of the system enables the user to evaluate the reliability of the forecast model. The system also includes the facilities to perform the following functions: Establish a forecast model for an SKU (Stock Keeping Unit) ... establish a measure of reliability of the forecast of demand for an SKU ... build and maintain necessary system files -- reporting.

**HIGHLIGHTS**

The ability to fit a forecasting model to historical data for the purpose of projecting future demand.

The ability, through simulation, to evaluate the model fitted to assist in the choice of the best model.

The ability to update the forecast model being used with current demand in such a way to balance stability and responsiveness in the model.

The ability to monitor the adopted model's performance.

The means of screening all information presented for its validity and reasonableness.

The flexibility to adopt the working day calendar to which the data corresponds.

The ability to interface with some existing customer files with only a minor modification.

**Use:** The user must provide input data in prescribed format which describes the product and its environment to the system. This data when given to the application program will generate all the files required to operate the system with the exception of a sales master file. The sales master file is user created and maintained.

**CUSTOMER RESPONSIBILITIES**

The program requires a minimum of two years sales history. It is the customer's responsibility to update and maintain a sales master file.

The final decision as to which forecast model is to be used is left to the user. The program furnishes the user with data upon which to base his selection.

**SPECIFIED OPERATING ENVIRONMENT**

**COGS FORECASTING - OS**

**HARDWARE REQUIREMENTS**

The OS version of COGS - Forecasting requires an IBM S/360 mdl G40 (128K) or larger Processing Unit with decimal and floating-point arithmetic ... a card read punch ... a printer ... four 2311 Disk Storage Drives ... two magnetic tape drives ... a 1052 console printer.

COGS - Forecasting requires a 102K region under MVT or a 102K partition under MFT. It can be executed on the minimum machine configuration with a PCP nucleus that does not exceed 26K.

**SOFTWARE REQUIREMENTS**

All routines in COGS - Forecasting are written in PL/I. COGS - Forecasting will function with PCP, MFT or MVT control programs. These programs are:

- OS Primary Control Program (PCP) (360S-CI-566)
- OS Multiprogramming with a Fixed Number of Tasks (MFT) (360S-CI-505)
- OS Multiprogramming with a Variable Number of Tasks (MVT) (360S-CI-535)

In addition to one of the control programs listed above, preparation and operation of the OS version of COGS - Forecasting require the following programs:

- OS Sequential and Partitioned Access Method 360S-DM-508
- OS Linkage Editor E 360S-ED-510
- OS PL/I F 360S-NL-511
- OS PL/I Subroutine Library 360S-LM-512
- OS Utilities 360S-UT-506
- OS Sort/Merge 360S-SM-023

In addition, this program product runs under OS/VS1 or OS/VS2.1. The program is not supported under OS/VS2.2. The program also

operates in a VM/370 environment under control of one of the supported OS or OS/VS systems, excluding OS/VS2.2.

**COGS FORECASTING - DOS**

**HARDWARE REQUIREMENTS**

S/360 mdl 30F (65K) \*\*\* with Decimal Arithmetic (#3237) ... Floating Point Arithmetic (#4427) ... 1051 Attachment (#7915) ... 1051 Control Unit mdl N1 ... CPU Attachment (#3130) ... 1442 Card Read Punch mdl N1 ... 1052 Printer-Keyboard mdi 8 ... 1443 Printer mdl N1 (with Selective Character set (#6402) and 63 character set type bar (#9089) \*\* ... 24 Additional Print Positions (#5558) \*\* ... 2311 Disk Units (2 required - including system residence) \* ... 2415 Tape Unit mdl 1 (2 required).

The main storage required to compile, link-edit and execute the application program under the control of DOS is 63,000 bytes.

- \* One disk unit not occupied by the Disk Operating System (DOS) is required for data, programs and working storage for COGS - Forecasting.
- \*\* Any control unit and printer (132 positions) compatible with DOS may be substituted for these units.
- \*\*\* A minimum partition size of 56K bytes is required for execution of DOS - COGS Forecasting.

**SOFTWARE REQUIREMENTS**

COGS - Forecasting is written in PL/I and it operates under the control of the Disk Operating System/360 or Disk Operating System/VS. In addition, this program product also operates in a VM/370 environment under the control of DOS or DOS/VS. The minimum system must be include:

- |  |             |
|--|-------------|
| Supervisor - 2311 (6K)                   | 360N-SV-474 |
| System Control and Basic IOCS            | 360N-CL-453 |
| Direct Access Method                     | 360N-IO-454 |
| Consecutive Disk IOCS                    | 360N-IO-455 |
| Consecutive Tape IOCS                    | 360N-IO-456 |
| Group 1 Utilities (Unit Record and Disk) | 360N-UT-461 |
| Group 2 Utilities (Magnetic Tape)        | 360N-UT-462 |
| Disk Sort/Merge (or S/370 equivalent)    | 360N-SM-450 |
| Basic PL/I (or PL/I Optimizing Compiler) | 360N-PL-464 |

**DOCUMENTATION :** (available from Mechanicsburg)

*Application Description Manual(GH20-0722) ... Boosting Net Profit through Improved Inventory Management Brochure (G520-2343).*



PROGRAM PRODUCTS

**CODE AND GO FORTRAN (5734-FO1)**

**PURPOSE**

Code and Go FORTRAN, which operates under the Time Sharing Option (TSO) of the IBM Operating System and CMS, as well as in a batch environment, provides programmers with a high-speed processor for compiling, loading and executing programs written in the FORTRAN IV language with extensions for list-directed input/output.

Code and Go FORTRAN opens the area of rapid response time sharing to many programmers who are already familiar with the FORTRAN language. Its simplicity and ease-of-use is particularly suited to the 'problem-solver,' who writes, debugs, and executes relatively short programs at the terminal; and to the 'production programmer', who debugs sections of a large program online before running that program through a standard batch compiler.

As a batch processor Code and Go FORTRAN's compile-load-go mode of operation eliminates much system overhead and is thus ideally suited for processing large numbers of small jobs.

**HIGHLIGHTS**

- Code and Go FORTRAN is a high-speed facility which operates in the TSO foreground and OS batch environments.
- Code and Go FORTRAN supports the FORTRAN IV Language and the DEBUG facility.
- List-directed input/output facilitates data entry and output by freeing the user from standard FORTRAN data format restrictions. With list-directed I/O in effect, no FORMAT statements are required and data items may be entered in any typing or column position.
- (Use of list-directed input/output requires an installation to have the FORTRAN IV Library Mod II (5734-LM3)).
- FORTRAN keyboard input format (free from source) permits the user, in writing his FORTRAN source program, to ignore all card-column dependencies. (A standard form option is also provided.)
- A SIFT utility is provided for two way conversion between standard and free form source, thus ensuring source format compatibility with the other OS FORTRAN Compilers. Under CMS the SIFT utility provides for a one-way conversion from free form source to standard FORTRAN source.
- Object programs are compiled directly into main storage.
- All subprograms in the OS FORTRAN IV Library are available to Code and Go programs, as are user-written programs previously compiled into object code by a batch compiler.
- Diagnostic messages are displayed at the user's terminal when the processor is operating in the TSO foreground or CMS environment.
- Through the TSO EDIT command the FORTRAN Syntax Checker may be used to check source programs on a statement-by-statement basis prior to compilation.
- Prompting the TSO user for correct specification of compilation parameters is a built-in feature of the compiler.
- The processor can be invoked under CMS with the CMS command GOFORT.
- A source listing option is provided for batch users.
- Batch users can cause object modules to be saved for later link editing and execution.
- Batch users can optionally suppress execution of the compiled program.

**COMPATIBILITY**

All valid source programs compilable on FORTRAN IV (G1) (5734-FO2), or on FORTRAN E, G and H compilers, compile on Code and Go FORTRAN with the standard form option in effect.

A SIFT utility which may be run in a batch mode or be invoked by the TSO CONVERT Command converts the format of FORTRAN source programs from free form to standard form or vice versa. The SIFT utility is available for users who create a Code and Go FORTRAN source program using free form source and later wish to compile it on another FORTRAN IV compiler. In this case, the user should recognize that not all FORTRAN IV compilers support all of the language features of Code and Go FORTRAN (e.g., the DEBUG facility, and list-directed input/output). Data sets used and produced by Code and Go FORTRAN programs are completely compatible with those used and produced by the Operating System.

Under CMS the SIFT utility provides for a one-way conversion from free form source to standard FORTRAN source.

The disk formats of CMS data sets are not compatible with OS, however, the data sets are transferable through utilities or card and tape. It should be noted that ASCII data sets are not allowed under CMS.

The language level supported by the Code and Go FORTRAN processor is compatible with and encompasses the American National Standard (ANS) FORTRAN.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

IBM TSO foreground operation requires the minimum TSO configuration. For batch operation under IBM MVT or MFT, a minimum area of 88K bytes of main storage is required. In IBM VS1 and VS2 a minimum of 128K bytes of virtual storage is required. To run under CMS the minimum CMS configuration is required.

**PERFORMANCE**

Elapsed time from start of compilation to start of execution for 100 statement programs is generally three to four times faster than FORTRAN IV (G or G1) operating in the TSO foreground, and two to three times faster in a batch environment.

The object code produced by Code and Go FORTRAN is less efficient than FORTRAN IV (G1) (5734-FO2) object programs.

**DOCUMENTATION:** (available from Mechanicsburg)

*OS/360 Time Sharing Option Guide GC28-6698 ... FORTRAN Program Products for OS and OS with TSO, General Information GC28-6824 ... OS/360 Code and Go FORTRAN GC28-6823 ... System/360, FORTRAN IV Language GC28-6515.*



## PROGRAM PRODUCTS

**OS FORTRAN IV (G1) (5734-FO2)****PURPOSE**

FORTRAN IV (G1) is an extended version of FORTRAN IV (G), adapted to run in Time Sharing Option (TSO) environment, under CMS, and in an OS (batch) mode.

**HIGHLIGHTS**

A compile time option is provided which allows the introduction of source programs in either BCD or EBCDIC character codes. The output of the compilers (source listing and literal data in the object programs) will utilize the original, untranslated character codes. At object time, literal A-format and H-format input and output data will not be translated; D, E, F and I-format input data may be either in BCD or EBCDIC code representation.

- FORTRAN IV (G1) complements the Code and Go FORTRAN processor (5734-FO1) in its ability to save object programs and produce source listings in the TSO environment.
- Object code listing and storage map options are available.
- Users who have the FORTRAN IV Library (5734-LM3), may use the new FORTRAN IV list-directed I/O statements to simplify data entry and output at the terminal or other data set.
- TSO editing and syntax checking facilities are available for the creation and modification of FORTRAN IV (G1) source programs at a TSO terminal.
- Compilation progress and diagnostic messages may be directed to the terminal or suppressed.
- The compiler's entire listing data set may be optionally directed to the terminal.
- The processor may be invoked most conveniently by the TSO FORTRAN Prompter (5734-CP3) which conversationally interacts with the terminal user to obtain the necessary compilation parameters.

The processor may be invoked under CMS with the CMS command FORTGI.

**COMPATIBILITY**

All source programs compiled by the FORTRAN IV (E), (G) and (H) compilers can be compiled by FORTRAN IV (G1). Source programs written in the FORTRAN keyboard input format may be converted to standard form by a SIFT utility provided with the Code and Go Processor. Data sets used and produced by the FORTRAN IV (G1) programs are completely compatible with those used and produced by the operating system.

The disk formats of CMS data sets are not compatible with OS, however, the data sets are transferable through utilities or card and tape. It should be noted that ASCII data sets are not allowed under CMS.

The language level supported by FORTRAN IV (G1) is compatible with and encompasses the American National Standard (ANS) FORTRAN. Language extensions beyond ANS FORTRAN are:

- IMPLICIT statement allowing extended implicit classification by first character of a name.
- An extended type statement, including length specification.
- G-conversion, extended to cover all numeric and logical data type.
- Multiple entry points to subprogram, and non-standard returns from subroutines.
- Arrays of up to seven dimensions.
- PAUSE statement extended to permit output of messages.
- NAMELIST statement permitting input/output and conversion without an explicit I/O list and FORMAT statement.
- Extended subscripts.
- Hexadecimal constants and FORMAT code.
- Support of the direct (BDAM fixed length only) data access method.
- Compatible extension to the READ and WRITE statements to provide direct access data organization in support of direct access storage devices.
- Mixed mode arithmetic.
- The T-specification, permitting printed output to begin at any print position.
- STOP statement allows the processing of codes for testing by OS Job Control Statements.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

FORTRAN IV (G1) and its object programs require the Scientific Instruction Set. FORTRAN IV (G1) operates on any IBM S/360 or S/370 processor supported under OS and having enough core storage to satisfy the following requirement: Minimum region size for MFT, MVT is 90K ... Minimum user region for TSO is 110K ... Minimum processor for PCP is 128K.

Minimum virtual storage for VS1 and VS2 is 128K. In order to run under CMS, the minimum CMS configuration is required.

**SOFTWARE REQUIREMENTS**

An installation procedure for including FORTRANIV (G1) into an OS system is provided. PARM field options may be specified or the standard default values may be used. An installation procedure is also provided to include the processor under CMS.

The OS system requirements are:

For time sharing use, TSO option is required. A currently supported release of OS is required for batch use.

One of the following FORTRAN IV Libraries is required:

FORTRAN IV Library (Mod II) provides the list-directed I/O function and employs improved numeric conversion routines which are identical to those in FORTRAN IV (G1) (and Code and Go FORTRAN). It also provides special support for FORTRAN IV (H-Extended).

The Type I FORTRAN IV Library distributed with OS (not available under CMS) may be used if list-directed I/O is not desired. Due to the different conversion routines employed, this library and FORTRAN (G1) will produce slightly different results when performing conversions between external decimal constants and internal hexadecimal value.

The OS Utilities, Assembler F or Assembler H, Linkage Editor E or F, and the Sequential and Partitioned Access Methods are also required for OS.

**PERFORMANCE**

The FORTRAN IV (G1) compiler has the same performance and source program capacity as the FORTRAN IV (G) compiler.

Performance under CMS is a function of the number of users of the system.

**DOCUMENTATION**  
(available from Mechanicsburg)

*OS/360 Time Sharing Option Guide GC28-6698 ... FORTRAN IV Language GC28-6516 ... OS/360 FORTRAN IV (G1) Processor Program Product Specifications GC28-6854.*



PROGRAM PRODUCTS

**OS FORTRAN IV (H EXTENDED) COMPILER  
5734-FO3**

**PURPOSE**

The FORTRAN IV (H Extended) Compiler program product, with the FORTRAN IV Library (Mod II) program product, provides OS and CMS FORTRAN users with increased performance and additional functional capabilities.

**DESCRIPTION**

The compiler provides a compile time option which allows the introduction of source programs in either BCD or EBCDIC character codes. If a cross-reference listing and/or a structural source listing is requested, a data set for each option must be defined.

This product includes language extensions to the Full FORTRAN language. OS Full FORTRAN language is compatible with and encompasses the American National Standard (ANS) FORTRAN. The language includes the following extensions to ANS FORTRAN:

- IMPLICIT statement allowing extended implicit classification by first character of a name.
- An extended type statement, including length specification.
- G-conversion, extended to cover all numeric and logical data types.
- Multiple entry points to subprograms, and non-standard returns from subroutines.
- Arrays of up to seven dimensions.
- PAUSE statement extended to permit output of messages.
- NAMELIST statement permitting input/output and conversion without an explicit I/O list and FORMAT statement.
- Extended subscripts.
- Hexadecimal constants and FORMAT code.
- Support of the direct (BDAM fixed length only) data access method.
- Compatible extensions to the READ and WRITE statements to provide direct data organization in support of direct access storage devices.
- Mixed mode arithmetic.
- The T-specification, permitting printed output to begin at any print position.
- STOP statement allows the processing of codes for testing by OS Job Control statements.

Enhancements to the OS Full FORTRAN language are:

*EXTERNAL Statement Extension* ... the EXTERNAL statement is extended to provide the capability to 'detach' the names of FORTRAN-supplied library functions and subroutines. This feature provides the user with the advantage of being able to supply his own functions or subroutines in the place of FORTRAN-supplied library functions and subroutines. The extension is achieved by the use of an ampersand prefixed to the function or subroutine name in its appearance in the EXTERNAL statement.

*List-Directed I/O* ... List-Directed I/O facility enables the user to read and write formatted data without having to specify a FORMAT statement. In List-Directed READ or WRITE statements, an asterisk is substituted for the FORMAT statement number.

*Automatic Function Selection* ... This facility simplifies the user's task of referencing built-in and library functions by obviating the need for coding specific or data dependent function names. Automatic Function Selection is requested by means of a new specification statement, GENERIC.

The processor can be invoked under CMS using the CMS command FORTHX.

The three most significant features of the FORTRAN IV (H Extended) Compiler program product are the ability to handle extended precision arithmetic and to support asynchronous I/O.

*Extended Precision* ... FORTRAN is used extensively to solve complex scientific problems. As the number of operations performed on a piece of data increases, so do the accumulated errors due to truncation. Higher precision, therefore, has to be used in certain stages of the computation to maintain the desired result significance.

The FORTRAN IV (H Extended) Compiler provides extended precision support to assure optimum accuracy of computational results.

*Asynchronous I/O* ... In the large systems area, where the requirement for reading and writing large logical records is frequent, this feature will offer significant performance improvement. (This feature is not available under CMS.)

*Automatic Precision Increase Option* ... this feature enables the compiler to convert single precision floating point calculations to double precision and/or double precision floating point calculations to extended precision. The Automatic Precision Increase option is a useful tool in precision conversion.

Automatic Precision Increase assists in overcoming precision problems encountered in converting second generation FORTRAN programs to OS floating point format.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The FORTRAN IV (H Extended) Compiler supports all IBM OS machine configurations currently supported by the OS FORTRAN IV (H) Compiler.

In MFT and MVT, a minimum of 160K bytes of main storage is required for operation of the compiler, inclusive of data management.

In VS1 and VS2, 192K bytes of virtual storage, and in CMS, a virtual machine of at least 600K bytes of virtual storage is required for the compiler. The standard instruction set and floating point option are required.

**SOFTWARE REQUIREMENTS**

The FORTRAN IV (H Extended) Compiler requires no additional data sets beyond the SYSIN, SYSPRINT, SYSLIN, SYSPUNCH, SYSUT1 and SYSUT2 data sets currently required by the FORTRAN H Compiler depending upon the execution options selected.

Extended precision divide instruction is simulated for processors with extended precision instruction set. Extended precision add, subtract, multiply and divide instructions are simulated by the OS Supervisor for processors not having the extended precision hardware.

The extended precision simulator is also available with CMS.

**Operating Environment:** The FORTRAN IV (H Extended) Compiler operates as a separate component under OS MFT, MVT, VS1 and VS2, as well as under CMS.

The FORTRAN IV Library (Mod II) (5734-LM3), or its equivalent, is required when compiling and executing under the FORTRAN IV (H Extended) Compiler.

For extended precision floating point simulation, the Extended Precision Simulation is required.

**COMPATIBILITY/CONVERSION CONSIDERATIONS**

The FORTRAN IV (H Extended) Compiler program product will compile programs written for the OS FORTRAN H Compiler. Object code compatibility will also be assured. Thus, users will not have to recode nor recompile their FORTRAN programs when obtaining this program.

The disk format of CMS data sets are not compatible with OS, however, the data sets are transferrable through utilities or card or tape. It should be noted that ASCII data sets are not allowed under CMS.

**DOCUMENTATION**

(available from Mechanicsburg)

*Installation Procedure Letter ... FORTRAN IV Language (GC28-6515, TNL GN28-0595) ... FORTRAN IV (H Extended) Compiler and Library (Mod II) General Information (GC28-6884).*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**SYSTEM/7 FORTRAN IV  
HOST COMPILER and LIBRARY  
5734-FO4 - OS; 5736-FO1 - DOS**

**PURPOSE**

Provides high-level FORTRAN IV Language support for the System/7 user, enhances the System/7 Host Program Preparation Facility II, and offers to the System/7 user the ease and speed of coding in the FORTRAN language.

System/7 FORTRAN IV (S/360/370 OS, DOS Host Compiler and Library) processes source programs written in System/7 FORTRAN IV, which is an extension of American National Standard Basic FORTRAN, X3.10-1966. The FORTRAN processor is installed on a host S/360 or S/370 under the facilities of OS/VS1, OS/VS2, DOS/VS, Operating System, or the Disk Operating System; and produces relocatable object code that is suitable, after link-editing and formatting, for execution on a System/7.

System/7 FORTRAN IV requires the use of Host Program Preparation Facility II for processing object and load modules. The required facilities are:

- MSP/7 Macro Library/Relocatable, which contains IBM supplied sensor-based, input/output, and supervisory macros that are used by the System/7 FORTRAN IV programs,
- ASM/7 which assembles the MSP/7 macros,
- LINK/7, which link edits the compiled object code and combines it with appropriate library and sensor-based subprograms to form a load module, and
- FORMAT/7, which accepts the output of LINK/7 and produces a System/7 storage load.

**DESCRIPTION**

**Compiler**

- Supports all devices available to S/360/370 FORTRAN IV compilers during compilation.
- Device statement support for the 5022 Disk Storage Module, the 129 Data Recorder, the 7431 Line Printer, the 5028 Operator Station, and BSCA during execution.
- Access, through CALL statements, to MSP/7 functions (including sensor-based input/output).
- Extensive syntax checking and diagnostics.
- Time and Space optimization for enhanced object-time performance.

**Library**

- Sensor-based subroutines per ISA S61.1
- Mathematical subprograms for exponential, natural logarithm, square root, sine, cosine, arctangent and hyperbolic tangent.
- Subprograms for extensive error handling and diagnostics, format conversion of numeric data, and input/output operations for the 5022 disk device (formatted and unformatted direct access and unformatted sequential records) and the 5028 Operator Station (ASCII data).
- Environment specification macro instructions to identify the user's FORTRAN input/output environment when configuring a storage load module for System/7.
- Modular and reentrant.

**CUSTOMER RESPONSIBILITIES**

- Understand the application they wish to perform and provide the appropriate hardware and software design.
- Generate a supporting system nucleus using the facilities of MSP/7 Host Program Preparation Facilities II on a S/360 or S/370.
- Provide the required user-written programs and link edit these programs with the MSP/7 nucleus on a S/360 or S/370.
- Load and test the resulting object programs on a System/7.

**Note:** Generation of the supporting nucleus requires a thorough understanding of MSP/7. The user should consider attending the required MSP/7 education courses, or requesting IBM to provide this nucleus through Systems Engineering Services.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Host System (for compilation)**

The system configuration required on the host is an IBM S/360 or S/370 CPU with at least 40K bytes of main storage available to the compiler, exclusive of the storage required by data management and the overlay supervisor (overlay supervisor exists for OS/VS1, OS/VS2, and OS only). Source programs of 250 cards can be processed in the minimum storage available to the compiler.

The Floating Point feature must also be installed in the host System.

A minimum system configuration requires the following devices:

- 1 - Input device
- 1 - Output device
- 1 - Console Typewriter
- 1 - Disk Storage Device

For its residence on the host, the compiler and library require the following number of tracks on an IBM 2314:

OS	15 Compiler
	12 Library
DOS	11 Compiler (in the core-image library)
	19 Library

An additional 21 tracks are required for DOS if the compiler object modules are also kept in the relocatable library.

**System/7 (for execution)**

The minimum system configuration for executing on System/7 is the following:

- 1 - IBM 5010 Processor Module - 6K or larger
- 1 - IBM 5028 Operator Station

To use FORTRAN direct-access or sequential I/O statements unformatted, an IBM 5022 Disk Storage Module is also required plus additional memory required by Symbolic File Support access methods. Use of the 5022 disk device also requires the Disk Support System (DSS/7) service programs.

**SOFTWARE REQUIREMENTS**

IBM System/7 FORTRAN IV runs under the facilities of OS/VS1, OS/VS2, DOS/VS, Operating System or Disk Operating System. The object modules produced by System/7 FORTRAN IV must be link-edited using LINK/7 and the resultant load module must be formatted using FORMAT/7 prior to execution on a System/7 machine. Both LINK/7 and FORMAT/7 are system control-type programs that execute on the host machine. The System/7 Host Macro Assembler and the MSP/7 Macro Library/Relocatable are required for preparing the nucleus and for those user applications that utilize sensor-based subprograms.

**COMPATIBILITY**

The host compiler accepts source programs written in System/7 FORTRAN IV, which is an extension of American National Standard Basic FORTRAN, X3.10-1966 and produces object modules that are acceptable to LINK/7 for link-editing. The System/7 FORTRAN IV compiler will also accept source programs written in ANS Basic FORTRAN. Its language level is similar to stand-alone System/7 FORTRAN, with minor differences due to hardware restrictions.

System/7 FORTRAN IV can process on the 5022 Disk Storage Module, formatted and unformatted direct-access data sets that are compatible with System/3 data sets.

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**FORTRAN INTERACTIVE DEBUG (5734-FO5)**

**DESCRIPTION**

FORTRAN Interactive Debug provides FORTRAN programmers the ability to debug programs conversationally at a terminal using high-level language.

FORTRAN Interactive Debug operates under TSO and CMS through a comprehensive set of subcommands which enable the programmer to control, monitor, and modify executing FORTRAN programs. The programmer can interact with an executing FORTRAN program in a simple, natural, 'FORTRAN-like' fashion. He can refer to program locations by FORTRAN statement labels or by TSO or CMS line numbers. He can access or change values of FORTRAN variables by specifying the corresponding symbolic FORTRAN variable names.

FORTRAN Interactive Debug operates under TSO on programs compiled by FORTRAN IV (G1) or Code and Go FORTRAN program products using the TEST compiler option.

**HIGHLIGHTS**

Capabilities available at program execution from a TSO or CMS terminal are:

- Setting breakpoints at statement numbers or at line numbers.
- Displaying and changing values of variables.
- Tracing the execution of FORTRAN programs.
- Tracing back subroutines and the last 10 transfers prior to the execution of the current statements.
- Ascertaining the statement number of the currently executing statement.
- Taking automatic action based upon evaluation of a specified arithmetic or logical condition.
- Displaying parts or all of the source program.
- Correcting invalid arguments passed to FORTRAN library routines.
- Conditional execution of Debug subcommands.
- Providing information (HELP) about the syntax and semantics of Debug subcommands (TSO only).
- Providing an execution frequency count for each FORTRAN source statement.
- The WHEN subcommand which allows the user to specify data fields to be continuously monitored for either a change in value or a change to a prespecified value.
- Dynamic control of the FORTRAN Extended Error Handling Facility.
- Listing all breakpoints and WHEN conditions.

In addition, the following support is provided for VS FORTRAN (5748-FO3):

- Character data type
- Extended precision data type
- Non unity lower bound arrays
- Assumed size arrays
- Ability to debug LONGLVL(66) and LANGLVL(67) programs

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

FORTRAN Interactive Debug operates on all hardware/system configurations supported by the IBM Time Sharing Option of OS and the CMS component of VM/370. A typical 100 statement FORTRAN program is expected to be compiled and interactively tested in a 169K TSO region.

The TSO Terminal Monitor Program, Command Scan, and the service routines GETLINE, PUTLINE and PUTGET are assumed to reside in the time sharing link pack area and do not figure into the user region requirement.

**SOFTWARE REQUIREMENTS**

FORTRAN Interactive Debug operates under the Time Sharing Option of OS, MVS/370, MVS/XA and the CMS component of VM/370. It operates on and in conjunction with programs compiled by FORTRAN IV (G1) Compiler (5734-FO2), or by the Code and Go FORTRAN Compiler (5734-FO1) or by the VS FORTRAN Compiler (5748-FO3). The FORTRAN IV Library (Mod II), 5734-LM3, with Extended Error Handling is required for programs compiled using Code and Go FORTRAN compiler (5734-FO1). The VS FORTRAN Library (5748-LM3) is required for programs using VS FORTRAN Compiler (5748-FO3). FORTRAN IV (G1) Compiler (5734-FO2) may use either VS FORTRAN Library (5748-LM3) or FORTRAN IV Library (Mod II) (5734-LM3).

**COMPATIBILITY**

No changes are required to the FORTRAN source program to use the FORTRAN Interactive Debug. The user merely indicates at compile time on the EXEC area or in the CMS command line that the TEST option is to be invoked. This will signal to the compiler that the program may be executed with FORTRAN Interactive Debug.

FORTRAN Interactive Debug is compatible with any Code and Go FORTRAN G1 or VS FORTRAN program that runs under TSO EDIT, except for programs containing debug packets. FORTRAN Interactive Debug becomes fully compatible with these programs if the background debug packets are removed for FORTRAN IV (G1) Compiler (5734-FO2) and Code and Go Compiler (5734-FO1). For VS FORTRAN (5748-FO3), the debug packets may be left in, and the TEST compiler option will override them.

A FORTRAN source program can be compiled with the TEST option in the foreground or the background. The object program produced can then be executed without the presence of this product as well as with it. The generated code will require more space than if it had been compiled without the TEST option.

The FORTRAN Interactive Debug program product adheres to the syntactic conventions of the TSO command language. Commands which are common with TSO TEST have the same meaning.

**PERFORMANCE CHARACTERISTICS**

*Compile Time* -- FORTRAN Interactive Debug will require the latest level of the FORTRAN G1 and Code and Go Compilers to facilitate the TEST/NOTEST option. Compile time performance will not be affected when NOTEST is specified.

*Execution Time* -- Execution time CPU requirements depend on the type and frequency of the debugging functions selected by the terminal user. Since monitoring is performed at every statement boundary, there will be a uniform execution time overhead in the absence of debugging subcommands.

**DOCUMENTATION:** (available from Mechanicsburg)

*FORTRAN IV Language (GC28-6515) ... Specifications (GC28-6888). ... VS FORTRAN Application Programming Language Reference (GC26-3986) ... FORTRAN Interactive Debug for CMS and TSO Reference Summary (SX28-8193) ... FORTRAN Interactive Debug for CMS and TSO Guide and Reference (SC28-6885) ... FORTRAN Interactive Debug for CMS and TSO Installation Reference Material (SC28-6886).*



PROGRAM PRODUCTS

**ELECTRONIC PAYMENT SYSTEMS SUPPORT  
CHECK PROCESSING CONTROL FEATURE  
DEPOSIT PROCESSING FEATURE  
5734-F11 (#6072-#6073)**

**DESCRIPTION**

The Electronic Payment Systems Support/Check Processing Control System (CPCS) - Deposit Processing Feature provides the application support necessary to incorporate the IBM 3895 Document Reader/Inscriber into a fully integrated check-processing system. The 3895 is an online, high speed device that optically reads data from up to three numeric OCR fields, including the hand or machine-printed amount on a check or deposit slip and inscribes that amount in magnetic ink on the ABA code line.

When used in conjunction with the data base facility, online operator control, full restart/recovery and image processing provided by CPCS, the Deposit Processing Feature for the 3895 offers commercial banks an integrated approach to item capture, online microfilming, MICR inscribing, proof of deposit, item correction, endpoint distribution and control and information retrieval.

By integrating this function into CPCS, the CPCS user will have full facilities for:

- Reading, inscribing, sorting and processing of MICR documents on the 3895 for subsequent processing on the IBM 3890 Document Processor.
- Distribution to 6 or 12 stackers on the 3895 prior to distribution to 6, 12, 18, 24 30, or 36 stackers on the 3890.
- Item numbering - supported on the 3890 and the 3895.
- Microfilming supported on the 3890 and the 3895.
- Merge feeding of control slips - supported on the 3890 and the 3895.
- An integrated data base which provides comprehensive audit and control capabilities through unique item identification. The item number, assigned on 3895 runs, is passed through image matching for printing on kill lists or for other final disposition of items.
- Single region operation, where all task and data management is integrated.
- Data security with unique password control of an operator's access to various tasks; duplexing of critical data sets.

**HIGHLIGHTS**

The Deposit Processing Feature of CPCS, together with the 3895, provides the following capabilities:

- MICR reading of encoded data on the MICR code line, optical character recognition (OCR) of hand or machine-printed amount fields and bar-code recognition of special documents.
- Online MICR inscribing of recognized amounts and/or other fields such as process control or "on us".
- Online microfilming of all items under program control.
- Unique sequential item numbering as well as batch number printing on the face of every prime pass document to provide detailed audit trail facilities.
- Online systems status reporting for better workflow control.
- Online float statistics by batch.
- Online reject correction through display terminals.
- Online deposit balancing through display terminals to accomplish proof of deposit.
- Online inscribing of non read and corrected items in a subsequent 3895 pass following balancing.
- Preparation of item information and control for subsequent high-speed processing and for archive functions.
- Collection of statistics for operations management and cost accounting.

In conjunction with the data base facility, online operator control, full restart/recovery and image processing provided by CPCS, the Deposit Processing Feature now offers commercial banks an integrated approach to item capture, MICR encoding, proof of deposit, item correction and endpoint distribution and control.

**CUSTOMER RESPONSIBILITIES**

The potential benefits to be derived from automating functions of the proof department require many new operating procedures. Some of the areas for special user consideration involve work flow planning, personnel training and coordination of conversion and testing.

The customer is also responsible for the tasks required to tailor the system to his specific operational environment. Some of these tasks are:

- To provide stacker-select edit routines that analyze each document image processed by the capture, key-entry and proof-of-deposit functions.
- To assemble and maintain Document Identification Handler (DIH) data in an OS/VS data set for use by the 3895. The program product, Document Identification and Description Macros (DIDM) (5748-F12), can be used to construct the DIH data.
- To provide the data and build a sort-pattern data set for processing different types of work on the 3895.
- To provide the parameters required to generate the program product.
- To provide required data sets, such as the bank name and address data set, endpoint tables, and optionally, an authorization/security table.
- To generate an OS/VS system and allocate disk space for data sets.
- Optionally, to provide programs for float analysis and investigations using the data base provided by the program product.
- Optionally, to provide the programs necessary to generate adjustment advices to customers based on the actions taken during the proof of deposit/adjustments function.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum Configuration:** CPCS - Deposit Processing Feature is designed to operate on an IBM S/370 mdl 135 and up with 384K bytes of main storage and conditional swapping. In addition to a card reader, a 132-print position printer and other requirements for either OS/VS1, OS/VS2 Release 1.7 (SVS) or OS/VS2 Release 3.7 (MVS), the following features and input/output devices are necessary:

- 2 Disk storage modules on any appropriate Direct Access Storage Facility (2314, 2319, 3330, 3340 or 3350).
- 1 3803 Tape Control (or equivalent 2803).
- 2 3420 Magnetic Tape Units mdl 3 (or equivalent 2400 Series) (three if disk capture/restore option is selected).
- 1 3272 Control Unit mdl 1 or 2.
- 3 3277 Display Stations mdl 2 with alphameric keyboard attached to 3272 Control Unit.
- 1 3895 Document Reader/Inscriber.
- 1 3896 Tape-Documents Converter.

In addition to the above, either a dedicated 132-print-position printer or an additional dedicated tape drive is required for CPCS printed output. If the latter, the transfer of data to hardcopy will be delayed until the magnetic tape can be printed in a background region/partition. To avoid this delay, it is recommended that a printer be dedicated to the job.

**Typical Configuration:** (CPCS - With Deposit Processing and CPCS 3890 Features)

- 1 S/370 mdl 148 (1024K bytes)
- 1 3505 Card Reader
- 1 3811 Printer Control Unit
- 1 3211 Printer
- 2 3890 Document Processors, with item numbering/endorsing, three pocket modules and microfilming.
- 2 3272 Control Units mdl 1 or 2.
- 30 Display Stations mdl 1 or 2 with alphameric keyboard \*.
- 1 3284 Printer mdl 1.
- 1 Disk storage facility with four 3330 Disk Storage modules (eight drives) and one 3830 Storage Control with feature #8170 two channel switch.
- 1 3803 Tape Control Unit mdl 2.
- 4 3420 Magnetic Tape Units mdl 3.
- 2 3895 Document Reader/Inscribers with microfilming attached to a block multiplexer channel.
- 2 3896 Tape-Documents Converters.

The appropriate system configuration for each user is highly dependent on user volumes, processing techniques and performance requirements.

**CPCS/Deposit Processing Feature (cont'd)**

This configuration information is intended only as a guide. The IBM marketing representative can assist in detailed configuration planning.

Consideration should be given to device data rates for their impact on system throughput. In addition, if the computer is used for batch processing concurrently with check processing, examine the data rates of shared devices to avoid system slowdown. See the *Factors Affecting Throughput* section of the *CPCS Deposit Processing Feature General Information Manual* for additional considerations.

**SOFTWARE REQUIREMENTS**

Deposit Processing Feature is written to operate under the release levels of OS/VS which are prerequisite to the Selectable Units (SUs) or Independent Component Release (ICR) containing 3895 SCP support. This support consists of environmental recording, editing and printing (EREP) facilities and error recovery procedures (ERP). The appropriate levels are:

OS/VS1 Release 6 with the EREP Modifications and the 3895 SU.

OS/VS SVS Release 1.7 with EREP Modifications and the 3895 ICR.

OS/VS2 MVS Release 3.7 with the Scheduler SU, Supervisor 1 SU, Supervisor 2 SU, Scheduler/IOS SU, EREP Modifications and the 3895 SU.

CPCS - Deposit Processing Feature will operate under subsequent releases of these operating systems unless otherwise identified.

CPCS - Deposit Processing Feature is written in Assembler language and COBOL and is distributed in source form. The following is a list of programs used by the CPCS - Deposit Processing Feature.

OS/VS1 5741-VS1  
OS/VS2 5742-017 (SVS) or 5752-VS2 (MVS)  
OS/VS Utilities  
OS/VS Linkage Editor F  
OS/VS Primary Data Management (BSAM, QSAM, BPAM)  
OS/VS Assembler F  
OS/VS Basic Direct Access Method (BDAM)  
OS/VS Basic Telecommunication Access Method (BTAM)  
ANS COBOL  
ANS COBOL Library

See *DP Guide for Ordering Programs (ZZ20-3651)* for program numbers.

To assist 3895 customers in developing Document Identification Handler data, the Document Identification and Description Macros program product provides a macro-level language capability for identifying various types of documents and the locations of their OCR data fields.

PROGRAM PRODUCTS

**TELECOMMUNICATIONS CONTROL SYSTEM  
TCS (5734-F31)**

**PURPOSE**

The Telecommunications Control System (TCS) is a teleprocessing (TP) system providing a wide scope of message and network control functions. It supplies complex but easy-to-use communications services and access to a wide variety of standard, online, application programming services.

TCS was designed to meet the demanding requirements of the securities industry in the following areas: Large network, high throughput, sophisticated CCAP-like message switching, and high reliability combined with powerful network control facilities. These requirements for TCS have been specified by the securities industry; they are, however, general in nature, and are not restricted to that particular industry.

TCS runs under OS/VS1 or OS/VS2 (SVS or MVS) on a S/370 in conjunction with the Telecommunications Access Method (TCAM or TCAM NCP/VS Direct).

TCS supports line speeds of up to 50,000 bits per second and a wide range of line controls. Examples of supported items are: Full-duplex teletypewriters, keyboard printers, video display terminals, audio units, concentrators, and other processors.

**DESCRIPTION**

TCS handles message switching, data collection, and remote printing; it also performs communications and message control for inquiry, conversational file updating, time sharing, executive query, and so on. It can also handle -- concurrently -- different types of terminals, applications, and message types. Each entity can be assigned a different option for buffering, line control, queuing (main storage or disk), message handling, and restart. Message handling (consisting of routing and optional analysis) is specified by the user via a high-level language. Different message handling techniques can be chosen for each line, application, and message type.

TCS can accommodate, simultaneously, messages for application programs running under other control programs (CICS, TSO, GIS), and those using OS/VS. Groups of application programs can run in separate regions, or partitions, and application-to-application communication can be performed. In these circumstances, any application program group can fail without bringing down any other group or the message control program.

Terminals and lines can be shared by applications - with equal efficiency - while performing data collection, conversational file updating, time sharing inquiry, and many other operations.

TCS can optionally reside in multiple processors connected by leased lines. Any given terminal connected to one such processor has access to the applications in any of the other processors, and can also switch messages to terminals connected to the processors.

The TCS program product specifically contributes the following optional functions to the combined TCS/TCAM package:

**ALTERNATE STATION AND APPLICATION NAMES:** Any station or application can be assigned more than one name. The system recognizes all such names as synonymous.

**ROUTING CONTROL:** In many situations, TCS can exert control over the routing of messages. For example: A given station can be directed to accept only specific kinds of messages, or traffic from specific origins; broadcast messages may be entered only at predetermined locations, and access to specific applications can be limited.

**POWERFUL ERROR HANDLING:** The TCS user can employ a high level of program logic in error handling. The user may select from a large number of options: Literally, hundreds of different identifiable error conditions; tailored error message formats; user-selected message priority level; and many other features.

**ELABORATE RESTART FACILITIES:** The presence of a special monitor allows TCS to be restarted with minimal operator intervention. After any given type of restart, TCS can initiate many discrete actions; various restart messages, the resetting of sequence numbers, and so on.

**POWERFUL OPERATOR CONTROL FACILITIES:** TCS offers a vast number of functions that are highly desirable in a medium-to-large TP system. Some of these facilities are: Action on multiple lines; selective queue status display on a regular basis; throughput and traffic statistics measurement; dynamic message rerouting; and dynamic extra message copy generation. The system can be directed to handle all but the most serious malfunctions without manual intervention. A complete retrieval facility is provided: Any message can be retransmitted to any station or application; retrievals can be specified by origin and/or destination, sequence number, or time of day.

**SAVING UNSENT MESSAGES:** Unsent messages may be saved on a sequential data set before the system is closed, and then reentered into the system later -- for instance, after a system regeneration. The user can choose among several options to determine which messages to save.

**ADDITIONAL LINE CONTROL TYPES:** TCS fully supports freewheeling stations as well as four kinds of full-duplex line control -- mainly for teletypewriter use.

Essentially, TCS provides a high throughput, rapid-response, reliable teleprocessing system, tailored for the needs of each user. The *TCS Concepts and Facilities Manual* (GH20-1207) contains further details. It introduces, discretely, TCS and TCAM concepts both to readers who are experienced in the field and to readers who have no previous teleprocessing knowledge.

**CUSTOMER RESPONSIBILITIES**

Before installing the program product, the customer must order and satisfactorily install all required communications equipment ... meet minimum machine configuration requirements ... generate an OS/VS1 or OS/VS2 system with TCAM ... train all persons instaling, operating, or maintaining TCS in OS/VS ... have a thorough knowledge of the message switching and order handling functions ... train system analysts, programmers and operators ... develop system conversion procedures and schedules.

This program product is released to work with the following operating systems and TCAM release levels (for as long as they themselves are current):

OS/VS1 or OS/VS2 and TCAM Levels 5, 8, and 9.  
OS/VS1 or OS/VS2 (SVS) and TCAM NCP/VS Direct (Level 10).

TC will also support OS/VS2 (MVS) and TCAM NCP/VS Direct.

TCS is written in the OS Assembler language and uses TCAM and TCS macros under Operating System Virtual Storage 1 (OS/VS1) (5741-020) or Operating System Virtual Storage 2 (OS/VS2) (5742-010).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

In addition to the machine and device requirements of TCAM, TCS requires the following:

Minimum region or partition size of 25K in an OS/VS system in a V=V environment (this does not include main storage requirements for the order edit application program).

The terminal device support of any TCS system is determined by the level of TCAM operating with that system; in addition, all releases of TCS up to and including the support of TCAM NCP/VS Direct Support freewheeling teletypewriters; Teletype (registered trademark of the Teletype Corporation, Skokie, Illinois) Model 28, and full-duplex terminals using AT&T 4VH, AT&T FINAC, AT&T 81D1 or Western Union 117 line control.

For full-duplex line control, the RPQ configuration is as follows:

Line Control	Control Unit	Control Unit
	2702	2703
FINAC	E40435	E53506
	851057	851030
	M40316	851029
81D1		A03394
	Not Available	M29185
		853017
4VH		853018
	Not Available	E57294
		M29185
WU117		853017
		853018
	E40840	E51544
	851039	E51037
		851038

Full-duplex support under the 3705 Communications Controller in the level of Emulation Program (EP) is concurrent with the availability of PRPQ #P85010-5799AGN.

**DOCUMENTATION:** (available from Mechanicsburg)

*Promotional Flyer* (G520-2465) ... *Concepts and Facilities Manual* (GH20-1207).



**OS FORTRAN IV LIBRARY (MOD II) (5734-LM3)****PURPOSE**

OS FORTRAN IV Library (Mod II) contains mathematical and service subprograms required by the OS FORTRAN IV (H Extended) Compiler (5734-F03). These are two main types of subprograms. The first computes mathematical values, such as the square root or sine, of data arguments supplied during problem program execution. The second group communicates with the operating system to obtain services, such as input/output, for the problem program. These subprograms are combined, as needed, with the compiler output during linkage editing to form a complete, executable problem program.

**DESCRIPTION**

**Features:** In addition to the OS FORTRAN IV Library functions, this program product has the following features and capabilities:

- Function and input/output conversion support for two new data lengths: REAL \*16 and COMPLEX \*32.
- New conversion routines for all data, providing greater accuracy and the same results as conversions by the FORTRAN IV (H Extended) Compiler.
- Support for new FORTRAN input/output features:
  - Asynchronous input/output, which provides high-speed capabilities for reading and writing unformatted, sequential data. In the MFT environment, this feature requires the ATTACH option (not available under CMS).
  - List-Directed I/O, which permits reading and writing of formatted data without a FORMAT statement (not available under CMS).
- Support for Automatic Function Selection, which allows the simplest form of a function name to serve for all lengths and types of data arguments.
- Support for Automatic Precision Increase, which, when invoked, promotes all single precision floating point variables, constants, and functions to double precision and/or double precision variables, constants, and functions to extended precision floating point.
- Support for tape data sets written in the American National Standard Code for Information-Interchange (also referred to as ASCII).
- The FORTRAN IV Library (Mod II) contains all the features of the FORTRAN IV Library (Mod I) (5734-LM1), which has now been withdrawn.

**COMPATIBILITY**

Upward compatibility with the OS FORTRAN IV Library is maintained. Object modules and datasets valid for the OS FORTRAN IV Library are accepted by this program product. Due to the greater accuracy of conversion routines, results of calculations may not always be identical to previously obtained results.

ASCII data sets are not allowed under CMS.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

OS FORTRAN IV Library (Mod II) operates under OS on the same hardware configurations as the FORTRAN IV (H Extended) Compiler. The standard instruction set and the floating point options are required. Extended precision floating point instruction set is optional.

**SOFTWARE REQUIREMENTS**

This program product operates under Operating System (MFT, MVT, VS1, VS2 and under CMS).

The FORTRAN IV Library (Mod II) supports the FORTRAN IV (H Extended) Compiler (5734-F03), the FORTRAN IV (GI) Compiler (5734-F02) and Code and Go FORTRAN (5734-F01).

The Extended Precision Simulation is required for the simulation of extended precision floating point.

Performance under CMS is a function of the number of users of the system.

**DOCUMENTATION**

(available from Mechanicsburg)

*FORTRAN IV Language* (GC28-6515, TNL GN28-0595) ... *FORTRAN IV (H EXT) Compiler and Library (Mod II) GI* (CG28-6848).



PROGRAM PRODUCTS

**OS PL/I RESIDENT LIBRARY  
5734-LM4**

**DESCRIPTION**

This program product is used in conjunction with the OS PL/I Optimizing Compiler. For the complete compilation and execution of a PL/I program, the following program products are required:

- OS PL/I Optimizing Compiler (5734-PL1) - For compilation.
- OS PL/I Resident Library (5734-LM4) - For link-editing.
- OS PL/I Transient Library (5734-LM5) - For execution.

For a processor in which programs are compiled, but not link-edited or executed, only the compiler is required. For a processor in which programs are link-edited but not compiled or executed, only the resident library is required. For a processor in which programs are executed but not compiled or link-edited, only the transient library is required. The three products are available packaged together (as 5734-PL3) or individually.

The OS PL/I Resident Library consists of those subroutines which, when link-edited under OS with the object module produced by the OS PL/I Optimizing Compiler, form a load module or object program for subsequent execution under OS. To execute a load module, the OS PL/I Transient Library is required.

When operating under the CMS component of VM/370, the OS PL/I Resident Library is required when loading the object module, as produced by the OS PL/I Optimizing Compiler, prior to execution. The OS PL/I Transient Library is required during the subsequent execution.

The functional areas serviced by subroutines of this library are as follows:

- Mathematical routines (e.g., SIN, COS).
- Data type conversions (e.g., Pictured Character to Float).
- Edit, List- and Data-Directed I/O (Stream I/O).
- System Control Program Interfaces, including:
  - Program Management and (optionally) Tasking.
  - Storage Management.
  - Display.
  - Timer Facilities.
  - Error Handling.

but excluding those routines loaded during execution.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Link Edit: Approximately 37 tracks of 3330 or equivalent direct access storage space are required for the resident library subroutines. Devices are required as for the Linkage Editor.

**Execution under the IBM Operating System:** The main storage requirements of the object program are a function of the PL/I facilities used. The decimal and floating point instruction sets are required. If extended floating point calculation is explicitly used in the object program, the extended floating point instruction set is automatically simulated (if not present on the machine) by the OS Extended Precision Simulator. The timer feature is required if use is made of the TIME built-in function or the DELAY statement. The object programs produced by the PL/I Optimizing Compiler can utilize all input/output devices supported by BSAM, QSAM, BISAM, QISAM, VSAM, BDAM and TCAM.

**Execution under CMS:** When executing a PL/I object program under CMS, all of the processor features that are used when operating under the IBM Operating System are required.

**SOFTWARE REQUIREMENTS**

Release 3.1 of the resident library is supported on OS Release 21, OS/VS2 (SVS) all releases, OS/VS1 Releases 1 through 7, OS/VS2 (MVS) through Release 3.8 and the CMS component of Releases 1 through 6 of VM/370, until March 31, 1982. After March 31, 1982, Release 3.1 of the resident library is no longer current.

Release 4.0 of the resident library is supported on OS/VS1 Release 7, OS/VS2 (MVS) Release 3.8 and the CMS component of Release 6 of VM/370, and subsequent versions, releases and modifications, unless otherwise stated in a modification of the specifications.

Under OS, the resident library load modules reside in PLI.PLIBASE and PLI.PLITASK. Resident library load modules may be placed in LINKPACK using the shared library facility. This facility may also be used by application programs running under CICS/VS.

PL/I multitasking facilities can be used only on an MVT or VS2 system.

All object programs require BSAM and QSAM in the generated operating system. Programs using INDEXED or VSAM data sets require ISAM or VSAM, and those using REGIONAL data sets require BDAM. Programs using TRANSIENT files require TCAM. The use of TCAM also requires the generation of a TCAM message control program to direct messages to and from the disk queues. The timer system generation option is required if use is made of the TIME built-in function or the DELAY statement.

Under CMS, the library resides on the system disk as PLILIB TXTLIB S2. In the CMS environment, the following features are not available:

- Multitasking.
- Teleprocessing file support.
- INDEXED file support.
- PL/I SORT facilities.
- PL/I Checkpoint/Restart facilities.
- ASCII data sets.
- BACKWARDS attribute with magnetic tapes.
- PL/I FETCH and RELEASE statements.
- VS or VBS record formats

For additional information about the object time restrictions under CMS, refer to the publication *OS PL/I Optimizing Compiler CMS User's Guide* (GC33-0037).

Object programs may be executed as application programs in the CICS environment. The usability of PL/I programs in the CICS/VS environment is increased by Release 3 of the OS PL/I Optimizing Compiler under OS/VS.

**DOCUMENTATION:** (available from Mechanicsburg)

*OS PL/I Optimizing Compiler General Information Manual* (GC33-0001) ... *OS PL/I Resident Library Specifications* (GC26-3992).

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No



## PROGRAM PRODUCTS

**OS PL/I TRANSIENT LIBRARY  
5734-LM5****DESCRIPTION**

This program product is used in conjunction with the OS PL/I Optimizing Compiler and the OS PL/I Checkout Compiler.

For the OS PL/I Optimizing Compiler, to compile, link-edit, and execute a PL/I program, the following program products are required:

- OS PL/I Optimizing Compiler (5734-PL1) - For compilation.
- OS PL/I Resident Library (5734-LM4) - For link-editing.
- OS PL/I Transient Library (5734-LM5) - For execution.

For a processor in which programs are compiled, but not link-edited or executed, only the compiler is required. For a processor in which programs are link-edited but not compiled or executed, only the resident library is required. For a processor in which programs are executed but not compiled or link-edited, only the transient library is required. The three products are available packaged together (as 5734-PL3) or individually.

For the OS PL/I Checkout Compiler, to translate and interpret a PL/I program, the following program products are required:

- OS PL/I Checkout Compiler (5734-PL2) - For translation and interpretation.
- OS PL/I Transient Library (5734-LM5) - For interpretation only.

The transient library consists of those load modules loaded dynamically during object program execution, thus minimizing the space occupied by the object program. These load modules reside in the link library (PLI.LINKLIB); they are transient and are automatically loaded when required, by the system macros LINK, LOAD and XCTL. Transient library load modules may be placed in LINKPACK.

The principal functions of the transient library modules are:

- Error and interrupt handling.
- Opening and closing files.
- Record-oriented and stream-oriented input/output transmission.
- Program initialization and storage management.

A transient library module remains in main storage for as long as it is required by the problem program being executed.

Support for the ASCII character set is provided for object programs by QSAM. Object programs can create and access data sets in ASCII provided the data sets are on magnetic tape with formats, U, F, FB, D or DB. These data sets will be supported by STREAM files and by RECORD SEQUENTIAL BUFFERED files using the CONSECUTIVE environment option. Only character data may be written onto an ASCII data set. This support is not available when operating under CMS.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Approximately 30 tracks of IBM 3330 or equivalent direct access storage space are required for the transient library subroutines.

The main storage requirements of the object program are a function of the PL/I facilities used. The decimal and floating point instruction sets are required. If extended floating point calculation is explicitly used in the object program, the extended floating point instruction is automatically simulated (if not present on the machine) by the OS Extended Precision Simulator. The timer feature is required if use is made of the TIME built-in function or the DELAY statement. The object programs can utilize all input/output devices supported by BSAM, QSAM, BISAM, QISAM, VSAM, BDAM and TCAM.

**SOFTWARE REQUIREMENTS**

Release 3.1 of the transient library is supported on OS Release 21, OS/VS2 (SVS) all releases, OS/VS1 Releases 1 through 7, OS/VS2 (MVS) through Release 3.8 and the CMS component of Releases 1 through 6 of VM/370 until March 31, 1982. After March 31, 1982, Release 3.1 of the transient library is no longer current.

Release 4.0 of the transient library is supported on OS/VS1 Release 7, OS/VS2 (MVS) Release 3.8 and the CMS component of Release 6 of VM/370, and subsequent versions, releases and modifications, unless otherwise stated in a modification of the specifications.

PL/I multitasking facilities can be used only on an MVT or VS2 system.

All object programs require BSAM and QSAM in the generated operating system. Programs using INDEXED or VSAM data sets require ISAM or VSAM, and those using REGIONAL data sets require BDAM. Programs using TRANSIENT files require TCAM. The use of TCAM also requires the generation of a TCAM message control program to direct messages to and from the disk queues. The timer system generation option is required if use is made of the TIME built-in function or the DELAY statement.

Under CMS, the library resides on the system disk as PLILIB TXTLIB S2. In the CMS environment, the following features are not available:

Multitasking.  
Teleprocessing file support.  
INDEXED file support.  
PL/I SORT facilities.  
PL/I CHECKPOINT/RESTART facilities.  
ASCII data sets.  
BACKWARDS attribute with magnetic tapes.  
PL/I FETCH and RELEASE statements.  
VS or VBS record formats.

For additional information about these restrictions, see *OS PL/I Optimizing Compiler: CMS Users Guide* (GC33-0037)

Object programs may be executed as application programs in the CICS environment. The usability of PL/I programs in the CICS/VS environment is increased by Release 3 of the OS PL/I Optimizing Compiler under OS/VS.

**DOCUMENTATION:** (available from Mechanicsburg)

*OS PL/I Optimizing Compiler General Information Manual* (GC33-0001) ... *OS PL/I Checkout Compiler General Information Manual* (GC33-0003) ... *OS PL/I Transient Library Specifications* (GC26-3993).

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No



PROGRAM PRODUCTS

**REQUIREMENTS PLANNING (5734-M51)**

**PURPOSE**

This program product offers a mechanized approach to detailed requirements planning for a large segment of manufacturing industries. It uses the Item Master and Product Structure files created by the Chained File Management System. It performs time series planning to determine planned orders for finished products, assemblies, sub-assemblies, parts and material based upon the input of forecasts and/or customer orders.

Requirements Planning determines the net requirements for finished products and component parts, establishes planned orders based on the predetermined order policy, and offsets the planned orders with respect to lead times. Additional capabilities include projecting demand ... consideration of safety stock, allocated quantity, shrinkage factors ... planned order policies include discrete, fixed quantity, least unit cost, and part period balancing ... modifying planned order policies by considering number-days-supply, minimum-maximum-multiple quantities, and cutoff dates ... offsetting by a fixed or a calculated lead time. Processing variations include: Complete generation of requirements, Requirements Alteration (revisions to gross requirements), and Plan Order Adjustment (revisions to planned orders). A customizing procedure permits a user to tailor the system to meet his specific requirements. OS/360 Requirements Planning uses many of the concepts of the Requirements Planning subsystem discussed in the *IBM Production Information and Control System (GE20-0280)*.

The Chained File Management System is used to create and maintain a central information system for a manufacturing organization. The system contains generalized programs to organize and maintain Item Master, Product Structure, Routing and Work Center data on direct access files. CFMS is required and provided with OS/360 Requirements Planning.

**DESCRIPTION**

OS/360 Requirements Planning consists of three programs: The Requirements Generation Program, the Print Exception Program and the Chained File Management System.

The inputs to the Requirements Generation Program are from card, magnetic tape or disk and contain the gross requirements by shop day, calendar date or time period. Card input is by date and quantity only. These requirements can be generated manually from a forecast, from customer orders, or from OS/360 Inventory Control (5734-M52). This input spans a user-specified number of planning periods into the future.

The output of the Requirements Generation Program is in the form of planned orders for purchased and manufactured items. Orders for manufactured items are available for input to a capacity planning function, and orders to be purchased are available to a purchasing function. A considerable amount of flexibility is provided to enable the extraction of as much or as little information as desired for printing. Three types of reports are provided: Detailed requirements, planned orders that have been adjusted through Plan Order Adjustment and an exception report. The Print Exception Program is used to print the exceptions generated from the Requirements Generation program.

The Chained File Management System provides manufacturing organizations with easy-to-modify programs that establish and maintain basic information files describing the structure of products and their manufacturing procedures. Logic diagrams explaining the retrieval of this information in fundamental applications is also supplied.

The Requirements Generation Program requires that the Item Master and the Product Structure files are organized using the Chained File Management System.

**HIGHLIGHTS**

- Three programs are provided to assist the user in performing requirements planning: The Requirements Generation Program performs the actual time series requirements generation; the Print Exception Program prints notices for the exceptions that were discovered during requirements generation; and the Chained File Management System creates and maintains a central manufacturing data base.
- Functions performed by the Requirements Generation Program include gross requirements determination, net requirements determination, plan orders and offset requirements.
- Many options are provided within the functions. These include projection of demand ... safety stock quantity ... allocated quantity ... shrinkage factor ... discrete, fixed quantity, least unit cost, part period balancing and user order policies ... minimum-maximum-multiple, number-days-supply, maximum quantity and cutoff date modifiers to order policies ... fixed and calculated lead time ... product structure offset adjustment ... product structure scrap factor ... user's exits for engineering change effectivity of product structure.
- Three types of processing variations are provided by the Requirements Generation Program. These include: Complete generation of requirements, Requirements Alteration (revisions to gross requirements), and Plan Order Adjustment (revisions to plan orders).

- Three types of reports are provided. These include: Detail report of requirements, plan orders that have been adjusted through Plan Order Adjustment and an exception report created by the Print Exception Program.
- The Requirements Generation Program provides two optional methods for printing detail requirements. These include printing of item indicative information, gross requirements, open orders, net requirements, plan orders and offset requirements in random sequence, as requirements are generated, or at the completion of generating requirements in the sequence that the Item Master file is organized.
- Provision is made to store gross requirements, open orders and plan orders in either an Item Master or Subordinate Item Master file, both of which are created and maintained by the Chained File Management System. When the Subordinate Item Master file is used, any combination of the gross requirements, open orders and plan orders will be stored as one separate record for each item. The linkage between the two files will be created by the Requirements Generation Program.
- Input to the Requirements Generation program is from card, magnetic tape or disk and contains gross requirements by shop day, calendar date or time period. Card input is by date and quantity only.
- A customizing procedure permitting the user to select the functions and options necessary to tailor the Requirements Generation Program to meet his specific requirements.
- The Chained File Management System provides disk file chaining to link Product Structure records with Item Masters, to link Routing records to Item Masters, and Routing records to Work Center Masters ... the user designs his own record layouts by incorporating his own information plus certain required data ... low level coding is automatically maintained ... assembly to sub-assembly continuity is verified.
- The Chained File Management System is modular in design, permitting the user to select only features that suit his needs ... bi-directional chaining is provided ... a run activity control technique aids in restart and reconstruction, and facilitates additional retrieval features.
- Tailoring of the generalized source program of the Chained File Management System to the specific needs of each user's installation is performed by a special customizing program ... the user prepares parameter cards to specify his needs ... macros are provided for sequential or random access to master files ... retrieval program may be written in Assembler, PL/I or COBOL.

**USE**

OS/360 Requirements Planning is direct access file oriented utilizing data contained in the Item Master, Product Structure and Subordinate Item Master (optional) files. The records within these files are created and maintained by the Chained File Management System.

Frequency of use of OS/360 Requirements Planning will depend on the user needs of his production planning function. Typically, each scheduled program run would be a complete generation of requirements with the input of gross requirements spanning from the current time period to the last time period in the planning horizon. The Plan Order Adjustment (optional) method of processing enables the system to stop processing after each level of planned orders has been developed. This allows the planned orders to be reviewed and, if necessary, readjusted before the next level of requirements is determined. Thus, either complete requirements generation or Plan Order Adjustment would normally be performed on a scheduled basis. Requirements Alteration processing (optional) provides for regeneration of requirements due to changes to the original gross requirements input. In this instance, only the altered gross requirements are input to the system. Requirements Alteration processing would normally be performed between scheduled complete requirements generation or Plan Order Adjustment program runs.

**CUSTOMER RESPONSIBILITIES**

A thorough knowledge and understanding of this program before installation ... customize OS/360 Requirements Planning to meet user requirements ... a thorough knowledge and understanding of the Chained File Management System ... provide and maintain a shop calendar that resides on a direct access device ... define contents and format of the Item Master, Product Structure, and Subordinate Item Master files ... maintain accurate up-to-date data ... provide open orders to the system ... provide file organization and maintenance of the Item Master, Subordinate Item Master, and Product Structure files through the use of the Chained File Management System.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum machine configuration includes an IBM S/360 or S/370 Processor with main storage of 128K bytes or more for PCP (S/360 only) and MFT, and 256K bytes or more for MVT and appropriate I/O

## PROGRAM PRODUCTS

**Requirements Planning (cont'd)**

units to satisfy the OS/360 requirements for system console, system input, system output, system residence and system data sets. The only additional requirements are direct access storage for the data sets. OS Requirements Planning requires a minimum of an 80K byte partition or region for PCP, MFT and MVT. User core requirements may vary due to the selection of user options.

**SOFTWARE REQUIREMENTS**

S/360 Requirements Planning is written in Assembler language. It uses the macro language facility and operates under control of OS/360 Multiprogramming with a Variable Number of Tasks (MVT). This program product also runs under all OS/VS operating systems. In addition, the program also operates in a VM/370 environment under the control of any OS or OS/VS system.

**DOCUMENTATION:** (available from Mechanicsburg)

*Application Description Manual (GH20-0751) ... Specifications ... (GH20-4005)*

**CONNECTION RECORD FEATURE (#6015)**

The OS/360 Requirements Planning Special Feature #6015 extends the support of OS/360 Requirements Planning to make it possible to generate connection records. The connection record provides information regarding parent-component relationships of all orders planned during a requirements generation run. These may be used as input to OS Capacity Planning -- Finite Loading (5734-M54) to link component orders with parent orders.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum system requirements for OS/360 Requirements Planning Special Feature #6015 are similar to those necessary to support OS/360.

The minimum machine configuration includes an IBM S/360 or S/370 Processor with main storage of 128K bytes or more for PCP (S/360 only) and MFT, and 256K bytes or more for MVT and appropriate I/O units to satisfy the OS requirements for system console, system input, system output, system residence, and system data sets. The only additional requirements are direct access storage for OS/360 Requirements Planning data sets. This support requires OS/360 Requirements Planning as a prerequisite. OS Requirements Planning with Special Feature #6015 requires a minimum of an 80K byte partition or region for PCP, MFT and MVT. User core requirements may vary due to the selection of user options.

**SOFTWARE REQUIREMENTS**

The program is written in Assembler language. It uses the macro language facility and operates under control of OS/360 (PCP, MFT or MVT). OS/360 Requirements Planning (5734-M51) is required. This program product also runs under all OS/VS operating systems. In addition, the program also operates in a VM/370 environment under the control of any OS or OS/VS system.

**DOCUMENTATION:** (available from Mechanicsburg)

*Application Description Manual (GH20-0751) ... Specifications (GH20-4005).*

PROGRAM PRODUCTS

**OS PL/I OPTIMIZING COMPILER  
5734-PL1**

**PURPOSE**

The OS PL/I Optimizing Compiler is designed specifically for generation of very fast object programs. Good all-around performance is achieved through the incorporation of the best design features of a number of well-proven compilers. The compiler operates under the IBM Operating System and under the Conversational Monitor System (CMS) component of Virtual Machine Facility/370 (VM/370).

**DESCRIPTION**

Main features offered include:

**Improved Optimization** - Object code can be optimized to a much greater extent than has previously been possible for PL/I users.

**Advanced Level of PL/I** - A powerful implementation of PL/I with language extensions and developments beyond the PL/I F level. New features include the DEFAULT statement, file variables, entry variables, new compile-time preprocessor facilities and structured programming statements.

**Virtual Storage Systems** - The products operate efficiently at both compile and execution time on virtual storage systems. The ability to use large virtual storage permits the full range of PL/I debugging features to be used.

**VSAM Support\*\*** - Support for the use of data sets created with or converted to VSAM. In most cases, VSAM will be used directly; where this is not possible the ISAM Interface will be used.

**Extensive Debugging Aids** - Clear and specific diagnostic messages at compilation and execution times, plus a comprehensive range of options, reduce the time and effort required for program checking.

**Use with OS PL/I Checkout Compiler** - The OS PL/I Optimizing Compiler and the OS PL/I Checkout Compiler (5734-PL2) have been designed as a pair. Used together, the two compilers can increase the efficiency of both programmer effort and machine usage.

**ASCII Support\*** - ASCII data sets can be created and accessed using QSAM.

**Communication with FORTRAN, COBOL and Assembler** - This compiler facilitates communication between PL/I object modules and FORTRAN, COBOL or Assembler object modules. See *OS PL/I Optimizing Compiler: General information Manual* (GC33-0001). For details, see *OS PL/I Optimizing and Checkout Compilers Language Reference Manual* (SC33-0009) and *OS PL/I Optimizing Compiler Programmer's Guide* (SC33-0006).

**Time Sharing** - This compiler can be used with the Time Sharing Option of the IBM Operating System or the CMS component of VM/370. The compiler can be invoked from a remote terminal and compiler diagnostic messages and listings can be received at the terminal. Under TSO only, the user can be prompted at the remote terminal for job parameters that are omitted or incorrectly entered. Data sets required for compilation are dynamically allocated.

The compiler can be used to write interactive application programs. Execution of a program compiled by the OS PL/I Optimizing Compiler may be interrupted from the terminal by use of the attention button (or equivalent).

**Teleprocessing Support\*** - Messages can be read and written from TCAM queues.

**Extended Precision Arithmetic** - Floating point calculations are optionally performed on fractions of approximately 33 decimal digits. The OS Extended Precision Simulator is automatically invoked if the instructions are not present on the machine.

**Extended Graphic Character Set Support** - New functions, available on Release 4 only, improve the usability of PL/I for applications requiring large character sets. This is accomplished by defining a new data type, GRAPHIC, which defines two-byte string data (graphic string data). For detailed information see *OS and DOS Optimizing Compiler: Extended Graphic Character Set Support Supplement* (SC26-3971).

\* This feature is not available at object time when running under CMS.

\*\* This feature is available under CMS at object time as of VM/370 Release 3, except that no ISAM Interface is provided.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Compilation under the IBM Operating System:** The compiler will operate in a 54K partition under MFT, in a 56K region under MVT or in a 76K region with TSO. With VS, partition and region sizes are rounded up to a multiple of 64K.

Additional memory, either real or virtual, can be used to reduce compilation time, by reducing the use of auxiliary storage (SYSUT1) used by the compiler.

The machine must include the floating-point and decimal instruction sets. The timer feature is required if the time taken for compilation or the time of compilation are to be recorded.

Approximately 146 tracks of 3330 or equivalent direct access storage space are required for compiler residence.

**Execution under the IBM Operating System:** The main storage requirements of the object program are a function of the PL/I facilities used. The decimal and floating point instruction sets are required. If extended floating point calculation is explicitly used in the object program, the extended floating point instruction set is automatically simulated (if not present on the machine) by the OS Extended Precision Simulator. The timer feature is required if use is made of the TIME built-in function or the DELAY statement. The object programs produced by this compiler can utilize all input/output devices supported by the following access methods:

BSAM, QSAM, BISAM, QISAM, VSAM, BDAM and TCAM.

**Time Sharing under TSO:** Any TSO terminal can be used to interact with the compiler provided that the correct character set is available. If a 2741 is used, the most suitable keyboard configuration is PTTC/EBCD with either the #9571 or the #9591 print element. The TSO Message Control Program must be suitably set up to accept the character codes from this terminal. Other keyboards can be used but may not be as convenient as the above.

Suitable display terminals are the 3275 mdl 2 and 3277 mdl 2 Display Stations. With these terminals, the most suitable keyboard is the 78 EBCDIC Typewriter Keyboard #4633.

**Compilation and Execution under CMS:** To operate the compiler under CMS, a minimum of 320K of virtual storage is required for the CMS virtual machine.

When executing a PL/I object program under CMS, the same processor features are required as are used when executing under the IBM Operating System.

Under CMS, the compiler and libraries support those I/O devices which are supported under the IBM Operating System provided they are supported by VM/370. For a list of devices supported by VM/370, see the *IBM Virtual Machine Facility/370 Planning and System Generation Guide* (GC20-1801).

**SOFTWARE REQUIREMENTS**

Release 3.1 of the compiler is supported on OS Release 21, OS/VS2 (SVS) all releases, OS/VS1 Releases 1 through 7, OS/VS2 (MVS) through Release 3.8 and the CMS component of Releases 1 through 6 of VM/370, until March 31, 1982. After March 31, 1982, Release 3.1 of the compiler is no longer current.

Release 4.0 of the compiler is supported on OS/VS1 Release 7, OS/VS2 (MVS) Release 3.8 and the CMS component of Release 6 of VM/370, and subsequent versions, releases and modifications, unless otherwise stated in a modification of the specifications.

**Subroutine Libraries:** A subroutine library is required during link-edit of a compiler output module (or when loading an object module under CMS). A second library is required for execution of the object program. Each library is available as an IBM program product:

OS PL/I Resident Library (5734-LM4) - For link-editing.

OS PL/I Transient Library (5734-LM5) - For execution.

For a processor in which programs are compiled, but not link-edited or executed, only the compiler is required. For a processor in which programs are link-edited but not compiled or executed, only the resident library is required. For a processor in which programs are executed but not compiled or link-edited, only the transient library is required. The three products are available packaged together (5734-PL3) or individually.

**Compilation Under the IBM Operating System:** The access methods used directly by the compiler are BSAM and QSAM. BPAM is used if required for compile-time preprocessing. The timer system generation option is required if the time taken for compilation or the time of compilation are to be recorded.

**Execution Under the IBM Operating System:** PL/I multitasking facilities can be used only on an MVT or VS2 system.

All object programs require BSAM and QSAM or VSAM in the generated operating system. Programs using INDEXED data sets require ISAM or VSAM, and those using REGIONAL data sets require BDAM. Programs using TRANSIENT files require TCAM. The use of TCAM also requires the generation of a TCAM message control program to direct messages to and from the disk queues. The timer system generation option is required if use is made of the TIME built-in function or the DELAY statement.

**Time Sharing:** This compiler can be invoked from a remote terminal when using the Time Sharing Option of the Operating System or under CMS.

PROGRAM PRODUCTS

OS PL/I Optimizing Compiler (cont'd)

**Compilation and Execution under CMS:** There are no additional restrictions on the language accepted by the compiler under CMS. Programs compiled under CMS will execute under the IBM Operating System but the following features are not available when executed under CMS:

- Multitasking.
- Teleprocessing file support.
- INDEXED file support.
- PL/I Sort facilities.
- PL/I Checkpoint/Restart facilities.
- ASCII data sets.
- BACKWARDS attribute with magnetic tapes.
- PL/I FETCH and RELEASE statements.
- VS or VBS record formats.
- VSAM data sets (Note 1).

Note 1: This restriction is removed as of VM/370 Release 3.

For additional information about the object time restrictions under CMS, refer to the publication *OS PL/I Optimizing Compiler: CMS User's Guide* (SC33-0037).

**Execution under CICS:** Object programs may be executed as application programs in the CICS environment. The usability of PL/I programs in the CICS/VS environment is increased by Release 3 of the OS PL/I Optimizing Compiler under OS/VS.

COMPATIBILITY

Compatibility between different releases of the OS PL/I Optimizing Compiler and the OS PL/I Resident and Transient Libraries: For the successful link-editing of object modules, the resident library must be from a release corresponding to, or later than the compiler used. Object modules from different releases of the compiler can be link-edited together provided that the release of the resident library is at least as recent as the latest compiler used.

For successful execution, the transient library must be from a release corresponding or subsequent to that of the resident library used.

The OS PL/I Optimizing Compiler is compatible with the OS PL/I F Compiler and the DOS PL/I D (Version 4) Compiler in the following respects:

	With PL/I F (Version 5)	With PL/I D (Version 4)
Source Language	Yes*	Yes**
Data Sets	Yes	Limited
Compiler Restrictions	Yes*	Yes**
Object Code	No	No

\* For more information, see the *OS PL/I Optimizing Compiler General Information Guide* (SC33-0006).

\*\* For more information, see the *DOS PL/I Optimizing Compiler Programmer's Guide* (GC33-0008).

**Compatibility with the OS PL/I Checkout Compiler:** The OS PL/I Optimizing Compiler and OS PL/I Checkout Compiler (5734-PL2) have been designed as a pair. The primary aim of the Checkout Compiler is to reduce time and effort spent on program checkout, while the Optimizing Compiler is primarily concerned with providing increased system throughput when the program is in production use. Thus, used together the two compilers can increase the efficiency of both programmer effort and machine usage. The conversational PL/I language features applicable to the Checkout Compiler are syntax checked by the Optimizing Compiler but otherwise ignored. A summary of the compatibility of the two products is shown below.

**Compatibility with the DOS PL/I Optimizing Compiler:** The OS PL/I Optimizing Compiler implements a superset of the DOS language and the high degree of compatibility between these two compilers provides a convenient migration path from DOS to OS. A summary of the compatibility between the two products is shown below:

	W/Checkout Compiler	W/DOS Optimizing Compiler
Source Language	Yes*	Yes
Data Sets	Yes	Limited
Compiler Restrictions	Yes*	Yes
Object Code	Yes	No

\* For more information, see the *OS PL/I Optimizing and Checkout Compilers Language Reference Manual* (SC33-0009).

Features:

**Extensive Optimization:** Object code can be optimized to a much greater extent than has previously been possible with IBM PL/I compilers. Optimization is optional, the options available to the programmer being:

**OPT(TIME)** - Object code optimized to reduce the time required for execution of the object program. The secondary effect may be a reduction in object program size.

**NOPT** - No optional optimization, permitting fastest compilation. This is the standard default setting.

**Advanced Level of PL/I:** The level of PL/I supported by the compiler is more extensive than the language supported by the OS PL/I F (Version 5) and the DOS PL/I D (Version 4) Compilers. It contains the following new features:

**VSAM Support \*\*** - Current RECORD I/O language in existing programs, written to use ISAM data sets, automatically runs on VSAM. New environment options allow PL/I Support for more VSAM features in new programs compiled on Release 3 of the compiler.

**DEFAULT Statement** - The programmer can now override the standard language default attributes for all identifiers and descriptors by use of the DEFAULT statement. This statement can also be used for subsequent reversion to the standard defaults.

**ENTRY Attributes** - Internal entry constants need not be declared with the ENTRY attribute. The use of entry variables is introduced to PL/I.

**File Variables** - Increased capability for data base handling is provided by the introduction of file variables.

**Based Variables** - A locator variable used to qualify a based variable can now be subscripted or based.

**Preprocessor Functions** - The use of compile-time preprocessor functions has been simplified. Two additional string built-in functions, LENGTH and INDEX, are available. The RESCAN and NORESCAN options can be used to qualify the activation of a preprocessor variable. Additional built-in functions, COUNTER, COMPILETIME and PARMSET, are available. Statements %NOTE, %PRINT and %NOPRINT are introduced. Arguments to preprocessor procedures may be specified by keyword reference as well as positionally.

**The %INCLUDE Facility** - Using the compiler option INCLUDE will improve compile speed if the inclusion of external text is the only preprocessor function used.

**The CHECK Condition** - Variables that are based, defined or parameters, in addition to automatic, controlled and static variables, can be used with the CHECK condition.

**The VARYING Attribute** - Variables that are BASED or DEFINED can be used with the VARYING attribute.

**Record Input/Output** - Variables that are parameters or defined, or arrays or structures of varying strings, can be used in record oriented input/output statements. Parameters that are CONNECTED arrays or structures can similarly be used.

**Comparison of Labels** - Label constants and label variables can be compared in IF statements.

**Array and Structure Assignments** - Assignments to arrays of structures can include arrays that are not arrays of structures.

**The REFER Option** - Greater flexibility is available in the use of the REFER option in self-defining structures. More than one REFER option can be used in each structure. In some structures, use of REFER is not restricted to the end of the structure.

**Dynamic Variables in the ENVIRONMENT Option** - Expressions such as maximum record length, blocksize, etc., for record I/O may be specified by variables in the ENVIRONMENT option, which are accessed at the time the file is opened.

**Structured Programming Statements** - the ease with which Structured Programming Techniques can be utilized is increased in the compiler by the SELECT group, and the LEAVE, DO UNTIL and DO REPEAT statements.

**ASCII Support\*** - Object programs can create or access data sets in ASCII provided the data sets are on magnetic tape with formats U, F, FB, D or DB. These data sets will be supported by STREAM files and by RECORD SEQUENTIAL BUFFERED FILES using the CONSECUTIVE environment option. Only character data may be written onto an ASCII data set.

\* This feature is not available at object time when running under CMS.

\*\* This feature is available under CMS at object time as of VM/370 Release 3, except that no ISAM interface is provided.

**Time Sharing:** This compiler can be invoked from a remote terminal when using the Time Sharing Option of the IBM Operating System or the CMS component of VM/370. In this mode, it will support line numbers

## OS PL/I Optimizing Compiler (cont'd)

(in addition to statement numbers) in diagnostic messages. Compiler error messages can be received at the user's terminal. Under TSO only, the user can be prompted at the remote terminal for job parameters that are omitted or incorrectly entered. Data sets required for compilation are dynamically allocated.

The compiler can be used to write interactive application programs. Execution of a program compiled by OS PL/I Optimizing Compiler may be interrupted from the terminal by use of the attention button (or equivalent).

**Extensive Debugging Aids:** The extensive diagnostics available at compilation and execution times minimize the time and effort required for program debugging. Where possible, the compiler will make an assumption as to the intended meaning of an erroneous statement. Diagnostic messages produced by the compiler are in the categories of termination error, severe and other errors, and warnings. Messages for each category are listed in statement number order, each message indicating:

- The number of the erroneous statement, and the portion of the statement involved.
- The exact nature of the error.
- Any assumptions made, or actions taken by the compiler.

Other aids to program debugging include:

- Control over interrupt and error handling. Error handling functions may be built-in or programmer-defined.
- Powerful flow-tracing facilities, including statement number trace facilities, statement counting facilities, the CHECK condition, the SNAP option and dynamic dumping facilities.
- Communication with the program during execution by use of the DISPLAY statement, or attention condition.
- A compiler option to allow the programmer to check only the syntax of his programs. This avoids the burden of complete compilation when serious errors are found.

**Communication with FORTRAN, COBOL and Assembler:** Subject to certain rules the compiler will allow communication between PL/I object modules and FORTRAN, COBOL or Assembler object modules. Data may be passed as arguments and automatically remapped if required. See *OS PL/I Optimizing Compiler: General Information Manual* (GC33-0001). For details, see *OS PL/I Optimizing and Checkout Compilers Language Reference Manual* (SC33-0009) and *OS PL/I Optimizing Compiler Programmer's Guide* (SC33-0006).

**Compiler Options:** In addition to the option for object code optimization, the wide range of options includes control over:

- Main storage allocation for compilation.
- Preprocessing and processing characteristics.
- Input/Output features including:
  - Source program listings.
  - Attribute and cross-reference tables.
  - Object program listings in Assembler code.
  - Storage maps.
  - Use of terminal for all compiler listings with TSO or CMS.
  - Punched card decks.

The default settings for all options can be altered or selected options can be deleted from usage.

**Additional Facilities:** Provisions are made for:

- Accessing the system CHECKPOINT/RESTART program, thus providing recovery facilities in the event of system or machine failure during long production runs.
- Accessing the sort routines of the system Sort/Merge program directly from a PL/I object program.

Note: The CHECKPOINT/RESTART and Sort/Merge facilities are not available when running an object program under CMS.

**DOCUMENTATION:** (available from Mechanicsburg)

*OS PL/I Language Reference Manual* (GC33-0009) ... *OS PL/I Optimizing Compiler General Information Manual* (GC33-0001) ... *Specifications* (GC26-2991)

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No



## OS PL/I CHECKOUT COMPILER Release 3 5734-PL2

### DESCRIPTION

**Interpretive Processing:** The Checkout Compiler provides comprehensive facilities for checking and debugging PL/I programs. It provides many of these functions because it is an interpretive processor in both background and foreground.

Processing is divided into two stages: Translation and interpretation. During translation, the original PL/I source code is translated into a more elemental form; this process is roughly equivalent to conventional compilation. During interpretation, the coded text is interpreted under control of the Checkout Compiler to achieve the same effect as conventional execution. The design emphasis is on high translation speed. Interpretation speed is adequate for debugging purposes.

**Diagnostic Capabilities:** Because the Checkout Compiler is interpretive, it has the following features which assist the programmer in developing and debugging his programs:

- During translation, the compiler carries out extensive syntactic and semantic checks, and provides lucid diagnostic messages about the errors it discovers.
- Diagnostic messages are available in either a full or short form, selected by compiler option. The full-form messages are detailed and make the identification of errors very simple, thus minimizing the need to refer to supporting publications.
- During interpretation, the compiler acts as an execution monitor. This enables it to detect and report errors as they occur. Processing is not allowed to continue to the point where secondary errors may obscure the exact nature of the original problem. Detailed error information, such as the names and values of variables involved in an interrupt, is provided. Current statement number and procedure name are also given when an error is found.
- The Checkout Compiler detects illegal branching outside the bounds of the user's program and intercepts addressing of storage not belonging to the program.
- A user option allows the compiler to continue interpretation after attempted compiler fix-up, up to a specified maximum number of errors.
- Since the translation process retains the identity of each PL/I source statement, execution time errors can be pinpointed and reported in PL/I terms. Therefore, debugging can usually be completed at the source level without the need for storage dumps.

**Debugging Facilities:** In addition to the existing powerful debugging features of PL/I (e.g., the CHECK prefix option for program tracing and ON-units for interrupt handling), the Checkout Compiler implements new checking aids: The CHECK and NOCHECK statements allow tracing of identifiers to be turned on and off dynamically ... a continuous record of the last N (a compiler option) program branches is automatically saved; PUT FLOW causes this list to be printed ... FLOW and NOFLOW allow printing of branch points to be turned on and off dynamically ... PUT ALL provides a simple means of printing information on variables, files, ON-units ... PUT SNAP causes the printing of a backward calling trace.

The compiler also provides an option for maintaining and printing statement execution counts. This helps the programmer to detect redundant code, test all paths through his program and tune the performance of production programs.

**General Operation:** Program compilation is fast, due to the Checkout Compiler's very high translation rate and its low start-up overhead. Throughput is further improved by allowing single external procedure programs to be translated and immediately executed without link editing. This permits processing of multiple programs within a single job step or command.

Since all programs are executed under control of the Checkout Compiler, an error in one program will seldom affect the processing of subsequent programs included in the same job step. Furthermore, compiler options are available to limit the total number of statements executed and the total SYSPRINT output and, thus, help prevent runaway situations.

Procedures can also be saved for later link editing (or loading, if operating under CMS) and execution (under Checkout Compiler control) with modules produced by:

- The Checkout Compiler itself.
- The OS PL/I Optimizing Compiler.
- OS Assembler and FORTRAN and COBOL compilers using the Interlanguage Communications routines supplied as part of the Checkout and Optimizing Compilers.

**Batch Processing:** The Checkout Compiler operates under OS as a conventional batch processor to help debug programs quickly and thoroughly.

Batch operation can be made even more productive, with the option to continue interpretation after errors have been diagnosed and fixed-up. Thus several run-time errors may be diagnosed in a single turnaround.

**Conversational Processing:** The compiler operates under the OS Time Sharing Option (TSO), or the Conversational Monitor System (CMS) component of VM/370.

#### • Program Build and Translation

In conversational mode, the programmer ordinarily builds his program at the terminal, using the EDIT facility of TSO or CMS. The compiler can then be invoked from the terminal, and diagnostic messages will be printed there. Messages concerning errors detected during translation are issued as each phase of translation is completed. Compiler options provide flexibility in choosing whether processing is to continue or the programmer is to gain control when errors are found. If he gains control, then he can modify his source program and commence a fresh translation immediately, without waiting for output from a background compilation run.

The HALT option allows the user to gain control before the first execution of each external procedure. This allows breakpoints to be inserted in the program if desired.

#### • Interpretation

During interpretation, the programmer may interact with the executing program or with the Checkout Compiler itself. Information about the progress of interpretation may be delivered directly to the terminal, allowing the programmer to monitor program events as they occur. Interpretation may be interrupted by the programmer at any time. Execution errors which are encountered cause the Checkout Compiler to suspend interpretation and report the details of the problem to the terminal user.

The following facilities are available to the terminal user to stop the program and gain control during execution.

- The terminal interrupt key. This stops the program unless an ATTENTION ON-unit is active, in which case the programmer has specified the action to be taken.
- The STEP subcommand which causes interpretation to be suspended after execution of a specified number of statements.
- A HALT statement in the PL/I source program.
- Programmed breakpoints inserted using the AT and ABOVE subcommands.

The processor also stops during interpretation when it discovers an error.

**Corrective Action:** When interpretation is stopped, almost any PL/I statement may be executed immediately to display and alter the values of variables or to perform scratch pad calculations. These statements, known as immediate PL/I, can introduce new variables and labels in addition to performing operations on variables declared in the original source.

The programmer may also:

- Display active ON-units.
- Display information on the status of files.
- Obtain a flow trace.
- Invoke additional debugging aids.
- Resume interpretation at any point in the program.

Temporary source-level modifications may be made conversationally using the AT and ABOVE subcommands. Permanent corrections can be made to the source as well as to the code being interpreted, using the following 'Source Management' facilities:

- Syntax corrections made by the compiler can also be merged into the source.
- Current source is available for listing at the terminal at any time.
- Attributes of and references to variables are available on request during interpretation.
- Source can be located, rearranged, modified, verified and renumbered using a range of editing subcommands.
- TSO dataset and CMS file manipulation subcommands can be invoked without leaving the PL/I environment.
- Current source can be saved at any time.
- Retranslation is simplified - thus assisting the modification of declarations made in the original source.

**Language Level:** Because of language extensions and developments, the level of PL/I exceeds that supported by the OS PL/I (F) Compiler. New features include the ability to vary the default attributes of variables (DEFAULT), to FETCH and RELEASE procedures dynamically,

PROGRAM PRODUCTS

**OS PL/I Checkout Compiler R3 (cont'd)**

and the addition of FILE and ENTRY variables, and structured programming statements.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

For operation under MFT and MVT at least 100K bytes of main storage of an IBM S/360 or S/370 must be available. Both the compiler and user program use this area.

In a TSO environment, an additional 18-20K will be required in the user's region. Main storage in excess of the basic requirement will be used to reduce I/O activity and hence, to improve performance.

To operate under VS1 and VS2 the compiler requires a minimum virtual partition or region of 128K.

Standard decimal and floating point instructions are mandatory. The extended floating point instruction set will be simulated by the Operating System (if not present on the machine) if extended floating point precision is explicitly used in the program. Programs in execution are able to use any of the devices supported by the access method being used (BSAM, QSAM, BISAM, QISAM, VSAM, BDAM or TCAM). The IBM 3330 and 2305 are supported; however, when accessing its workfiles, the Checkout Compiler will not make use of the multiple request and Rotational Position Sensing features. The IBM 3211 Printer is supported, and the IBM 3505 and 3525 special features are fully supported when specified via JCL.

The compiler together with its associated data sets occupies approximately 250 tracks of IBM 3330 or equivalent of direct access storage space.

A suitable terminal to be used to interact with the Checkout/Optimizing Compilers is an IBM 2741. If this terminal is used, the most suitable keyboard configuration is PTTC/EBCD with either the #9571 or the #9591 print element. The TSO Message Control Program must be suitably set up to accept the character codes from this terminal. Other keyboards can be used but may not be as convenient as the above.

Suitable display terminals are the IBM 3275 mdl 2 and 3277 mdl 2 Display Stations. With these terminals, the most suitable keyboard is the 78 EBCDIC Typewriter Keyboard #4633.

**Minimum System Configuration - CMS:** To operate the compiler under CMS, the minimum CMS virtual machine size of 320K bytes is required.

When executing a PL/I program under CMS, the same processor features are required as are used when executing under the IBM Operating System. Under CMS, the PL/I Checkout Compiler and Transient Library support those I/O devices which are supported under the IBM Operating System provided they are supported by VM/370. For a list of the devices supported by VM/370, see the *IBM Virtual Machine Facility/370 Planning and Generation Guide* (GC20-1801).

**SOFTWARE REQUIREMENTS**

The compiler is designed to operate under currently supported releases of the IBM Operating System and under all subsequent releases, versions and modifications - including VS1 and VS2 - unless otherwise stated in a revision of the Specifications. The Time Sharing Option (TSO) of the Operating System is required for conversational mode.

The compiler also operates (from compiler Release 2.1) in conversational mode under Release 2 and all subsequent releases of the Conversational Monitor System (CMS) component of the Virtual Machine Facility/370 (VM/370).

**Under IBM Operating System:** The minimum data management access methods required by the compiler are BSAM and QSAM. If compile-time preprocessing is specified, or if translated text is to be link-edited, BPAM will also be required. Programs using INDEXED or VSAM files require ISAM or VSAM and those using REGIONAL files require BDAM. Programs using TRANSIENT files require TCAM. ASCII data sets can be created and accessed using QSAM.

During interpretation under OS, ASCII data sets can be created or accessed provided they are on magnetic tape with format U, F, FB, D or DB records. These data sets will be supported by STREAM files and by RECORD SEQUENTIAL BUFFERED files using the CONSECUTIVE environment option. Records in these files may contain CHARACTER data only.

**Under CMS**

The following language cannot be executed under CMS:

- Teleprocessing file support.
- INDEXED file support.
- PL/I SORT facilities.
- PL/I Checkpoint/Restart facilities.
- ASCII data sets.
- BACKWARDS attribute with magnetic tapes.

- PL/I FETCH and RELEASE statements.
- VS and VBS record formats.

In addition, the object code of programs compiled under CMS cannot be transferred to OS, or vice versa. (The Optimizing Compiler may be used to create object code which is transferrable between the operating systems.)

For additional information about the restrictions under CMS, refer to the publication *OS PL/I Checkout Compiler General Information Manual* (GC33-0003).

**COMPATIBILITY**

**Compatibility with PL/I (F) (360S-NL-511):** With the exception of sterling pictures and constants, the language implemented by the Checkout Compiler includes all of the language implemented by PL/I (F). Programs written for the F Compiler can, therefore, be processed by the Checkout Compiler. However, there are a few minor implementation differences and language changes which are detailed in the *Checkout Compiler General Information Manual*. Most are beyond the range of normal program usage. Object modules that have been compiled by the PL/I (F) Compiler, and modules from the PL/I (F) Compiler Subroutine Library, cannot be incorporated into programs compiled by the PL/I Checkout Compiler. Such programs should be recompiled with the Checkout Compiler.

**Compatibility with the PL/I Optimizing Compiler (5734-PL1):** With the exception of the special purpose language features listed below, there is full source language compatibility between the Checkout Compiler and the OS PL/I Optimizing Compiler. The Checkout Compiler implements language features associated with its debugging facilities which the Optimizing Compiler does not share. The Optimizing Compiler implements PL/I optimization features which the Checkout Compiler does not. Each compiler checks the syntax of the statements that are implemented only by the other, but otherwise ignores them.

Modules of translated text from the Checkout Compiler and object modules from the Optimizing Compiler can be combined (by link-edit or CMS load), to run together under control of the Checkout Compiler. The following language features are implemented under the PL/I Checkout Compiler but not the PL/I Optimizing Compiler.

- PUT SNAP
- PUT FLOW
- PUT ALL ('option')
- HALT
- FLOW, NOFLOW
- CHECK, NOCHECK (as language statements; does not apply to the CHECK condition prefix)

In addition, subcommands recognized during conversational use of the PL/I Checkout Compiler under TSO and CMS would not be accepted by the PL/I Optimizing Compiler.

The checkout compiler can interpret multitasking statements under CMS, but multitasking statements compiled by the OS PL/I Optimizing Compiler cannot be executed under CMS.

The following language features are implemented under the PL/I Optimizing Compiler but not by the Checkout Compiler.

- ORDER, REORDER
- TOTAL

**Compatibility with the DOS PL/I Optimizing Compiler (5736-PL1):** There are significant differences between the PL/I language implemented by the PL/I Checkout Compiler and that implemented by the DOS PL/I Optimizing Compiler. If the Checkout Compiler is used to develop programs for subsequent compilation by the DOS Optimizer (e.g., if the Checker is used under CMS under VM, and the DOS Optimizer is used under DOS under VM), care should be taken to ensure that PL/I Language features used are supported by both compilers.

As an aid to users, a list of the principal differences between the levels of PL/I Language supported by the two compilers is given below. (Note: The list is intended as a guide only, and is not guaranteed to define all possible differences.) Users are recommended to refer to the following two publications:

- OS PL/I Checkout and Optimizing Compilers: Language Reference Manual* (GC33-0009)
- DOS PL/I Optimizing Compiler: Language Reference Manual* (GC33-0005)

Principal differences between the PL/I Language levels supported by the PL/I Checkout Compiler and the DOS PL/I Optimizing Compiler.

**a. Input/Output**

Control of program input/output is the area of language where most differences between the two compilers exists. In general a DOS program must contain much more information about the dataset associated with a file than is required in an OS program, and there

### OS PL/I Checkout Compiler R3 (cont'd)

are important differences in the options of the ENVIRONMENT attribute of files. Particular differences are:

The following OS ENVIRONMENT options are not recognized under DOS:

NCP, REGIONAL (2), REREAD, TOTAL, TP, TRKOFL

The following DOS ENVIRONMENT options are not recognized under OS (although many of them can be specified in JCL):

ASSOCIATE, CMDCHN, COLBIN, EXTENTNUMBER, FILESEC, FUNCTION, HIGHINDEX, INDEXMULTIPLE, MEDIUM, NOFEED, NOLABEL, NOTAPEMK, OFLTRACKS, OMR, RCE, STACKER, UNLOAD, VERIFY, VOLSEQ, WRTPROT.

There are no EXCLUSIVE files under DOS (so no NOLOCK option and UNLOCK statement).

There are no TRANSIENT files under DOS (so no PENDING condition).

Under DOS, the only options that can be specified in an OPEN statement are: INPUT, OUTPUT, PAGESIZE, LINESIZE and TITLE. INPUT and OUTPUT can only appear if the file is declared CONSECUTIVE UNBUFFERED. TITLE cannot be specified for a CONSECUTIVE UNBUFFERED file, a file associated with a magnetic tape, or for a file with a unit record device specified explicitly in the MEDIUM option.

Under DOS, V-format records are not allowed on a REGIONAL (3) file.

Input (primary and included) to the DOS PL/I Optimizing Compiler must be 80-byte fixed length records. The PL/I Checkout Compiler accepts F and U-format records with lengths up to 100 bytes, and V-format records up to 104 bytes.

#### b. Compiler Options

The following options usable with the PL/I CHECKOUT Compiler are not supported by the DOS PL/I Optimizing Compiler:

BLOCK, CAPS/ASIS, COMPATIBLE, DIAGNOSE, ERRORS, FORMAT, HALT, ISASIZE, LMESSAGE/SMESSAGE, NUMBER, OBJECT, RUN, SEQUENCE, SMAN, STEP, STEPLINES, STMT, TERMINAL and VERIFY.

The following options usable with the DOS PL/I Optimizing Compiler are not supported by the PL/I Checkout Compiler:

DECK, DYNBUF, GOSTMT, INCLUDE, LINK, LIST, LIM-SCONV, MAP, OFFSET, OPTIMIZE and WORKFILE.

LINK on DOS is equivalent to OBJECT on OS.

#### c. Other Features

Features available under OS but not under DOS include: Multitasking ... FETCH and RELEASE ... Extended floating point.

In addition:

Under DOS, the library name for included text must consist of one character.

Certain statements that can be processed by the PL/I Checkout Compiler, and can be accepted but not processed by the OS PL/I Optimizing Compiler, will be treated as errors by the DOS PL/I Optimizing Compiler. (For differences between the OS Optimizing and Checkout Compilers [including Checker-only statements] see Appendix L of the OS PL/I Optimizing and Checkout Compilers: Language Reference Manual (GC33-0009).

**Compatibility Between Releases:** Correct execution is not guaranteed where modules translated by Release 1 of the PL/I Checkout Compiler are interpreted by Release 2 or Release 3. Thus, mixtures of Release 1, 2 and 3 modules are not supported. For Release 2.0 and subsequent releases the normal compatibility rules apply; e.g., Release 2.0-compiled modules may be interpreted on Release 2.1, 2.2 or 3.0 of the compiler and transient library.

#### PERFORMANCE

The primary design objective of the compiler is to improve programmer productivity by providing fast program translation and highly comprehensive checkout and debugging facilities. The implementation of these features is made possible by the interpretive nature of the processor. Design emphasis has been placed on extensive object time checking and control rather than execution speed. Although object time performance will be significantly slower than that of conventional compilers, it should be entirely adequate for program checkout.

The following statement of PL/I Checkout Compiler Release 2 capabilities is based on actual measurements made on a S/370 mdl 155 using 3330 direct access devices. Note that the measurements were made in 'batch' mode, without the internal source file; i.e., using the NOSMAN option.

**Compiler Performance Under MFT and MVT:** This compiler will operate at roughly the following speeds PROVIDED IT IS GIVEN AMPLE PROVISION OF MAIN STORAGE (see notes below).

Processor time for translation:

(1 + number of statements translated) / 45 seconds

Processor time for execution:

(1 + number of statements executed) / 1200 seconds

The effect of the SMAN option, applicable where programs are to be conversationally debugged under TSO, is that the compiler requires on average 15% more time to translate a given program. If there is significant contention for main storage between compiler phases and the program being translated with the SMAN option, up to 10K more storage may be needed to achieve this performance, since the SMAN option increases the size of the internal compiler files. The SMAN option has a negligible effect on the time required for execution.

Note that in general execution and (to a much lesser extent) translation performance of the Checkout Compiler is strongly influenced by the amount of main storage available.

Elapsed time for execution will be between four and ten times longer than that for executing the same program compiled by Version 5 of the PL/I (F) Compiler at OPT=0.

Execution times for certain individual programs may vary widely from these estimates.

**Storage Requirements under MFT and MVT:** Storage requirements depend on the size of the program. Small programs can be translated in 100K bytes. On the other hand, a program with a large number of identifiers might require more than 150K.

For execution, a small program using only a small amount of data might run effectively in 100K, while a more complicated program with larger data or I/O buffer requirements might require more than 150K.

The speed of operation of the compiler will be improved if more than the minimum storage is provided.

**Storage Requirements under VS1 and VS2:** VS1 and VS2 allow partitions/regions to be defined as multiples of 64K bytes; hence, the minimum partition/region size required by the Checkout Compiler is 128K. The virtual storage required by a particular program is variable in the same way as discussed for the MFT/MVT case. However, larger virtual partitions/regions will, in general, enhance performance provided there is sufficient real memory available such that excessive paging activity does not occur.

**Storage Requirements under CMS:** The minimum CMS virtual machine size of 320K bytes may be used. This is sufficient for most PL/I programs, but large programs might require a larger virtual machine.

**Prerequisite:** A subroutine library is required during interpretation of a translated program. The library is available as an IBM program product, the OS PL/I Transient Library (5734-LM5). Note: A single copy of this library can be used with both the OS PL/I Checkout and Optimizing Compilers.

**DOCUMENTATION:** (available from Mechanicsburg)

OS: PL/I Transient Library Specifications (GC33-0024) ... OS: PL/I Checkout Compiler Specifications (GC33-0030) ... OS: PL/I Checkout Compiler General Information Manual (GC33-0003) .

**Conversational Monitor System (CMS) Feature**

5734-PL2 Feature: 5013, 5014, 5015, 5016.

OS PL/I Checkout Compiler is a prerequisite for ordering this program feature.





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Jul 83

PROGRAM PRODUCTS

**OS PL/I OPTIMIZING COMPILER & LIBRARIES  
5734-PL3**

This package provides one ordering number for the following program products on one tape:

Compiler	5734-PL1
Resident Library	5734-LM4
Transient Library	5734-LM5

**DOCUMENTATION:** (available from Mechanicsburg)

*OS PL/I Optimizing Compiler Language Reference (GC33-0009) ... OS  
PL/I Optimizing Compiler General Information Manual (GC33-0001)  
... Specifications (GC33-0022).*



PROGRAM PRODUCTS

**VIDEO/370  
DOS (5736-RC3)  
OS (5734-RC5)**

**DESCRIPTION**

VIDEO/370, IBM's Visual Data Entry Online System which runs on S/360 or S/370 is an online data entry program product for both transcriptive and distributive means of collection and verification of source data. It performs most of the functions of the 29 Card Punch, 59 Verifier, 129 Card Data Recorder, 50 Magnetic Data Inscrber 50 and DATA/360-2260 functions with cost reduction facilities made possible by an online local or remote 3270 System and computer program logic. VIDEO/370 is of most significance to customers who are using keypunches, key-to-tape or off-line key clusters to disk, and to those who have a requirement for source data entry.

DOS/VIDEO/370 is a key entry system which operates under the Disk Operating System (DOS) and DOS/VS. OS/VIDEO/370 is a key entry system which operates under the Operating System (OS), MVT, VS1 and VS2. This program provides a method of entering source data online by local or remote 3270 System terminals to disk file(s), and paging, correcting and verifying this data to produce input to a customer's program eliminating all unit record operations. VIDEO/370 supports any number of displays within processor storage limits, addressing limits and response limits of the processor (see "Hardware Requirements"), operating system limits, and 2311, 2314, 2319, 3330/3333, 3340 or 3350 direct access storage limits.

The CICS feature of DOS/VIDEO/370 enables the online portion of the product to run as an application program under the control of CICS/DOS-Standard (5736-XX7) and CICS/DOS/VS (5746-XX3). The CICS feature of OS/VIDEO/370 enables the online portion of the product to run as an application program under the control of CICS/OS-Standard V2 (5734-XX7) and CICS/OS/VS (5740-XX1).

**HIGHLIGHTS**

- Provides for data validation and error correction at the source.
- Maximum number of 3270 control units and terminals - limited by system's size and response time.
- Supports local and remote 3270 displays.
- Generalized design is application independent; the size and function of DOS/VIDEO/370 is tailorable to a particular installation's requirement.
- Functionally duplicates most of the 029, 059, 050, 129 and DATA/360 functions plus additional features.
- Increases system throughput.
- Improved turnaround time.
- Improves management control of key entry.
- Improves keystroke rate.
- Application dependent data formatting and prompting.
- Permits use of fill-in-the-blanks concept without increasing operator keystrokes.
- Requires no change to existing entry documents; entered records can be re-arranged by field under format control.
- Error fields are intensified for easy recognition.
- Each display station can optionally enter or verify data.
- Input data length is restricted only by screen size and VIDEO/370 control information.
- Format control on any number of fields (within display screen limit).
- Record lists of unresolved entry-verify errors maintained for fast access when correcting.
- Format change possible by use of program function key.
- Operator, format and production statistics.
- On output, fixed or variable length application records may be created.
- User exits in edit and extract operations to provide customized operation.
- Delete, Insert and Update record facility during entry, paging or verification.
- Simultaneous data entry and extraction (of different batches) to an application program.
- Keyboard upper shift under programmed format control.
- Paging of records by variable increments.
- Unlimited number of formats per batch.
- Multiple entry sets for flexibility and reliability.
- Extensive editing capability.
- Balance Totals - A summation for checking purposes of one or more designated fields of a batch.
- Ability to mark records in error for subsequent easy access and correction.
- Crossfooting - Addition of any number of numeric fields within a record for balancing or checking.
- Flexible security features.
- Message transmission from 3270 operator to system operator.
- Ability to tab from field to field both during normal entry and error correction procedures.
- Terminal flexibility when the CICS feature is used.
- Use of CICS Teleprocessing and File I/O facilities.

**Use:** The user of DOS/VIDEO/370 (OS/VIDEO) has the capability of entering data for typical applications that will run in a DOS (OS) environment. The data or source characters may be entered directly if they are contained within the standard 3270 system character set. A

capability is provided to allow the entry of characters not within this 64-character set through hexadecimal characters.

**CUSTOMER RESPONSIBILITIES**

A customer installing VIDEO/370 must meet the minimum machine configuration. He must also assure that appropriate DOS or OS training (including terminal and direct access storage education) be given to the systems analysts responsible for the installation of VIDEO/370. The customer must ensure that appropriate training is given the terminal operator in the use of VIDEO/370 commands and procedures. The customer must define the disk file allocation, terminal network and specify VIDEO/370 options desired.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS - DOS**

VIDEO/370 operates under the Disk Operating System (DOS), DOS/VS, and DOS/VSE using BTAM (supporting 3270), DAM and SAM with: One IBM 3115 Processing Unit mdl FE or ... one IBM 2030 Processing Unit mdl F with the decimal arithmetic feature (#2327) and the interval timer feature (#4760) ... one Direct Access Storage Unit (IBM 2311, 2314, 2319, 3330, 3340 or 3350) ... one Line Printer (or equivalent) ... a selector channel, byte multiplexer channel or a block multiplexer channel

The minimum data communications configuration consists of one display device, a device controller and, for remote operation, a transmission controller.

Display Device: IBM 3277 (mdl 1 or 2), IBM 3278 (mdl 1, 2, 3 or 4) or the displays integrated in the IBM 3276 or 3275.

Device controller: IBM 3271 or 3275 (mdl 1 or 2), IBM 3274 (Model 1C or 1B) or the IBM 3276 (mdl 1, 2, 3 or 4).

Transmission controller: IBM 2701, 2703, 3704, 3705 or equivalent Integrated Communications Adapter configured for binary synchronous communication.

The IBM 3278 and integral display of the IBM 3276 are supported in 480 or 1920 character mode only.

**HARDWARE REQUIREMENTS - OS**

VIDEO/370 operates under the Operating System (OS) MFT, MVT, VS1, VS2, using BTAM supporting 3270, BDAM and BSAM with: one IBM 3135 Processing Unit mdl GD or ... one IBM 2040 Processing Unit mdl G with the decimal arithmetic feature (#3237) ... one Disk Storage Unit ... one Line Printer (or equivalent) ... a selector channel, byte multiplexer channel or a block multiplexer channel.

The minimum data communications configuration consists of one display device, a device controller and, for remote operation, a transmission controller.

Display Device: IBM 3277 (mdl 1 or 2), IBM 3278 (mdl 1, 2, 3 or 4), or the displays integrated in the IBM 3276 or 3275.

Device controller: IBM 3271 or 3275 (mdls 1 or 2), IBM 3274 (mdl 1C or 1B) or the IBM 3276 (mdl 1, 2, 3, or 4).

Transmission controller: IBM 2701, 2703, 3704, 3705 or equivalent Integrated Communications Adapter configured for binary synchronous communication.

The IBM 3278 and integral display of the IBM 3276 are supported in 480 or 1920 character mode only.

In addition, the following devices are required to install and maintain either system: one Card Read/Punch ... one 9-Track Tape Drive.

For the CICS feature, the processing unit requirements of CICS must be met.

**DOCUMENTATION:** (available from Mechanicsburg)

*Specifications* (OS GC27-6967, DOS GC27-6969) ... *Introduction to the IBM 3270 Information Display System* (GA27-2739) ... *Operator's Guide for IBM 3270 Information Display System* (GA27-2742).

**VIDEO/370 CICS FEATURE**

5736-RC3 ... Feature: #6038, 6039, 6040.  
5734-RC5 ... Feature: #6085, 6086, 6087.

VIDEO/370 is a prerequisite for ordering this program feature.



**PROGRAM PRODUCTS**
**OS SORT/MERGE  
5734-SM1**
**PURPOSE**

The OS Sort/Merge (5734-SM1) satisfies the sorting and merging requirements of both tape-oriented and disk-oriented installations. The program will use different sorting and merging techniques depending on:

- The control information supplied by the user.
- The amount of main storage and secondary storage which is available to the program.

**DESCRIPTION**
**Basic Features**

- Sorting or merging can be accomplished on as many as 64 control data fields.
- The collating sequence as well as the data format can be specified separately for each control field.
- Device independent initial input and final output.
- With sufficient main or virtual storage, as many as 32 tape units or 17 work areas on either 3330/3333 or 2314 or 6 work areas on either 2301 or 2311 may be used for intermediate storage, as well as multiple input and output devices.
- Callable through COBOL, Assembler language and PL/I.
- All functions, facilities and options available in Type I 360S-SM-023 have been incorporated into the 5734-SM1 program product. There are no requirements for modifications to user written routines.

**Features**

- Support of 3330/3333 ... Extended Use of Exits ... Allows the use of all User Exits when sort is dynamically invoked ... Concatenation of SORTIN.
- The input data sets can be concatenated even if they reside on 'unlike' devices.

**Modified CORE-parameter** - In MFT and MVT, OS Sort/Merge OS-SM1 will use all available core if the user specifies MAX as the CORE-parameter value. This saves the user from recalculating the amount of core needed on different installations or in different regions or partitions.

- In VS1 and VS2, an appropriate nominal value of the CORE-parameter should be used. Maximum should not be used as a value.

**Expanded Parameter List E61** - The parameter list passed to E61 previously contained only the number and the address of the extracted control field. It now also contains the length of the control field.

**Expanded Standard for User Exit Names** - A user library may contain several exit routines having unique names which may connect to the same exit point. In 360S-SM-023 all routines pointing at the same exit point had to have the same name as the exit point, even if they were not to be link-edited.

**Checkpoints in Merge** - Checkpoint/Restart is supported in Merge applications at End of Volume on SORTOUT.

**Print Control Statement** - The user will now have an option of printing his Sort/Merge control statements.

**ASCII Formatted Files** - It will be possible to read and write ASCII files and sort in ASCII Collating Sequence.

**Note:** 5734-SM1 or equivalent is a prerequisite for sorting on OS with the 3330/3333. 360S-SM-023 does not support the 3330.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

For MFT and MVT, an OS system allowing a minimum of 15.5K bytes of main storage for the OS Sort/Merge program (inclusive of minimum data management). For VS1 and VS2, a minimum virtual partition of 64K bytes is required.

In addition to the standard system residence, the Sort/Merge requires at least one device for input/output and three intermediate storage areas on one of the following IBM devices:

- One 2311 Disk Storage Drive.
- One 2301 Drum Storage Drive.
- One drive of 3330/3333 Disk Storage.
- One drive of 2314 DASD.
- Three 2400/3400 series Magnetic Tape Units.

For planning purposes, the *IBM S/360 OS Sort/Merge Systems Information Manual* may be used to calculate disk storage requirements.

Any device supported by QSAM can be used as an input or output device.

The following table shows the tape configuration requirements:

Record Format	Input	Work	Object
Fixed or Variable	9-track	9-track	9-track
Fixed	7-track	7- or 9-track or mixed	7- or 9-track or mixed
Variable	7-track	9-track	7- or 9-track

**Note:** Distribution of OS-SM1 is on tape; therefore, access to at least one 2400 series Magnetic Tape Unit is required for installation.

**SOFTWARE REQUIREMENTS**

OS-SM1 is written in Assembler language and operates under the current OS/360 MVT, MFT or PCP systems.

**DOCUMENTATION:** (available from Mechanicsburg)

*Timing Estimates* (GC33-4008) ... *General Information Manual* (GC28-6754) ... *Specifications* (GC33-4006).



## PROGRAM PRODUCTS

**TSO DATA UTILITIES: COPY, FORMAT, LIST, MERGE  
5734-UT1****PURPOSE**

The OS TSO Data Utilities consists of the following terminal commands:

COPY  
FORMAT  
LIST  
MERGE

This program provides OS Time Sharing Option users with the capabilities of copying, merging and controlled-format printing. The Data Utility commands are easy to use and are functionally complete. The design is consistent with the intent of TSO in that it addresses the professional programmer to the individual with no computer experience.

The Data Utility command processing programs provide full support of the TSO requirements and features. OS password protection is supported by the Data Utilities. The data set organizations supported are sequential and partitioned.

The FORMAT and MERGE commands also serve as EDIT subcommands. When invoked as subcommands, the FORMAT and MERGE operations are oriented specifically toward the data sets being processed by the EDIT command.

The HELP command provides assistance for the inexperienced user.

**HIGHLIGHTS****COPY**

- Duplicates sequential or partitioned data sets.
- Adds members to a partitioned data set.
- Merges two partitioned data sets.
- Resequences records as they are copied.
- Changes record length, blocksize and record format on a copy to a physical sequential data set. On a copy to a partitioned data set, the above attributes become those of the partitioned data set.

**MERGE**

- Copies all or part of a data set. into a specified part of another data set.
- Resequences the resultant data set or members of a partitioned data set.

**LIST**

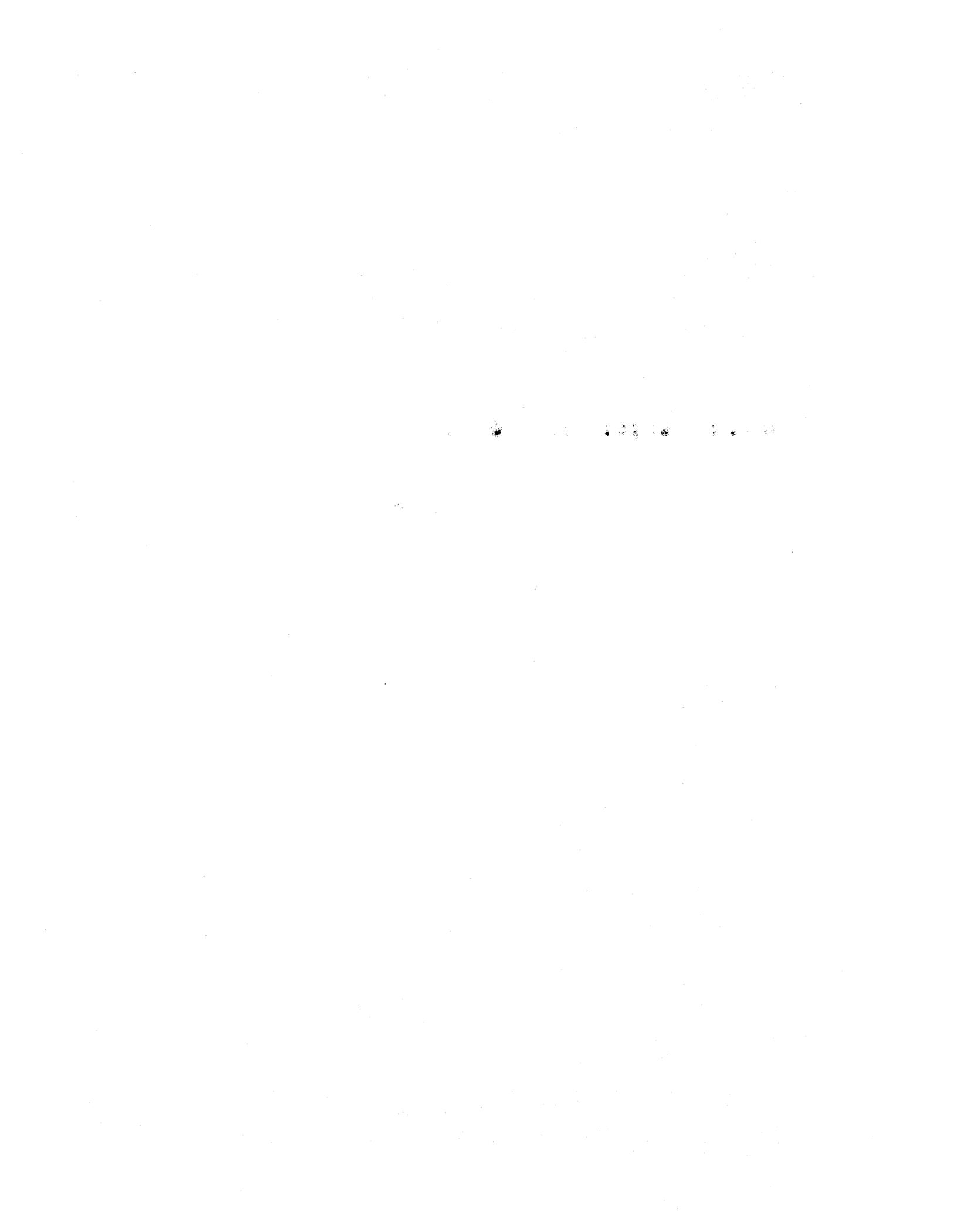
- Prints all or selected records of physical sequential data sets or members of partitioned data sets.
- Optionally prints specified columns of records.

**FORMAT**

- Prints data sets in a format determined by embedded control words.
- The control words enable the following capabilities:
  - Prints a heading on each page.
  - Centers lines between the margins.
  - Specifies the number of spaces in the top and bottom margins.
  - Causes right justification of lines.
  - Page numbering.
  - Stops printing.
  - Reprints pages.
  - Single and double line spacing.
  - Space insertion at the beginning of each line.
  - Line length variation.
  - Page length variation.
  - Paragraph indentation control.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Operation of the TSO Data Utilities under TSO requires the minimum TSO configuration.



## PROGRAM PRODUCTS

**STAT/BASIC  
5734-XA3****PURPOSE**

STAT/BASIC is an interactive program encompassing the most commonly used statistical techniques for the analysis of numerical data. It operates under ITF (DOS, OS, or TSO) or VS BASIC with VSPC, VM/370 CMS, or TSO.

STAT/BASIC is designed to meet the needs of the statistician, engineer, researcher or business analyst. It helps him to utilize the computer directly for statistical analyses. A statistically oriented user should have no difficulty in quickly learning the capabilities of the program. The interactive mode of the package allows a non data processing oriented user to use the program with ease, with a minimum of training.

Operation provides the user with fast results. Because of the interactive nature the user can sit at the keyboard and see the results of his analysis as they are developed. Delays and some of the sources of error familiar in batch processing are eliminated with STAT/BASIC.

**DESCRIPTION**

STAT/BASIC consists of 40 procedures, written in the BASIC language, providing a wide range of capabilities under the following categories --

Data Generation -- Read... Print... Edit ... Transformation.  
Elementary Statistics -- Cross Tabulation ... Histogram ... Tally ... Moments ... T-test ... Chi-square.  
Regression and Correlation Analysis -- Correlation ... Simple Regression ... Stepwise Regression ... Multiple Regression ... Polynomial Regression.  
Multivariate Analysis -- Discriminant Analysis ... Canonical Correlation ... Factor Analysis Part 1 ... Factor Analysis Part 2.  
Analysis of Variance -- One-way Analysis of Variance ... Factorial Design.  
Nonparametric Statistics -- Kendall Rank Correlation ... Sign Test ... Wilcoxon's Matched-pairs Signed-ranks Test ... Cochran Q Test ... Friedman Two-way Analysis of Variance ... Mann-Whitney U Test ... Kendall Coefficient of Concordance ... Biserial Correlation ... Point-biserial Correlation ... Tetrachoric Correlation ... Phi Coefficient.  
Time Series Analysis -- Moving Average ... Seasonal Analysis ... Cyclical Analysis ... Auto-covariance and Auto-correlation ... Cross-covariance and Cross-correlation ... Triple Exponential Smoothing.  
Biostatistics ---Survival Rate ... Probit Analysis.

**HIGHLIGHTS**

- A comprehensive set of statistical procedures.
- A user with a knowledge of statistics can learn the program capabilities with a minimum of effort.
- Interactive mode simplifies usage.
- Calculations performed in short or long precision.
- Extensive error checking with correction facilities.
- Instructional messages clarify procedures or options available.

**USE**

The user may utilize any of the STAT/BASIC programs through any terminal supported by the host interactive environment. The user first types a few systems commands and the name of the desired statistical program. Following a Ready indication, STAT/BASIC guides the user through his problem by typing out procedural instructions. Alternate courses of action or options are usually in the form of questions, which the user answers by typing the appropriate replies.

**CUSTOMER RESPONSIBILITIES**

The STAT/BASIC programs are distributed in machine readable form for loading into the user system. Once stored, it is available to any member of the organization authorized to use the system.

If confidential information is to be stored in the library, the user must take appropriate steps to safeguard against unauthorized access.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The size of the user area required to run the STAT/BASIC procedures is a function of the number of statements in an individual procedure and the amount of data processed in short and long precision.

All procedures, with the exception of the transformation procedure, can be executed in short precision in a user area of 40,000 bytes with a symbol table size of 9000 bytes.

All procedures, with the exception of the transformation procedure, can be executed in long precision in a user area of 50,000 bytes with a symbol table size of 16,300 bytes. The transformation procedure cannot be executed in long precision; it can be executed in short precision in a user area of 50,000 bytes with a symbol table size of 10,800 bytes.

**SOFTWARE REQUIREMENTS**

STAT/BASIC is written in the BASIC language. It may be used with VS BASIC (5748-XX1) or ITF BASIC (OS: 5734-RC3; DOS: 5736-RC2; or TSO: 5734-RC4).

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual* (GH20-1027) ... *Promotional Flyer* (G520-2463).



## PROGRAM PRODUCTS

**APPLICATION PROGRAM GENERATOR  
OS - 5734-XC3; DOS - 5736-XC3****PURPOSE**

The System/7 Application Program Generator (APG/7) offers high-level program support for many different sensor-based applications found in the plant automation, process control, and data-acquisition applications. APG/7 reduces the programming effort required to install and maintain such applications. It allows the customer or IBM systems engineer to focus attention on application design, rather than machine-oriented programming details.

**DESCRIPTION**

APG/7 is made up of three major components: 'fill-in-the-blanks' facilities, a high-level language compiler, and a series of System/7 subroutines. The first two execute on a S/360 or S/370; the third consists of subroutines that execute on System/7, and are used to implement functions invoked by 'fill-in-the-blanks' specifications, or by language statements.

The 'fill-in-the-blanks' facilities provide question forms that guide the user in the selection and specification of programs from the library of Modular Systems Programs (MSP/7) or from the Application Module Library (5707-LM1).

The APG/7 compiler provides the user a means for specification of operations that are more conveniently handled by language statements, rather than by specification of tables for library subroutines. The language contains a compatible subset of PL/I. The APG/7 language may be used to READ/WRITE files from/to a remote computing system, using the System/7 Binary Synchronous Communications Adapter (BSCA). Transmission of data to/from the remote computer will be in EBCDIC transparency mode in fixed record length.

The remote computing system may be an S/370, mdl 115 through mdl 195, an System/3, mdl 10 or mdl 15 Disk or another System/7 with the BSCA feature.

The APG/7 language contains special features oriented to System/7 applications. These features are peculiar to APG/7; they are not part of PL/I.

**HIGHLIGHTS**

- 'Fill-in-the-blanks' forms - guide users as they select and tailors library programs to be used, describes their data tables, and specifies the hardware configuration.
- Host file maintenance - S/360-S/370 host data files can be updated to reflect alterations to the System/7 program and data.
- Report generation - data from S/360-S/370 host files can be printed according to user-defined formats.
- Language compiler - provides users with high level method of describing their operating procedures using terminology familiar to them. The language contains a compatible subset of PL/I.

**Applications:** APG/7 is designed for cross-industry use in realtime sensor-based applications found in the plant automation, process control, and data acquisition applications.

The APG/7 language addresses a broad spectrum of sensor-based applications including manufacture, movement, test, and batch sequence control.

**Use:** To create a program for execution in System/7, the user answers questions about the application on 'fill-in-the-blanks' forms. These answers select and tailor the operating system facilities required from the MSP/7 library. If AML/7 is used, answers are also provided for the application data tables and facilities. Application operations are then described using the APG/7 procedural language. (Alternatively, subroutines may be written using the macro assembler language.) APG/7, working with the MSP/7 Host Program Preparation Facilities II, converts this information into a System/7 storage load module. The MSP/7 facilities are also used to format the storage load for transfer to the System/7 for execution.

Maintenance of such application programs is eased, since APG/7 provides facilities to generate reports that completely document the selections and the data provided on the forms. Additions to the APG/7 files can easily extend the use of the tailoring and documenting facilities to application subroutines that the user may personally write.

**CUSTOMER RESPONSIBILITIES**

- Create specification information for the application and complete the 'fill-in-the-blanks' forms for input to APG/7.
- Supply all program libraries necessary to the implementation of the application. This includes program products such as AML/7 if required.
- Provide, if necessary, appropriate application routines using the APG/7 procedural language.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

**System Configuration for OS, OS/VS1, or OS/VS2:** APG/7 requires a partition or region size of approximately 80K bytes. APG/7 requires storage space on a disk file for programs and files. The OS version uses approximately 418 tracks of an IBM 2316 Disk Pack or equivalent 3336 or 3348 Disk Pack Space. The sizes of some files are specified by the customer and may be smaller than the standard values. The use of tapes or cards for backup files can further reduce requirements.

**System Configuration for DOS or DOS/VS:** APG/7 requires a partition size of approximately 52K bytes. APG/7 requires storage space on a disk file for programs and files. The DOS version uses approximately 685 tracks of an IBM 2316 Disk Pack or equivalent 3336 or 3348 Disk Pack Space. The sizes of some files are specified by the customer and may be smaller than the standard values. The use of tapes or cards for backup files can further reduce requirements.

An APG/7 application program including only MSP/7 routines and not using the APG/7 language, the IBM 5022 Disk Storage Module, the IBM 3340 Disk Storage Module, an IBM 2790 Data Communication System, the BSCA support, or the Sequential Access Method requires a minimum System/7 configuration of 4K words of storage (an IBM 5010 Processor Module mdl A4 or B4) and an IBM 5028 Operator Station. Normally, at least a mdl A6 or B6 (6K words) is required if the APG/7 language is used. If other programs are included, such as AML/7 or PCP/7, the appropriate amount of storage must be added to the requirement.

The System/7 Processor mdls E16-E64 (16K words to 64K words) are supported.

**SOFTWARE REQUIREMENTS**

The portions of APG/7 that execute on the IBM S/360 or S/370 are written in macro assembler language. APG/7 operates under Release 26 and Release 27 of the Disk Operating System (DOS), and under Release 29 (DOS/VS), using the SAM and DAM access methods. When operating under the Operating System (OS), access methods used are QSAM, BSAM, and BDAM. APG/7 also operates under OS/VS1, and OS/VS2, in Real or Virtual Mode.

When using the IBM System/7 BSCA feature to communicate to a remote computing system, the remote system must use Teleprocessing access methods as follows:

For IBM S/370:

- DOS, DOS/VS - BTAM
- OS, OS/VS1, OS/VS2 - BTAM or TCAM
- DOS/VS, OS/VS1, OS/VS2 - VTAM

Refer to System/7 Facilities II Macro Library/Relocatable for System/7 specifications.

For IBM System/3:

- System/3 MLMP

For IBM System/7:

- MSP/7 Communications Access Method

The IBM System/7 subroutines are written in the System/7 macro assembler language. The Modular Systems Program (MSP/7), ASM/7 and LINK/7 are used in support of APG/7.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual* (GH20-1162).

**TERMS and CONDITIONS:** See PP Index



## PROGRAM PRODUCTS

**BUSINESS ANALYSIS/BASIC  
5734-XMB****PURPOSE**

This comprehensive set of interactive routines is used with VS BASIC under VSPC, VM/370 CMS, or TSO and with ITF under OS, DOS or TSO.

It consists of 30 routines written in the BASIC language, providing the problem-solver professional with procedures for data generation and maintenance, spread sheet analysis, investment analysis, break-even of cost-volume-profit analysis, depreciation analysis, and time series analysis. The program is designed so that a detailed knowledge of programming is not required.

**DESCRIPTION**

Business Analysis/BASIC includes 30 interactive routines for assisting the problem-solver in exercising the following functions:

- Spread Sheet Analysis:
  - Spread Sheet data file creation and update
  - Spread Sheet report formatting
- Investment Analysis:
  - Return-on-Investment computation
  - Discounted Cash Flow analysis
  - Loan analysis (multiple and single)
  - Lease vs Purchase analysis
  - Make vs Buy analysis
- Break-Even Analysis:
  - Break-even with definite assumptions
  - Break-even with probabilistic assumptions
- Depreciation Analysis:
  - Straight line depreciation
  - Sum-of-years digits depreciation
  - Declining balance depreciation
  - Equipment units depreciation
- Time Series Analysis:
  - Compound growth rate projection
  - Moving average
  - Seasonal analysis
  - Cyclical analysis
  - Autocovariance and Autocorrelation
  - Crosscovariance and Crosscorrelation
  - Exponential Smoothing
  - Simple Regression
- Graphic Presentation:
  - Histograms
  - Exponential Smoothing Plots
- Routine and File Indexing:
  - Business Analysis/BASIC routine index
  - User created data file log
- Data Generation and Maintenance:
  - Create and update data files
  - Select and rearrange records in data files and spread sheet data files
  - Resequence records in data files and spread sheet data files
  - Print data files

**HIGHLIGHTS**

- Comprehensive set of analytical routines to assist the user in examining investment alternatives and in preparing financial plans.
- Spread sheet analysis capability for report creation and update.
- Interactive features include instructional messages, flexible control of calculations, extensive error checking, and data editing.

**Use:** The professional analyst can utilize any of the Business Analysis/BASIC routines through a 2741 Data Communications Terminal or other terminals supported by ITF and VM/370-CMS.

The user first enters a few systems commands (LOGON, EDIT, etc.) and the name of the desired Business Analysis/BASIC routine. Following a READY indication, the Business Analysis/BASIC routine guides the user through his problem by typing out procedural instructions. Alternative courses of action or options are presented in the form of questions, which the user answers by entering the appropriate replies.

**CUSTOMER RESPONSIBILITIES**

The user must have the necessary computer configuration as described below. In the case of the S/360 or S/370, appropriate terminals and communication lines must be available. The user will also need the associated program product for his system as mentioned under "Programming Requirements".

Business Analysis/BASIC program is distributed in machine-readable form for loading into the user's system. Once stored, it is available to any member of the organization authorized to use the system.

If the user has confidential information to be stored in disk files, it will be his responsibility to take appropriate steps to safeguard against unauthorized access.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The requirements to run Business Analysis/BASIC are:

ITF (OS, DOS, TSO)

The Business Analysis/BASIC routines require a user area of 50,000 bytes and a symbol table of 10,800 bytes when the routines are run in short precision. Execution in long precision requires a user area of 60,000 bytes and a symbol table of 16,300 bytes. Business Analysis/BASIC supports all terminals supported by the host interactive environment.

**SOFTWARE REQUIREMENTS**

Business Analysis/BASIC is written in the BASIC language. To run the program requires the appropriate BASIC program product: DOS-ITF BASIC (5736-RC2), OS-ITF BASIC (5734-RC3), or TSO-ITF BASIC (5734-RC4), or VS BASIC (5748-XX1).



## PROGRAM PRODUCTS

**MATRIX GENERATOR and REPORT WRITER (MGRW)  
for the MATHEMATICAL PROGRAMMING SYSTEM  
EXTENDED (MPSX) 5734-XMC****PURPOSE**

MGRW is a Matrix Generator and Report Writer for the Mathematical Programming System Extended (MPSX), Program Product 5734-XM4 and for the Mathematical Programming System Extended/370 OS/VS (MPSX/370 OS/VS), Program Product 5740-XM3.

Mathematical programming models are essentially arrays where the names of rows and columns have mnemonic significance. MGRW is an array-oriented system which simplifies the difficult task of generating mathematical models. Extensive facilities for name manipulation, pictorial report writing, table maintenance and analysis of linear programming solutions are available in this system. MGRW operates as a procedure under MPSX or MPSX/370 OS/VS.

**HIGHLIGHTS**

MGRW statements are self-descriptive and easy to understand ... pictorial format descriptors provide a visual representation of a report before it is produced ... communication with MPSX CR cells is possible via symbolic references at the MGRW program level ... MGRW is based on a list-driven concept which eliminates the constant search for names in order to locate data ... sets of table elements may be easily referenced by means of list subscripts ... scalar as well as table facilities are available for data storage ... extensive diagnostic facilities include tracing ... arithmetic, relational, boolean, and list operators and functions satisfy the most sophisticated model building requirements.

**Use:** In mathematical programming, the user first assembles the information required to build the linear programming model. MGRW is designed to carry out the actual generation of the model. It provides the user with a specialized language-type tool not only for reading the raw data but for assembling it in LP model form. Once the LP model has been optimized, MGRW provides the necessary language facilities for relating the original data to the solution to the LP model to produce a report for management.

**CUSTOMER RESPONSIBILITIES**

Users of MGRW are expected to have a background in mathematical programming and, more specifically, in the Mathematical Programming System Extended (MPSX) or the Mathematical Programming System Extended/370 OS/VS (MPSX/370 OS/VS). MGRW is designed for easy use, and the degree of learning effort required is similar to that of a higher-level programming language like FORTRAN. Data may be read in almost any format, from which tables, master files, etc., may then be generated.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

MGRW is subject to the system configuration requirements of whichever of the Mathematical Programming Systems it is operating under. For MPSX, these will be found in the *MPSX Operations Manual* (SH20-0924), while for MPSX/370, they are in the *MPSX/370 General Information Manual* (GH19-1090). Under MPSX, MGRW requires a partition or region with a minimum address space of 190K bytes which includes Version 1 of MPSX. Under MPSX/370 OS/VS, the minimum virtual address space required to run MGRW is less than that needed to run MPSX/370 alone. It requires one direct access storage device supplied by the Mathematical Programming System and also one 2400-series magnetic tape unit for installation and support, since the MGRW program and program change releases are distributed on magnetic tape.

MGRW uses the Universal Instruction Set, and, if the system output is a printer, it must have 132 print positions. In addition to the MPSX or MPSX/370 file requirements, MGRW requires the files described in Figure 1, and it optionally uses the files described in Figure 2.

**Figure 1**

FILE NAME	DESCRIPTION
PROGFILE	Contains the compiled MGRW program and the data associated with it. Must be a direct access device.
SORT1	Work file

**Figure 2**

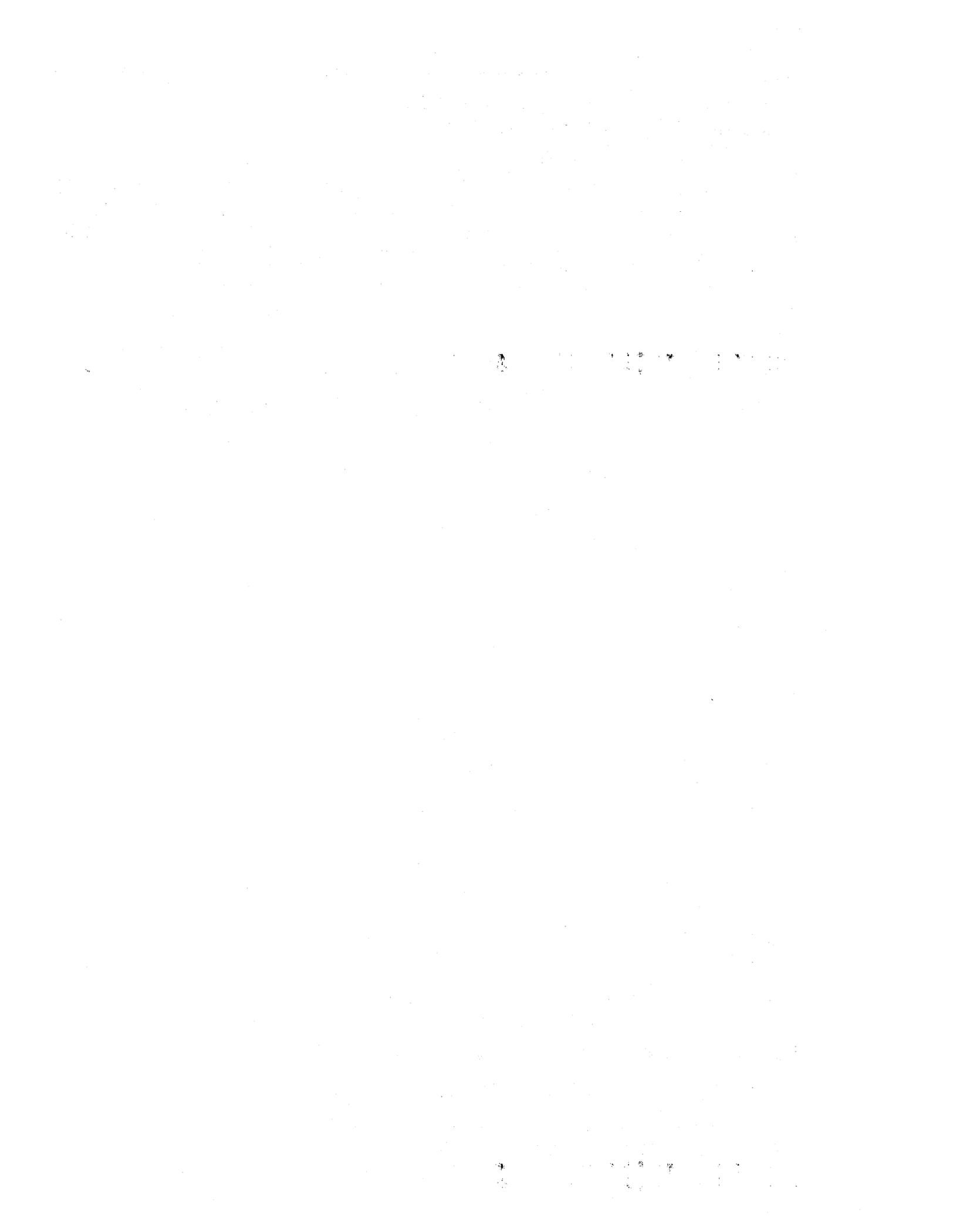
FILE NAME	DESCRIPTION
EQVFILE	Contains system equivalences.
ERROR	Contains error messages and tracing information.
SORT2, SORT3, SORT4	These files are used by MGRW to speed up the sorting operations.

**SOFTWARE REQUIREMENTS**

MGRW may be assembled with the OS/360 F-level Assembler, and uses BSAM and QSAM data management facilities. MGRW runs under OS MFT and MVT on S/360 and S/370 and under OS/VS1 and

OS/VS2 on S/370 only. It can also be used with any of these systems running under VM/370 on a S/370. MGRW requires the OS/360 Utility Program IEHMOVE for system generation, and it runs as a procedure under MPSX, Program Product 5734-XM4, or MPSX/370 OS/VS. The F-level Linkage Editor is also required.

**Program Services:** Programming Service Classification C ... Testing Period 30 days



## PROGRAM PRODUCTS

**PROCEDURE LIBRARY - MATHEMATICS  
5734-XM3****PURPOSE**

This program product provides in the PL/I language powerful computational tools for the scientist and engineer.

**DESCRIPTION**

This library is a set of basic computational procedures intended to help the user develop his own PL/I procedure library. It evolved from the mathematics portion of the Scientific Subroutine Package - PL/I (SSP-PL/I), a Type II Program (360A-CM-07X).

The procedures included in the Procedure Library-Mathematics may be classified into three groups.

Procedures taken from SSP-PL/I and modified according to new conventions, but with functional capabilities and coding virtually unchanged.

Procedures with functional capabilities similar to those found in SSP-PL/I, but with coding revised to take advantage of current algorithmic technology.

New procedures representing new functional capabilities.

These categories contain approximately 40, 20, and 40 percent of the procedures in the Procedure Library-Mathematics, respectively.

Individual procedures or combinations of them can be used in the following general areas:

- Elementary array manipulations
- Solution of linear equations
- Eigenanalysis and related topics
- Polynomial operations
  - Orthogonal polynomials
  - Lanczos economization
  - Zeros of a polynomial
- Numerical quadrature
- Tabulated functions
- Nontabulated functions
- Numerical differentiation
- Tabulated functions
- Nontabulated functions
- Interpolation
- Approximation
- Smoothing
- Zeros and extrema of functions
- Linear programming
- Systems of ordinary differential equations with given initial values
- Convergence acceleration
- Transforms
- Special functions

With respect to SSP-PL/I, this library includes the following revisions and additions:

- Iterative refinement of the solution of systems of linear equations
- Solution of the general eigenanalysis problem
- Real and complex zeros of a polynomial
- Interpolation and approximation by cubic splines
- Interpolation by exponential sums
- Fast Fourier transforms
- Chebyshev approximations
- Extrema of functions
- Linear programming
- Solution of systems of ordinary differential equations
- Convergence acceleration
- Special mathematical functions

**Features:**

All procedures are free of input/output statements.

All procedures are written in OS PL/I F-level language (60-character set).

Many of the procedures provide a double-precision option. This option can be implemented at compile time using the compiler option SORMGIN.

The use of certain procedures (or groups of them) is illustrated in the program documentation by sample main programs with input/output.

All procedures are documented uniformly.

Certain classes of errors are detected and flagged. If these are ignored, the user is warned under the default option.

**USE**

The user may invoke any procedure from the Procedure Library-Mathematics by means of the standard PL/I CALL statement or FUNCTION reference, just as he does with his own procedures. Procedures of this program product are computational in nature and do not contain any references to input/output devices. The user must furnish, as part of his program, whatever input/output and other operations are necessary for the total solution of his problem.

**CUSTOMER RESPONSIBILITIES**

The customer should be familiar with the OS PL/I (F) language and the Operating System.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

A minimum requirement for compilation is a S/360 or S/370 suitable for the OS PL/I (F) compiler or the OS PL/I Optimizing Compiler (5734-PL1). The procedures are distributed on magnetic tape.

The storage requirements for any given problem depend upon the number of procedures used, the size of the compiled procedures, the size of the compiled main program, the size of the control program, and the data storage requirements.

**SOFTWARE REQUIREMENTS**

The procedures are written in the PL/I language, using the facilities provided by the OS PL/I (F) Compiler. They may also be compiled under the OS PL/I Optimizing Compiler (5734-PL1).

The 60-character symbol set is used.

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual* (GH20-0854) ... *Promotional Flyer* (GH20-2341).

**Reference Material**

*IBM System/360 Operating System PL/I (F) Reference Manual* (GC28-8201) ... *IBM System/360 Operating System PL/I (F) Programmer's Guide* (GC28-6594) ... *System/360 Scientific Subroutine Package (PL/I) Program Description and Operations Manual* (GH20-0586).



PROGRAM PRODUCTS

**VEHICLE SCHEDULING PROGRAM - EXTENDED  
VSPX OS (5734-XM5)  
VSPX DOS (5736-XM3)**

**PURPOSE**

VSPX provides a comprehensive tool in the planning and operating of a distribution and delivery system. It computes near-optimal routes for the delivery of products or services by a fleet of vehicles. Since the program contains a wide range of options, it can be applied to most fleet routing and delivery situations. The advantages over manual methods are: Increased efficiency and speed of scheduling, improved routing and cost reductions through better fleet utilization.

**DESCRIPTION**

VSPX determines the routes a group of vehicles must travel to meet certain commitments in the delivery of services or products to customers at given locations. The program tends to optimize basic factors, such as travel time and number of vehicles. VSPX consists of two main sections, the Network Analysis Program and the Schedule Production Program. The first program analyzes a network representing the potential calling points by computing either actual or approximate distances between all points. The second program can repetitively produce schedules which meet various restrictions such as route time, speed, vehicle capacity and customer requirements.

VSPX can be used to solve many types of delivery problems. In addition to performing the daily routing function, VSPX can be applied to (a) redefine fixed routes, (b) aid in determining feasible locations of warehouses and depots to service customers, (c) plan for a new fleet and (d) provide statistical and cost data relative to the efficiency of a fleet.

Input to the Network Analysis Program may conform to one of two types: True-Distance or Coordinate Method. Both methods are based on zones rather than actual customers. A zone is defined as a delivery area (e.g., a shopping center, a postal zone or a section of a city), which can contain from 1 to 255 customers. The True-Distance Method considers actual distances over roads between all points, intersections and zones. An individual speed can be specified for each road in the network, if desired. This method, while more time-consuming to prepare, gives a higher degree of accuracy, because the output file represents the combined knowledge of a company's manual routing and dispatching departments. The True-Distance Method is best suited for networks in which customer locations can be determined in advance with relatively few changes so that the program needs to be executed only infrequently. Both methods produce a file representing all practical combinations of potential delivery zones.

The Schedule Production Program uses the output of the Network Analysis Program, together with a list of calls to be made. It then prepares feasible routes approaching optimum loads and minimum travel time, within the restrictions imposed by the user. The most valuable result is that fewer vehicles may be required. The output of the program consists of a printed list of the recommended routes. A summary of fleet utilization is also produced. All output is stored on disk in a format readable by PL/I programs and can be modified by the user to prepare a variety of specialized reports, including warehouse packing and loading lists, invoices in route sequence, special driver instructions and various analytical reports. The output can also be used as a re-entry medium into the user's existing data processing flow. Therefore, VSPX can be a link to a more fully integrated distribution system.

**HIGHLIGHTS**

The features of the Schedule Production Program listed below are of particular interest because they allow the schedules to be tailored to specific requirements of customer service and fleet utilization. These features are designed as options, which are used only when requested by the user and can then be combined in almost any manner.

- Limited calling times by stop.
- Average time at all stops in addition to loading/unloading.
- Special additional time for an individual stop.
- Vehicle limits by calling point.
- Up to 255 different vehicle types and capacities.
- Modification of average vehicle speed.
- Earliest possible starting and latest possible finishing time for the fleet.
- Maximum route time by vehicle type.
- Maximum number of calls per route.
- Multi-compartment vehicles (up to 15 compartments each).
- Variable assignment of trailers to vehicles.
- Average unloading time per unit.
- Dual specification of load (e.g., weight and volume.)
- Multiple trips in one scheduling period (up to three trips for each vehicle).
- Multiple-day journeys.
- Low-priority orders.
- Traveling time between calls within zones.
- Indicated orders.
- Average mileage between calling points within zones.
- Maximum route mileage.

- Consideration of route time between first and last customer on a route.
- Average reloading time per unit.
- Additional stop time at the depot.
- Predetermined start or end delivery for a route.

**USE**

VSPX consists of two basic parts, which can be thought of as separate programs and can be executed independently if desired. These are the Network Analysis and Schedule Production Programs.

After determining whether to use the True-Distance or the Coordinate Method of input, the user must prepare the appropriate network description cards for the Network Analysis Program. The output file from this phase is then used as partial input to the Schedule Production Program. In addition, for this second phase, the user must specify the various delivery requests and restrictions, fleet descriptions, and limits to be imposed.

The output from VSPX consists of a suggested schedule for each route and a summary of fleet utilization. All output is stored on disk. Although the user is not required to write additional programs, he may do so to create input for either phase or to expand the output from the Schedule Production Program.

**CUSTOMER RESPONSIBILITIES**

The user must be familiar with the options and features of both the Network Analysis and the Schedule Production Programs.

Capable user personnel must be assigned to choose between the True-Distance and the Coordinate Methods, and gather the appropriate data. Sufficient time should be devoted to data gathering prior to implementation of VSPX.

Overall work standards and special requirements for each delivery must be documented prior to producing the first usable schedule.

Some user programming may be required to tailor the input and output of the Schedule Production Program, as mentioned above.

A period of parallel operation should be planned when both VSPX and the manual system are used. This will allow time to try various combinations of the program features to produce the desired routings.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS - OS**

The execution of VSPX (OS) requires a 60K region in an IBM S/360 (with decimal feature) or S/370, one IBM 2311 Disk Storage Drive (in addition to OS System devices) or sufficient storage space on an IBM 2314 Direct Access Storage Facility, 2319 Disk Storage Facility, 3330/3333 or 3340 Disk Storage, one input device (card reader, magnetic tape drive or direct-access storage device), and one output device (printer, magnetic tape drive or direct-access storage device).

For the execution of VSPX using the PL/I Optimizing Compiler, a 100K region is required. For the generation of VSPX, one magnetic tape drive is required.

**HARDWARE REQUIREMENTS - DOS**

The execution of VSPX (DOS) requires a 24K partition in an IBM S/360 (with decimal feature) or S/370, an IBM 1052 Printer-Keyboard, one IBM 2311 Disk Storage Drive (in addition to DOS system devices) or sufficient storage space on an IBM 2314, 3330, 3340 Direct Access Storage Facility, one input device (card reader, magnetic tape drive or direct-access storage device); and one output device (printer, magnetic tape drive or direct-access storage device). For inclusion of VSPX in the core image and relocatable libraries, one magnetic tape drive is required.

For the execution of VSPX using the PL/I Optimizing Compiler, a partition of 60K is required.

**SOFTWARE REQUIREMENTS - OS**

VSPX (OS) is written in Assembler language and in PL/I. This program product is released to work with the IBM S/360 Operating System (MFT, MVT) Release 18.6 and all subsequent releases, unless so stated in a future revision of this document. Use is also made of the access methods QSAM, BSAM, BDAM. To install the program, the OS Utility Program IEHMOVE is required.

VSPX (OS) also executes on S/370 virtual storage configurations under control of OS/VS1 or OS/VS2 in virtual mode. It also operates under OS/MFT, OS/MVT, OS/VS1 and OS/VS2 running under VM/370 in virtual mode. The S/370 Virtual Storage configuration must be compatible with that of S/360 or S/370 described above.

**SOFTWARE REQUIREMENTS - DOS**

VSPX (DOS) is written in Assembler language and in PL/I (PL/I Optimizing Compiler is required). It operates under control of the IBM S/360 Disk Operating System. The utility programs Tape-Tape or



PROGRAM PRODUCTS

**VSPX (cont'd)**

Tape-Disk and Tape-Card are used to install the program. This program product is released to work with DOS Release 2.1 and all subsequent releases, unless so stated in a future revision of this document.

VSPX (DOS) also executes on S/370 Virtual Storage Configurations under the control of DOS/VS and under DOS and DOS/VS running under VM/370. The object code as distributed executes in virtual = real mode only. For execution in virtual mode, the source code - optional machine readable material - must be ordered and recompiled using the DOS/VS assembler. The S/370 Virtual Storage configuration must be compatible with that of S/360 or S/370 described above.

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual (GH19-2000).*



PROGRAM PRODUCTS

**MATH/BASIC  
5734-XM8**

**PURPOSE**

MATH/BASIC is a set of conversational routines for the solution of the most frequently encountered mathematical problems in science and industry. The library operates under VS BASIC with VSPC, VM/370 CMS or TSO.

MATH/BASIC is designed to meet the needs of the engineer and scientist. The conversational features of MATH/BASIC allow a non-data processing oriented user to use the programs with a minimum of training.

**DESCRIPTION**

MATH/BASIC consists of 44 routines providing computing capabilities in the following areas:

- Linear equations, matrix eigenvalue problem.
- Zeros of polynomials, zeros and minima of functions.
- Quadrature/differentiation.
- Interpolation, approximation and smoothing.
- Ordinary differential equations.
- Discrete Fourier transform.
- Special functions.
- Linear programming.

**HIGHLIGHTS**

- A comprehensive set of mathematical routines.
- Calculations in short and long precision.
- Control of operation in the case of ill-conditioned problems and error messages.
- Ease of use due to conversational mode.

**Use:** The user can utilize any of the MATH/BASIC routines through a 2741 Data Communications Terminal or other terminals supported by the host interactive environment.

The user first enters a few systems commands and the name of the desired MATH/BASIC routine. Following a READY indication, MATH/BASIC guides the user through his problem by printing procedural instructions. Alternate courses of action or options are described usually in the form of questions, which the user answers by entering the appropriate replies.

**CUSTOMER RESPONSIBILITIES**

The MATH/BASIC program is distributed in machine readable form for loading into the user's system. Once stored, it is available to any member of the organization authorized to use the system.

If confidential information is to be stored in the library, the user must take appropriate steps to safeguard against unauthorized access.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The MATH/BASIC routines require a user area of 50,000 bytes. When these routines are executed in short precision, a symbol table size of 9,000 bytes is required. Execution in long precision requires a symbol table of 16,300 bytes. In addition, the user must have sufficient space in the library to store the MATH/BASIC routines. MATH/BASIC supports all terminals supported by the host interactive environment.

**SOFTWARE REQUIREMENTS**

MATH/BASIC is written in the BASIC language. It may be used with VS BASIC (5748-XX1).

**DOCUMENTATION:** (available from Mechanicsburg).

*General Information Manual, (GH20-1128) ... Promotional Flyer, (G520-2508).*



## PROGRAM PRODUCTS

**MINIPERT (5734-XP3)****PURPOSE**

MINIPERT is an interactive Critical Path Method (CPM) program designed to help your customer meet the challenging managerial requirements of today's complex research, engineering and manufacturing projects. The value of CPM for project control has been proven in many applications such as construction, special products manufacture, maintenance and repair, research and development, etc. Effective project management requires good planning, control, and measurement of job status and financial performance with minimal delay. MINIPERT provides the management tool needed to meet these requirements and improve the productivity of your customer's valuable resources: men, machine, money and material.

**DESCRIPTION**

MINIPERT permits the interactive solution of project scheduling problems. The project schedule is described by a work-sequencing operation that treats a project as a series of interrelated activities, some of which can be done in parallel and others serially. When specified in this fashion, the activities form a network. The longest time path through this network determines the time required to complete the project. This path is called the critical path. All other paths through the network have some "slack" with respect to this critical path and represent non-critical work. The job of project management then becomes one of scheduling both critical and non-critical work to take best advantage of available resources while making the critical path as short as feasible.

**HIGHLIGHTS**

MINIPERT is an extremely versatile computer program for implementing CPM. Its features include variable size data fields ... flexible calendar capable of specifying holidays and vacation periods ... activities can be tagged for work on holidays ... optional use of master files ... networks may contain many subnets (a subnet consists of a number of related activities) ... ability to process either the whole network or an individual subnet ... ability to accept activity time durations in days, weeks, or months ... milestone summarization ... manpower loading ... conversational diagnostics and error correction ... a variety of reports including barcharts and project diagrams.

Note that the five APL workspaces contained in MINIPERT are a selected subset of the workspaces contained in SE Aid Programs - APL Library 835. Specifically, the five selected workspaces are:

- MINIPERT            CPM network manipulation and calculation
- MINIREPORTS        Basic CPM reporting facility
- DIAGRAM            Graphic plot of MINIPERT plan
- NEWDIAGRAM        Enhanced diagram report program
- MANPOWER           CPM resource manipulation and reporting

These five workspaces are equivalent to those similarly named in the APL Library 835.

**USE**

MINIPERT will provide an interactive CPM system which can aid in planning a customer's projects.

**CUSTOMER RESPONSIBILITIES**

A prerequisite for MINIPERT is the installation of either APL/360-DOS (5736-XM6) or APL/360-OS (5734-XM6). MINIPERT will operate in either of these environments after being installed through the use of the APL utility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

MINIPERT has no additional requirement over the APL/360 resident program product. Please see the appropriate pages for details.

**SOFTWARE REQUIREMENTS**

MINIPERT was written in the APL language provided by the APL/360 program products.

**DOCUMENTATION:** (available from Mechanicsburg)

*Introduction to MINIPERT* (GH20-0852) ... *Promotional Flyer* (G520-2368).



PROGRAM PRODUCTS

**PROJECT MANAGEMENT SYSTEM IV  
5734-XP4**

**PURPOSE**

This program, an integrated collection of computer program modules, has been developed to meet the challenging managerial requirements of today's complex research, engineering and fabrication programs. Projects of all types in construction, special products manufacture, large-scale R & D, etc., have been growing increasingly complex. Effective management requires up-to-date knowledge of job status and financial performance. Even more important, management needs to determine the probable schedule and cost impact of contemplated changes in plan. PMS IV provides the scientific management tools needed for making better delivery promises, for spotting out-of-line conditions, for meeting schedules, and for controlling costs. PMS IV will help your customers plan and control the use of their valuable resources: men, machines, money and material.

**DESCRIPTION**

Incorporated within this system is a comprehensive set of data processing programs that make available to the user some of the most advanced management techniques utilized both by government and industry. The system provides critical path and general cost analyses, PERT and PERT COST capabilities, Precedence and Precedence/Cost capabilities, as well as Resource Allocation. A principal design objective provides a flexible add-on and substitution capability that allows for a growing library of management-oriented routines, and permits the user to tailor the program to the specific requirements of his installation.

**HIGHLIGHTS**

PMS IV is an enhancement of PMS/360 III (program product 5734-XP1) and offers a basic Report Processor with three optional features; an Extended Network Processor, a Cost Processor for cost accounting, and a Resource Allocation Processor for schedule adjustment based on resource availability. In addition to the above modular availability, the following significant enhancements are included.

- Improved performance by means of a BSAM search for description records.
- Ability to dynamically alter report sort, paging and format parameters at execution time.
- Ability to process Precedence Networks with percentage lags.
- Ability to process more subnets per network per master file (max 254 networks each with 255 subnets).
- Ability to optionally continue processing with hanging starts and ends.
- Ability to report activity progress in various forms.
- Ability to specify five types of schedule dates.
- Non-linear spreading of cost.
- User defined default values for rates.
- Larger OAT (Organization Analysis Table) and WBS (Work Breakdown Structure) tables (32,767 detail entries per summary item).
- Improved performance through in-core table look-ups instead of sort/merges.
- Deletion of data by charge number.
- Dynamic blocking of work files.
- Compatible with PMS/360 Versions 2 and 3.

The processor capabilities are:

**Extended Network Processor:** -- Highlights include variable size data fields ... variable ordering of input elements on data cards ... flexible calendar capable of specifying holidays and vacation periods ... activities can be tagged for work on holidays ... optional use of master files ... network may contain up to 255 subnets; subnet size ranges from 1,000 to 32,000 activities, depending on core memory, disk memory, the size of other data elements, operating systems, etc. ... ability to process either the network or the subnet approach to PERT ... ability to accept activity time durations in hours, days, weeks, or months ... nine levels of milestone summarization ... two methods of milestone summarization ... one level of activity summarization that allows the summary activities to be specified explicitly ... a description of up to 99 characters for activities and milestone events that may be subdivided and operated upon in the PMS-Report Processor ... output through the PMS Report Processor can be formatted and tailored to individual needs ... user control of program logic through modular design ... programmed for easy modification ... ability to specify progress data for activities ... five types of schedule dates, including no earlier than, no later than, and imposed dates ... percentage lag relationships in precedence notation ... different work-weeks per activity ... current actual only reportings ... expanded calendar features.

**Resource Allocation Processor:** -- The highlights of this processor include: Fixed Time or Fixed Resource Scheduling - Secondary levels - full compatibility with other PMS modules - serial-parallel allocation technique... allocation for one or more subnets, which may or may not be in the same network ... Wide variety of possible priority rules for choosing the most important of a set of activities competing for a resource ... alternative resources ... up to 25 resources per activity (or 18 if each has an alternative) ... activities may be split (stopped and restarted later) ... the time-now clock can be stepped up by any number of time-units, so that approximate schedules can be quickly obtained ... more than 32,000 different resources allowed ... scheduling cut-off at any user-defined date ... cyclic or dated changes in resource levels ... 'customized' reports possible through the PMS Report Processor ... regular checkpoint facility.

**Cost Processor:** -- Highlights include an accounting calendar for variable cost period reporting ... rate tables for budgets, actuals, estimates, commitments and obligations ... Charge Number rate tables for application of factors such as general and administrative expenses and special fees ... Nine-level Work Breakdown Structure for product-oriented cost reporting ... Nine-level Organization Analysis Table Breakdown for function-oriented cost reporting ... optional use of master file ... approximately 32,000 charge numbers and organization codes permitted for each summary item in non linear spreading of cost, both the Work Breakdown Structure and the Organization Analysis Table ... grouping factors for summary resource reporting ... variable card format ... variable field size for many data elements ... description field for use as a user option ... user control of program logic through the modular design ... programmed for easy modification ... additional "customized" reports possible through the PMS Report Processor.

**Report Processor:** -- Highlights include a set of PERT reports (similar to those produced by IBM PERT COST II, 7090-CP-02X) ... selected DOD/NASA PERT COST reports ... Resource Allocation reports ... statements that allow a user to define his own reports without the aid of a programmer ... ability to read a wide range of input tapes other than those prepared by other PMS modules ... programmed for easy modification ... arithmetic and logical procedures permit analysis of data to be reported ... selectivity of data for processing through request cards.

**USE**

**Report Processor (Basic Package):** - The Report Processor of PMS IV is designed for use in output report generation for the other PMS IV modules, or as an independent module within the framework of PMS.

**Enhanced Network Processor (Optional feature):** - This processor provides enhanced capability in the areas of Progress Reporting, Scheduled Dates and Precedence Networks for application areas which require this function.

**Resource Allocation Processor (RAP) (Optional feature):** - This processor is a dependent module of PMS IV. It must take its input from either Network Processor of PMS IV and can only produce printed output by means of the Report Processor. The input from the Network Processor gives the earliest and latest dates on which each activity can start (if the entire project is to be finished on time) together with the resources required for each activity and the resources available for the whole project. RAP schedules the start as soon as possible, commensurate with efficient utilization of specified resource availabilities. By means of the Report Processor the user can then output the scheduled start of any activity, and the utilization of any resource at any time during the project.

**Cost Processor (Optional Feature):** - This module is a collection of project-oriented manpower, material and cost planning and control subroutines. It can be used in conjunction with PERT, or in a completely separate "companion" application. When used with the other major modules of PMS to implement the DOD/NASA PERT COST technique, it can produce the reports required for internal control and the total management cycle.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

PMS IV with the Resource Allocation Processor will require a minimum of about 75K data bytes of main storage over and above the requirements of OS. PMS IV without Resource Allocation (an optional feature) will require a minimum of 44K bytes over and above the OS requirements. Larger core sizes will lead to faster program execution and in the case of the Network Processor, larger subnet capacity (see below).

At least one disk storage drive is required to hold the PMS system and work files. Other peripheral devices supported by PMS IV include all devices supported by OS where QSAM is an accepted access method. Two cost reports furnished by PMS, Management Summary Report (36) and Project Status Report (90) read a file named ORDFILE backwards for efficiency. If no 9-track tapes are available for this file, reports 37



PROGRAM PRODUCTS

**PMS IV (cont'd)**

and 91 must be used. These have an additional sort module within them but read ORDFILE forwards.

PMS IV will run on a S/360 or a S/370. The Extended Network Processor operates on a S/370 only.

The Standard and Decimal Feature Instruction Sets are used. If the system's output device is a printer it must have 132 print positions.

The table below illustrates the core storage and peripheral storage byte requirements for a Network Processor and Report Processor run with one subnet for which a master file is created and detailed reports are produced. Input is through a card reader and output is directly on a printer.

No. of Activities in the Subnet*	Core	Peripheral
	Required by PMS/360	Storage Byte Requirements
1000	44K	700K
3560	108K	2,492K
8680	236K	6,076K
18920	492K	13,244K
32000	1004K	22,400K

\* For Precedence, activities include both activities and lag relationships.

Essentially, this table is based on a peripheral storage byte requirement of 700 bytes per activity.

**SOFTWARE REQUIREMENTS**

The program is written in Assembler language and is assembled and can be executed under any of the IBM OS/VS or IBM OS systems. Note: Under VS, PMS IV is supported for V = R only. PMS IV uses QSAM, BDAM and BSAM access methods and makes use of the OS Sort/Merge program. The Sort/Merge used can be any of the OS supported programs, provided that the operating configuration conforms to the device constraints of that Sort/Merge program. IEHMOVE and IEBGENER are required to install the system.

**DOCUMENTATION:** (available from Mechanicsburg)

*Application Description Manual* (GH20-0855-1).

## PROGRAM PRODUCTS

**GENERAL PURPOSE SIMULATION SYSTEM V  
OS (5734-XS2) - DOS (5736-XS3)****PURPOSE**

GPSS V provides an easy-to-use and easy-to-understand tool for modeling and examining the behavior of systems in the engineering and management science areas. This system will accommodate varying model sizes in a modular fashion for S/360 and S/370 configurations with storage capacities ranging from 64K bytes upward for DOS or DOS/VS, and from 128K bytes upward for OS or OS/VS.

**DESCRIPTION**

GPSS V is a broad range general purpose tool for modeling and examining the behavior of systems in the management and engineering science areas. Many applications of a complex logical and procedure oriented nature which ordinarily defy mathematical description can be easily described and studied using GPSS. Varying environments are simply introduced, and the user can identify optimal conditions, isolate bottlenecks, and determine the effects of delays caused by capacity limitations. Both the particular environment and the activity processes are permitted to have statistical fluctuations as a function of time. Proposed changes to existing policies, methods and operations can be subjected to critical performance criteria and evaluated. The user may also investigate and judge the value of new proposals without costly capital investments and without disturbing existing operations. The application areas in which GPSS type simulations have been useful and profitable are many and varied -- general information system design, communication traffic flow and capacity studies, quality control procedure specification, advanced management planning, analysis of consumer behavior, inventory system design, job shop processing, studies of equipment availability, performance and reliability, transportation loading and scheduling, computer configuration evaluation, economic studies, capital investment and risk studies, analysis of alternative military strategies, analysis of plans for corporate growth and merger, among others.

**FEATURES**

GPSS V provides many significant advantages over GPSS/360 Version 1 (Type II programs) and GPSS/360 Version 2 (IBM Program Products). The major functions and capabilities of GPSS V are:

- Compatibility with GPSS/360 Version 1 and GPSS/360 Version 2.
- Entities on Auxiliary Storage.
- An interface capability between GPSS V and user written PL/I routines.
- Unavailable Equipment Entities (FACILITIES and STORAGES).
- Byte and single precision floating point savevalues.
- Byte and single precision floating point matrices.
- Every transaction may have as many as 1020 parameters. A maximum of 255 halfword, 255 fullword, 255 byte and 255 single precision floating point parameters in any combination.
- Extended indirect addressing capabilities.
- An automatic cross-reference dictionary of all symbolically addressed entities included with the assembly listing.
- Descriptive error messages to supplement numeric messages.
- Free-Form coding of GPSS statements.
- Unique data sets for the READ/SAVE feature.

**USE**

Programming experience is generally unnecessary for users of GPSS V. The user needs only to know the rules by which system models are constructed. The logical structure and statistical parameters of the system are first modeled in terms of a GPSS V block diagram. Information from each block of the diagram is keypunched into cards, control cards are added, and the input is then loaded for assembly and execution. No operator intervention is required, diagnostics are executed automatically as required. The operating system used provides GPSS V with input/output services.

**CUSTOMER RESPONSIBILITIES**

- A thorough understanding of the principles of system modeling.
- Complete definition of system to be modeled, including configuration and all decision logic.
- Collection of data to be used as input to the model.
- Model validation to assure that output is meaningful.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS - OS**

The minimum machine requirements for GPSS V-OS are similar to those for OS/360, OS/VS1, OS/VS2, or VM/370. No additional devices should be necessary. The minimum system required for the program product is an IBM S/360 mdl 40 for OS/360 or an IBM S/370 mdl 135 for OS or OS/VS1 which can support a partition of at least 62K for a model running with PARM=A. An IBM S/370 mdl 145 is needed to run GPSS V-OS under OS/VS2. The only additional requirement is enough direct access and/or sequential storage space for the GPSS V-OS data sets. The GPSS V-OS program will be distributed on magnetic tape only. An IBM 2400-series Tape Unit

(9-or 7-track with Data Conversion feature) must be available for program distribution and maintenance.

**HARDWARE REQUIREMENTS - DOS**

The minimum system requirements for GPSS V-DOS/VS are similar to those necessary to support either DOS/VS or DOS. For DOS/VS, the minimum system requirement is an IBM S/370 mdl 115. For DOS, the minimum system requirement is an IBM S/360 mdl 30 or an IBM S/370 mdl 135. Use of the Auxiliary Storage feature is not recommended under DOS/VS and is not supported because of its similarity in capability to DOS/VS paging. An IBM S/360 mdl 40 is required for DOS users wishing to use the Auxiliary Storage feature. GPSS Input device support includes IBM 2501, 2520 Card Readers, 2400- or 3400-series Tape Units, or 2311, 2314, 2319, 3330 or 3340 Direct Access Storage devices. Output devices, in addition to the Tape Units and Direct Access Storage devices previously mentioned, include the IBM 1403, 1443, 3211, 3262 and 4245 Printers as well as the IBM 3525 Card Punch. One or more IBM 2400- or 3400-series Tape Units are required when either the Update, Jobtape and/or Read/Save features are to be used. To use the GPSS Run Length feature under DOS, the Interval Timer is required. The sequential access method is used for reading and writing all data sets. For DOS users utilizing the Auxiliary Storage feature, the direct access method is used for the respective entity data sets.

GPSS program modules may reside in either the system Core Image Library or in a private Core Image library. For GPSS data sets, users may wish to either utilize space already allocated to the DOS/VS or DOS system units or allocate other available direct access space.

Main storage requirements vary according to the GPSS phase in progress. A minimum partition of at least 52K is required. The maximum amount of memory required at any one time is approximately 34K, excluding entities, and input/output buffers. DOS users require an additional 5K when using the Auxiliary Storage feature. DOS/VS users can reallocate their real partition size to OK, if desired. For best performance under DOS/VS, the virtual partition size should be approximately equal to the size of the GPSS partition required when running virtual = real.

**SOFTWARE REQUIREMENTS**

Both GPSS V program products are written entirely in Assembler language.

**DOCUMENTATION  
(available from Mechanicsburg)**

*Application Description Manual (GH20-0826)*

## CONTINUOUS SYSTEM MODELING PROGRAM III and GRAPHIC FEATURE CSMP III (5734-XS9)

### PURPOSE

CSMP III and the CSMP III Graphic Feature are designed for the simulation of continuous systems.

### DESCRIPTION

Simulation is a well established tool for investigating phenomena ranging from information flow in business organizations to the dynamic behavior of complex electro-mechanical systems. The former often have been treated as discrete processes on digital computers through the use of such discrete system simulation programs as the General Purpose System Simulator (GPSS). By contrast, those continuous dynamic systems that are the usual concern of engineers and scientists have been traditionally simulated on analog computers. However, as the systems under investigation have become more complex and the need for accuracy and flexibility has increased, interest has grown in the application of digital computers for continuous system simulation. In addition, it is recognized that many working in these areas have no desire to learn digital computer programming. The need for a high level application language to facilitate the preparation of problems for solution on digital machines was clearly indicated. CSMP III satisfies the need.

CSMP III incorporates all the features of S/360 CSMP together with a number of enhancements and extensions.

CSMP III provides a basic set of functions with which the components of a continuous system may be represented, and accepts application-oriented statements for defining the relations between these components. This block modeling technique is common to engineering and scientific practices. CSMP III accepts FORTRAN statements, thereby allowing the user to readily handle non-linear and time-variant problems of considerable complexity. The CSMP III language consists of forty-two separate functions such as integrators, delays, function generators, Laplace transforms and limiter functions. This complement is further augmented by the FORTRAN library functions. In addition, special functions can be defined by the user, allowing CSMP III to take on the characteristics of a language oriented to any field of investigation. Input and output are facilitated by means of user-oriented control statements. Output routines are provided for tabular printing and print-plotting.

The Graphic Feature provides a powerful means for man-machine interaction at all stages of the simulation process. Communication with the machine is accomplished by means of a 2250 Display Unit equipped with a light pen and an alphameric keyboard. The program provides a set of display panels corresponding to the various stages of the simulation process. By means of these display panels, the user may review and modify his model. He may view a dynamic display of the simulation output while the computations are in progress. When the simulation is complete, he may analyze the output in more detail and he can choose which output curves he would like to have print-plotted. The program provides many diagnostic features and prompting messages to assure a successful simulation. Through these capabilities, CSMP III with the Graphic Feature permits the user to concentrate upon the phenomenon being studied rather than the mechanism for implementing the simulation.

### HIGHLIGHTS of CSMP III

#### Powerful Standard Functions

The CSMP III language contains forty-two powerful simulation functions for integration, differentiation, signal and function generation, Laplace transformation, and switching and logical operations.

#### Capability to Develop Additional Functions

By combining standard CSMP III functions and/or FORTRAN statements, the user may build large functions specifically suited to his particular field of study. These functions become part of his CSMP III language and they may be used in a manner identical to the standard CSMP III functions.

#### Wide Selection of Integration Algorithms

The user has a wide range of integration algorithms from which to choose - both single and double precision; fixed and variable step, including one specifically designed for stiff equations.

Time, the independent variable, is always calculated in double-precision.

#### Numerous Output Options

- The values of 1 to 55 selected variables may be printed during the simulation run.
- The values of 1 to 220 selected variables may be stored during the simulation run for subsequent printing in tabular or print-plot format. Consequently, the user need not anticipate all of his output requirements prior to the simulation run. He stores all relevant

variables during the run and specifies those additional variables to be printed or print-plotted at a later time.

- Print-plots are automatically scaled, labeled, and may be in linear or logarithmic format.
- As many as five variables may be print-plotted simultaneously on a single grid, each variable to its own scale or, at the user's option, a selected group of those five variables may be printed to a common scale.
- The results of several simulation runs may be easily merged and print-plotted on the same grid.
- Contoured or shaded print-plots may be produced. Such plots are useful particularly in displaying functions of two variables or the results of merged runs.
- CSMP III provides a well-defined interface to user-developed X-Y plotter subroutines.

#### Extensive Function Generation Capability

- The user may incorporate arbitrary or experimental data into his model. Such data may be the function of one or two variables.
- Interpolation between data points, including interpolation of functions of two variables, is handled automatically. The degree of interpolation (first through fifth degree) is selected by the user.
- The slope of the data is obtained with a single CSMP III command.

#### Powerful Array Handling Capability

- The storage, manipulation and printing of arrays is easily performed.
- Integrator arrays are also easily specified and handled. This capability is particularly helpful when working with partial differential equations.

#### FORTRAN-Based System

- FORTRAN statements can be intermixed (with a few minor exceptions) with CSMP III statements thereby placing the logic and algebraic capability of the FORTRAN language at the user's disposal.
- FORTRAN functions (mathematical, trigonometric, logarithmic, etc.) can be incorporated in the user's model as well as FORTRAN routines such as those of SL-MATH program product (5736-XM7).

#### Extensive Library Facilities

- The library facilities of CSMP III allow the user to develop and maintain libraries of functions, sub-models, arbitrary or experimental data, tables and complete models. This greatly simplifies the model development process.
- Complete models can be retrieved from the library, or created from elements in the library.
- Models may also be stored as executable modules eliminating the necessity of translating, compiling and link-editing a completed model prior to each simulation run.

#### Improved Coding and Debugging Aids

- The CSMP III language - including FORTRAN when used in conjunction with CSMP III - is free-form.
- The user is provided with extensive diagnostics of both his CSMP III and his FORTRAN statements.
- Extensive debugging aids are available to the user to check out his CSMP III and his FORTRAN coding.
- Extensive documentation of the entire simulation process is automatically provided.

#### Flexible Installation

- CSMP III installation, maintenance, and operation may be conveniently tailored to the user's particular hardware configuration.
- The user has the options of specifying the FORTRAN compiler and the Linkage Editor for a particular run.

#### Comparison of CSMP III (5734-XS9) with CSMP (Type II for S/360, 360S-CS-16X)

##### New Output Capability

- As many as five variables may now be print-plotted on a single grid to permit easy analysis of model interrelationships.
- The results of several simulation runs may be automatically merged and print-plotted on a single grid.

### CSMP III (cont'd)

- Contoured or shaded print-plots are not available for displaying functions of two variables or the results of merged runs.
- The number of variables which can be print-plotted from a single model have been increased from 50 to 220.
- The user may now specify the length and width of his printed page.
- CSMP III provides a well-defined interface to user-developed X-Y plotter subroutines.

#### Extensive Library Facilities

- The extensive source library facilities of CSMP III are unique to that program and are not included in previous version of CSMP.
- The storing of completed models as executable modules has been simplified.

#### Eight New Functions Provided

- A sampling function for use in collecting and processing data for a subsequent run or performing special I/O operations.
- An interpolation function in which the degree of interpolation may range from 1 through 5 and may be changed for different portions of the arbitrary data.
- An interpolation function that interpolates an arbitrary function of two variables.
- A function that computes the slope of an arbitrary function
- An array-to-scalar convertor function for accessing specific elements of an array.
- A scalar-to-array convertor function for collecting various scalar variables and combining them into a single array.
- A function for operating upon a variable with an easily-specified high-order polynomial Laplace transform.
- A variable-flow transport delay function for use in simulation models involving flow rates.

#### Usage of Arrays Simplified

- New array features simplify the modeling of distributed systems (systems represented by partial differential equations).
- Arrays of data and integrator arrays may be conveniently printed or print-plotted.
- Integrator array initial conditions may be entered as data tables in single or double precision.
- Arrays of data may be loaded directly into function generator storage.

#### Permissible Model Size Expanded

- A larger number of model variables are permissible.
- The maximum size of integrator arrays has been significantly increased.
- Previous limitations on the number of certain types of FORTRAN statements which could be included in a model have been eliminated.

#### Performance Improved

- Interpolation functions now use improved indexing and precomputed coefficients to improve execution speed.
- A new integration method which is significantly faster for stiff equations is now available.

#### Accuracy Improved

- A double precision integration method is now available.
- All integration methods now calculate TIME with double precision accuracy.
- Double precision constants now acceptable in model description.

#### Flexible Installation

- CSMP III installation, maintenance, and operation may be conveniently tailored to the user's particular hardware configuration.
- The user has options of specifying the FORTRAN compiler and the Linkage Editor for a particular run.

#### HIGHLIGHTS of the CSMP III GRAPHIC FEATURE

In addition to all the standard functions and capabilities of CSMP III, the Graphic Feature provides the following:

#### Interactive Model Development

- With its highly versatile set of editing features, the Graphic Feature makes it convenient for the user to develop simulation models, completely online.

- The user may conveniently store and retrieve data, sub-models, or entire models online using the CSMP III library. This assures continuity of model development, and helps the individual user to incorporate quickly commonly-used sub-models and data into his model.
- Both CSMP III and FORTRAN diagnostic messages are brought to the immediate attention of the user, dramatically reducing model development time.
- The Graphic Feature permits interactive graphical editing of arbitrary or experimental data that is to be incorporated in simulation models. The user may try various degrees of interpolation - from 1 through 5 - and immediately evaluate the resulting effect; data points may be added, moved, or deleted to quickly achieve the desired curve shape. Results of such interactive curve-fitting are automatically captured by CSMP III so that the model is immediately updated.

#### Interactive Simulation Run Control

- By dynamically displaying selected variables during a simulation run, the user can monitor the simulation and interrupt the run at will to change the model, model data, execution and control specifications or to vary the display itself.
- The number and length of simulation runs can be significantly reduced because the user can immediately halt simulation runs which produce unsatisfactory results.
- Parameter studies are completed in a fraction of the time; progress through the study is continually re-oriented as the user immediately sees the impact of his changes.
- Graphic plots are automatically scaled at the beginning of a run and rescaled during the run so that they are always of maximum size.
- The user may override graphic scaling as desired, zooming in on portions of the plot of particular interest simply by touching the scale with the light pen.
- Multiple-variable or multiple-run cross-plots are readily available.

#### Interactive Interrogation of Results

- Using the graphic device, the user may quickly display and analyze the results of the simulation run and select those variables which are to be printed or print-plotted for later reference and evaluation.
- One to four grids may be simultaneously displayed, with one to four variables plotted per grid.
- Graphic plots to logarithmic scales are readily available.
- The value of a plotted variable may be obtained merely by touching the display with the light pen at the appropriate point on the curve.

#### Online Reference Manual

- Whenever the user is in doubt about the use of a CSMP III statement, he can immediately obtain graphical display of instructional messages relating to rules and proper usage.
- The user may tailor this reference material to his own needs.

#### USE

The user can work from either a block diagram or a system of ordinary differential equations to prepare the language statements that are input to the CSMP III translator. The translator converts these application-oriented language statements into a FORTRAN subroutine which is automatically compiled and executed to accomplish the simulation and specified output of results.

#### CUSTOMER RESPONSIBILITIES

The user must represent the phenomenon to be simulated, by either a block diagram or a system of ordinary differential equations. Then the input language statements must be prepared and punched on cards for input to the CSMP III. A knowledge of basic FORTRAN is necessary for building more complex simulation models. Extensions to the language may be defined through a macro capability which permits the combination of standard CSMP III functions and FORTRAN algebraic and logic capability into larger more powerful functions.

The user is responsible for having or obtaining the knowledge of the Operating System required for installation and operation.

#### SPECIFIED OPERATING ENVIRONMENT

##### HARDWARE REQUIREMENTS for CSMP III

The minimum machine configuration for CSMP III, operating under the control of the Operating System with MFT or MVT option, is a S/360 mdl 40G (2040 Processing Unit) with Floating-Point Arithmetic (#4427) or a S/370 mdl 135GFO (3135 Processing Unit) with Floating-Point (#3900). The minimum partition or region size is 102K when using the FORTRAN IV (G) compiler and Linkage Editor F (88K).

The minimum machine configuration for CSMP III, operating under the control of the Operating System with Virtual Storage 1 option (OS/V51)

## PROGRAM PRODUCTS

**CSMP III (cont'd)**

is a S/370 mdl 135DHO (3135 Processing Unit) with Floating-Point (#3900). The minimum partition or region size is 104K in real mode or 128K in virtual mode when using the FORTRAN IV (G) compiler and the VS Linkage Editor.

The minimum machine configuration for CSMP III, operating under the control of the Operating System with Virtual Storage 2 option (OS/VS2), is a S/370 mdl 145I00 (3145 Processing Unit) with Floating-Point (#3910). The minimum partition or region size is 102K when using the FORTRAN IV (G) compiler and Linkage Editor F (88K).

One IBM 2314 Disk Storage Drive or the equivalent (in addition to the Operating System Disk Storage Requirement), is required to install and execute CSMP III, but this need not be dedicated disk storage. While not necessary for execution, one 2400 series tape drive is required for system installation.

The partition or region size required for the execution of CSMP III is determined by the largest of the following four phases: Translator, FORTRAN IV compiler, linkage editor or execution. The previously specified minimum partition or region size is due to the size of the linkage editor and very significant CSMP III models can be executed in this partition size.

CSMP III without the Graphic Feature will run under OS/MFT, OS/MVT, OS/VS1 or OS/VS2 in a VM/370 environment. The minimum configurations previously stated apply to the virtual machine operated in a VM/370 environment.

**HARDWARE REQUIREMENTS for the CSMP III GRAPHIC FEATURE**

The CSMP III Graphic Feature requires the CSMP III Program for its operation. The minimum machine configuration for the Graphic Feature is the following:

S/360 mdl 40GF (2040 Processing Unit) with Floating-Point Arithmetic (#4427) or a S/370 mdl 1 135DHO (3135 Processing Unit) with Floating-Point (#3900), when operating under the control of the Operating System with MFT or MVT option. The minimum partition or region size is 150K when using FORTRAN IV (G) compiler and Linkage Editor (88K). or S/370 mdl 145H00 (3145 Processing Unit) with Floating-Point (#3910), when operating under the control of the Operating System with Virtual Storage 1 option (OS/VS1). The minimum partition or region size is 154K in real mode or 192K in virtual mode when using the FORTRAN IV (G) compiler S/370 mdl 145I00 (3145 Processing Unit) with Floating-Point (#3910), when operating under the control of the Operating System with Virtual Storage 2 option (OS/VS2). The minimum partition or region size is 154K in real mode or 192K in virtual mode when using the FORTRAN IV (G) compiler and the VS Linkage Editor.

IBM 2250 Display Unit mdl 1 with the following features:

- 4K Buffer (#1498)
- Absolute Vectors and Control (#1002)
- Character Generator (#1880)
- Alphameric Keyboard (#1245)
- Light Pen (#4785)

or IBM 2250 Display Unit mdl 3 with the Alphameric Keyboard (#1245).

One IBM 2311 Disk Storage Drive or equivalent (in addition to the Operating System residence (DASD) is required to install and execute the Graphic Feature but this need not be dedicated disk storage. While not necessary for execution, one 2400 series tape drive is required for system installation.

The partition or region size for the execution of the Graphic Feature is determined by the longest of the following four phases: Translation, FORTRAN IV Compiler, Linkage Editor, or execution.

**SOFTWARE REQUIREMENTS**

CSMP III and the Graphic Feature are written in FORTRAN IV and Assembler languages and operate under control of the Operating System with MFT, MVT, VS1 or VS2 option. CSMP III without the Graphic Feature operates under the control of one of these Operating Systems running under VM/370 in virtual machine mode. CSMP III employs the following data management facilities and access methods: BPAM, BSAM, and QSAM. The Operating System must have the following programs available:

- FORTRAN IV (G or H) compiler and the FORTRAN IV Library.
- Assembler F for MFT and MVT or the respective Virtual Storage System Assembler for VS1 and VS2.
- Linkage Editor F for MFT and MVT of the respective Virtual Storage Linkage Editor for VS1 and VS2.
- The OS Utilities which are used to install CSMP III and maintain the CSMP III library data set.

The CSMP III Graphic Feature requires, in addition to the programming system requirements for CSMP III, the following:

- Graphic Access Method (GAM) for the 2250 display unit.

- Graphic Subroutine Package (GSP).
- Continuous System Modeling Program III.

This program product is released to work with Operating System Release 19 and all subsequent releases, versions, and modifications, unless so stated in a future revision of this document.

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual (GH19-7000) ... Promotional Flyer (G520-2477).*

**TERMS and CONDITIONS:** See PP Index

**INFORMATION MANAGEMENT SYSTEM (IMS/360)  
VERSION 2 (5734-XX6)****PURPOSE**

IMS/360 is an OS-based program product which supports user-written batch processing and teleprocessing applications. It provides extensive supervisory level services in two major categories.

- Data base management services which support the implementation of multiple applications in a common data base environment.
- Data communications management services which support the implementation of multiple applications in a shared terminal environment.

The data base management services are packaged as basic material in an orderable component called the Data Base (DB) System. The data communications management services are packaged as a special feature in a separately orderable component called the Data Communication (DC) Feature. The DB System is prerequisite to the DC Feature. When the basic DB System and the DC Feature are combined, the two form the Data Base/Data Communication (DB/DC) System.

Applications which operate within the environments supported by the DB or DB/DC Systems may be either batch-oriented or transaction-oriented. Batch-oriented and transaction-oriented applications may execute concurrently or separately.

In the DB System environment, applications are scheduled for execution through the operating system job stream in a process called batch-scheduling. The basic unit of work is assumed to be the operating system job step. The application itself may be transaction or batch-oriented.

In the DB/DC System environment, applications are scheduled for execution based upon the presence of transactions (input messages) in a process called transaction scheduling. The basic unit of work is the transaction. The DB/DC environment supports both batch-scheduling and transaction-scheduling of applications, either concurrently or separately. The internal logic of applications which are scheduled in the DB/DC environment is usually transaction-oriented. Evolutionary migration of applications from the Data Base System environment to the DB/DC System environment is facilitated.

The DB and DB/DC Systems of IMS/360 are designed to use the services of Operating System in its multiprogramming configurations, MFT and MVT, as well as the M65MP version of MVT and the program relocate features of OS/VS1 and OS/VS2.

**DESCRIPTION**

Application programs call upon the data base and data communications management services through Data Language/I (DL/I). DL/I provides the application program with a level of interface to the DB/DC management services which is independent of terminal and storage media programming considerations. Through installation management tools provided by IMS/360, terminal and storage media programming considerations may be manipulated independent of applications programs. Installation management can approach the problem of optimizing productivity for the total community of applications and users without affecting the functional capabilities of any of the members of that community. Existing IMS/360 application programs can be insensitive to the reorganization of stored data; the addition of new applications or data; changes in access methods, organization, or access strategy; and the introduction of new storage or terminal devices.

The data base management services of IMS/360 assist the user in:

- Description of data base structures.
- Creation of data bases.
- Access to and maintenance of data.
- Reorganization of data bases.
- Recovery and reconstruction of data.

Using utilities supplied with the system, the customer describes the structure of the data base from two viewpoints; the stored data structure as seen by the system and the logical data structure as seen by the application. Only one description of the stored data exists. However, multiple descriptions of the logical data may exist. These data base descriptions are external to application programs. They exist as stored data and are referenced by the system when it is processing access requests for application programs.

Data base descriptions define symbolic names for data-items (fields), segments, and data bases. They map collections of fields into segments and segments into data bases. To access or maintain stored data, the application program generates a functional GET/PUT level request for data base management services. As part of the functional request the application program supplies symbolic names which identify the data (segment type) to be processed. The names used are those defined in the logical data structure, not the stored data structure. Through data base descriptions the system maps the application-supplied logical data names to corresponding stored data names,

determines an access strategy and performs the requested function against the stored data.

The system description of stored data in data base descriptions contains information about organization, access strategy, the physical attributes of the data (length, format, etc.), the physical structure which exists among the stored data segments, and storage device characteristics.

A data base may be stored in two general organizations, Hierarchical Sequential (HS) or Hierarchical Direct (HD). For HS-organized data the access method and basic processing strategy may be sequential or index sequential. For HD-organized data it may be direct or index direct. Within a single data base, the system description defines a hierarchic relationship among segments within the stored data structure. In addition, relationships can be established between segments in different hierarchic structures stored within the same data base. Finally, relationships can be established between segments in different hierarchic structures stored in different data bases. The ability to interrelate hierarchic data structures assists in nonredundant data storage and permits data access through multiple retrieval paths.

Reorganization and recovery of stored data bases are supported by a set of utility programs supplied with the system.

The data communications management services of IMS/360 provide:

- Application-independent terminal management
- Input/output message traffic handling
- Terminal and program message switching
- Transaction initiated scheduling of application programs
- Conversational/interactive application support
- Terminal diagnostic aids
- System command and control language
- Resource security
- Checkpoint/restart for DB/DC environment

Application programs generate requests for message input/output operations through Data Language/I. Data is presented to the application programs in the same manner as data base requests. Data communications management services handle input and output traffic for the terminal network asynchronously to the processing performed by applications. In the characteristic response oriented interchange between terminal and application, the application is aware of the origin of the message it processes and the destination of the output it produces in a symbolic manner. It views the symbolic terminal as though it were a two level hierarchic data structure. The first level represents a segment type "First Message Segment". The second level represents a second segment type "Remaining Message Segments".

There is at least one symbolic name associated with each terminal managed by the system. Each transaction type known to the system also has a symbolic name. Messages entered by a terminal operator contain one of these two kinds of symbolic names. Based upon the characteristics of the name, an input message becomes either a message switch transaction or an application program transaction. Terminals may send messages to other terminals or to applications for processing. Applications may send messages to terminals or to other applications.

When the system receives a message for an application, it is entered into a selection queue based upon its priority relative to other messages in the system. The user specifies transaction selection priority when he generates the DB/DC System. Input transactions destined for application program processing are processed in message processing regions. When a message processing region or partition becomes available, the top transaction (message) type is selected from the queue of waiting transaction types and its associated application program identified. The application program is then scheduled for execution in the available region or partition where it will process under a unique protection key.

Some applications have the requirement to interface with a terminal operator in a conversational or interactive exchange of related input-response messages. The system will maintain data for the application between the interchanges of a conversation. A single conversation involves only one terminal operator but may take place with more than one application program.

A video terminal paging feature is provided to allow the application programmer to output multiple screens of information to a video device which may then be viewed by the terminal operator either in or out of sequence and as many times as he chooses. The capability is also provided for paging forward or backward within a series of screens, of skipping over one or more screens, and of returning later to view them. The only restriction IMS/360 imposes is that the operator may not return to a series of images after notifying IMS/360 that he has completed viewing them and has moved on to a new message or series of screens.

PROGRAM PRODUCTS

IMS/360 (cont'd)

Other applications might have the requirement for audio response support. Through the medium of a Touchtone® type telephone or a portable audio terminal (2721) in conjunction with the 7770-3 Audio Response Unit, the user can interface with application programs.

® AT&T

There is a system command and control language through which the customer can monitor and alter the operation of the DB/DC System. The commands provide dynamic display of the status of system resources such as communication lines, terminals, data bases, message queues, and programs. In addition, they permit the status of system resources to be changed dynamically. Terminal diagnostic aids can be invoked through the command language.

Provisions for system resource security are provided through a combination of password, terminal, data base, and program protection features. Through extensive checkpoint/restart capabilities, in combination with fail-soft and security provisions, a high degree of system resource integrity, reliability, and recoverability is provided.

HIGHLIGHTS

IMS/360 is a general-purpose system ... the user tailors the system to his environment ... data base support supplied through Data Language/1 ... application program independence from data management access methods and organization ... variable-length record support ... application programs may be written in COBOL, PL/I or Assembler language ... application-independent support on a multi-point or point-to-point basis for 1030, 1050, 2260, 2265, 2740, 2741, 2770 (multipoint only), 2780 and 3270 terminals (multipoint and local) ... switched communication line support for 2740 mdl 1, 2741 and 1050 terminals and the mdl 33/35 Teletypewriter (ARS) ... 7770-3 Audio Response support for the Touchtone® telephone (or equivalent equipment) and the 2721 Portable Audio Terminal ... single screen input, multiple screen output 2260 support ... a paging feature for video devices which allows output of multiple screens, viewing the screens as many times as is necessary, with the capability of forward or backward paging, or skipping over one or more screens, but being able to view any screen later ... interactive/conversational terminal application support ... teleprocessing or batch operations separately or concurrently ... transaction class selection priority scheduling ... security techniques available to user ... checkpoint/restart capability ... storage protection provided for each application program.

USE

The Customer defines the environment for applications, data bases, terminals, transactions, in a system generation process. Options and utilities enable him to tailor the generated system to his requirements. The Customer plans and implements application systems which use IMS/360 as a control program.

CUSTOMER RESPONSIBILITIES

A customer installing IMS/360 must meet the Minimum Machine Configuration (paragraph below) ... see to it that appropriate OS/360 and S/360 or S/370 training (including terminal and direct access storage education) be given to system analysts, application programmers, system programmers, and system operators ... have OS/360 successfully installed (no customer should attempt to implement IMS/360 until the installation has achieved proficiency in the use of OS/360) ... have personnel schooled in IMS/360 (a thorough knowledge and understanding of data base concepts and IMS/360 before installation are essential) ... provide adequate protection against the accidental loss or misuse of his data (functions exist within IMS/360 to assist in providing data security) ... plan for installation and operation of his remote terminals ... make sure personnel are trained in COBOL, PL/I, or Assembler language ... specify transactions for each application defined ... describe the structure of each data base for system and for application ... specify and implement application programs ... define the physical and logical communications network ... provide, if the 7770 mdl 3 Audio Response Unit is used, where required, the user-written input, output, and sign-on edit routines ... provide, if the 1030 Data Collection System is used, where required, the user-written output and sign-on edit routines ... if 3270 information Display System is used, message input and output descriptions must be created using the Format Language utility ... generate the IMS/360 control program by describing data bases, applications, transaction codes, message classes, communications lines and terminals, queues, system libraries, buffering requirements, storage devices, capacity, and programming system configuration to the IMS/360 System Definition Utility ... perform OS/360 maintenance associated with the installation of IMS/360.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

SYSTEM FUNCTION UNITS PERMITTED

Processing Unit S/360 mdls 40, 50, 65, 67 (65 mode), 75, 85, 91, 195, or S/370 Mdls 145, 155, 165 with main storage of:

M65MP	IMS/360	MFT	MVT
DB System	128K	256K	512K
DB/DC System	256K	512K	512K

If the S/360 mdl 40 is selected, the following features are required:

Selector Channel - first	#6980
Storage protection	#7520
Decimal arithmetic	#3237

Minimum Partition The practical minimum partition size is:

IMS/360	MFT	MVT	M65M
DB System	76K*	81K*	81K*
DB/DC System	175K	171K	171K

\* Plus the size of the user's application program = the practical batch minimum partition size

In order to determine particular core requirements, complete either the DB or the DB/DC Storage Estimates Worksheet (Figure 6.1 or 6.9, respectively), in the IMS/360 System/Application Design Guide (SH20-0910), Chapter 6. Examples of minimum configuration storage estimates are also provided in that chapter. The 3270 planning storage estimates are in GI Manual (GH200765).

System Console See the appropriate operating system documentation.

Tape Units DB System: At least one 2400 7-track with data conversion feature or one 2400 9-track

DB/DC System: At least two 2400 9-track

Direct Access For system libraries and working storage space any devices supported by OS/360. Minimum space for system use and maintenance:

DB System - 115 cyl 2316 or equiv.
DB/DC System - 185 cyl 2316 or equiv.

For IMS/360 data base storage, within the capability and restrictions of OS/360 support by Indexed Sequential and Sequential Access Methods

- 2301 Drum Storage
- 2302 Disk Storage
- 2303 Drum Storage
- 2311 Disk Storage Drive
- 2314/2319 Direct Access Storage Facility
- 2321 Data Cell Drive
- 2305 Fixed Head Storage
- 3330/3333 Disk Storage

Telecommunications For the DB/DC system master terminal one of the following nonswitched devices is required:

- 2740 Mdl 1 Communication Terminal
- 1050 Data Communication System with
- 1052 Printer-KeyBoard

Complete description of the required and prohibited features for telecommunications control and terminal devices appears below.

Terminal Control Units

The 2701 Data Adapter Unit, 2702 Transmission Control or 2703 Transmission Control may be used. In addition, if 2260 terminals are to be installed, the 2848 Display Control is required; if 2265 terminals are to be installed, the 2845 Display control is required. If Audio Response support is desired, the 7770 Audio Response Unit mdl 3 is required. If 3277 local display stations or 3284/3286 local printers are desired, a 3272 Control Unit is required. In addition, if remote 3277 remote display stations are desired, a 3271 Control Unit is required. Line adapters and/or data sets must be added as required for the selected terminal control units and communication line facilities. The specifications shown here do not consider combinations of terminal types or lines attached to the same control unit. For a complete description of the prerequisites and limitations applicable to each control unit, see the "Machines" section of the sales manual. Programmable features or features which change the line or terminal control characteristics and



**IMS/360 (cont'd)**

which are not shown below are not supported. In addition, there are restrictions and dependencies on processor models and channels which are described in the "Machines" and "Systems" sections of the sales manual.

For use with 1050 Data Communication System, 1030 Data Collection System, 2740 and 2741 Communication Terminals, and 33/35 Teletypewriter (ASR)

**2701 Data Adapter Unit mdl 1**

For use with 1050 and 2770 Data Communication Systems, 1030 Data Collection System, Remote 2848 Display Controls with 2260 Display Stations, Remote 2845 Display Controls with 2265 Display Stations, 2740 Communication Terminal, 2780 Data Transmission Terminal, 2980 General Banking Terminal System, 3270 Information Display System and 33/35 Teletypewriter (ASR)

	Feature #
<b>For 1050, 2740-1, 2740-2:</b>	
IBM Terminal Control Type I appropriate selective speed Terminal Base	4815 9696
<b>For 2741:</b>	
Line groups for 2741 terminals with active interrupt feature (#8055) must be isolated from 1050/2740-1 and 2740-2 terminals and the appropriate selective special features.	
<b>For 1030:</b>	
IBM Terminal Control Type II Speed Extension (Selective speed 600 bpi - #9685) Terminal Base	4616 7387 9696
In addition for 1032 Digital Time Unit, 1032 Attachment	7918
<b>For 33/35 Teletypewriter (ASR):</b>	
Terminal Control Base Terminal Control Expansion	9697 7935
<b>Additional features supported:</b>	
Autopoll Two processor switch	1319 8110
<b>2703 Transmission Control:</b>	
For use with 1050 and 2770 Data Communication System, 1030 Data Collection System, 2740 and 2741 Communication Terminals, 2780 Data Transmission Terminal, 2980 General Banking Terminal System, 3270 Information Display System, and 33/35 Teletypewriter (ASR)	

	Feature #
<b>For 1050, 2740-1, 2740-2:</b>	
IBM Terminal Adapter Type 1 with appropriate speed selection	4660
<b>For 1030:</b>	
IBM Terminal Adapter Type II	4648

**Terminal Control Units:**

The 2701 Data Adapter Unit, 2702 Transmission Control, or 2703 Transmission Control may be used. In addition, if 2260 terminals are to be installed, the 2848 Display Control is required; if 2265 terminals are to be installed, the 2845 Display Control is required. If Audio Response support is desired, the 7770 Audio Response Unit mdl 3 is required. If 3277 local display stations or 3284/3286 local printers are desired, a 3272 Control Unit is required. In addition, if remote 3277 display stations are desired, a 3271 Control Unit is required. Line adapters and/or data sets must be added as required for the selected terminal control units and communication line facilities. The specifications shown here do not consider combinations of terminal types or lines attached to the same control unit. For a complete description of the prerequisites and limitations applicable to each control unit, see the 'Machines' section of the sales manual. Programmable features or features which change the line or terminal control characteristics and which are not shown below are not supported. In addition, there are restrictions and dependencies upon processor models and channels which are described in the 'Machines' and 'Systems' sections of the sales manual.

**2701 Data Adapter Unit Model 1:** For use with 1050 and 2770 Data Communication Systems, 1030 Data Collection System, Remote 2848 Display Controls with 2260 Display Stations, Remote 2845 Display Controls with 2265 Display Stations, 2740 Communication Terminal, 2780 Data Transmission Terminal, 2980 General Banking Terminal System, 3270 Information Display System, and 33/35 Teletypewriter (ASR)

	Feature #
<b>For 1050, 2740-1, 2740-2:</b>	
IBM Terminal Adapter Type 1 with appropriate speed selection	4660
<b>For 1030:</b>	
IBM Terminal Adapter Type II	4648
<b>For remote 2848/2260 or 2845/2265:</b>	
IBM Terminal Adapter Type III	4656 or 4657
<b>For 2770 and 3270:</b>	
Synchronous Data Adapter Type II Transmission code	7698 9060 or 9061
<b>Features not permitted:</b>	
Transparency	8029
<b>For 2780:</b>	
Synchronous Data Adapter Type II Transmission code:	7698 9060 or 9061 or 9062
<b>Features not permitted:</b>	
Transparency	8029
<b>For 2980:</b>	
Synchronous Data Adapter Type II Transmission code	7698 9060
<b>Features not permitted:</b>	
Transparency	8029
<b>For 33/35 Teletypewriter (ASR):</b>	
Telegraph Adapter Type II	7885

**2702 Transmission Control:**

	Feature #
<b>For 1050, 2740-1:</b>	
IBM Terminal Control Type I IBM Terminal Control Base Start Stop Base Type 1 Line Speed Option 134.5 bps	4696 4619 7505
<b>For 2740-2:</b>	
IBM Terminal Control Type I IBM Terminal Control Base Start Stop Base Type II Line Speed Option 600 bps	4696 4619 7506 4879
<b>For 2741:</b>	
Line groups for 2741 terminals with active Interrupt feature (#8055) must be isolated from 1050/2740-1 and 2740-2 terminals and the appropriate selective special features.	
<b>For 1030:</b>	
IBM Terminal Control Type II IBM Terminal Control Base Start Stop Base Type II Line Speed Option 600 bps	4697 4619 7506 4879
<b>For 2770:</b>	
Synchronous Attachment Synchronous Base Type 1A Base Expansion Synchronous Terminal Control	7702 7703 (7706) 1440 7715 or 7716
<b>Features not permitted:</b>	
Transparency	9100
<b>For 2780:</b>	
Synchronous Attachment Synchronous Base Type 1A or 1B Base Expansion Synchronous Terminal Control	7702 7703 or 7704 1440 7715 or 7716 or 7717
<b>Features not permitted:</b>	
Transparency	9100
<b>For 2980:</b>	
Synchronous Attachment Synchronous Base Type 1A, 2A, or 2B	7702 7703, 7704,



PROGRAM PRODUCTS

IMS/360 (cont'd)

Base Expansion	or 7706
Synchronous Terminal Control	1440
Not Supported: Transparency	7715
For 3270:	9100
Synchronous Attachment	7702
Synchronous Base Type 1A, 2A	7703 or 7704
Base Expansion	1440
Synchronous Terminal Control	7715 or 7716
Not supported: Transparency	9100
For 33/35 Teletypewriter (ASR):	
Line Speed Option 110 bps	4877
Telegraph Terminal Control Base	7905
Optional features supported:	
Two processor switch	8110
2712 Attachment	8043
7770 mdl 3 Audio Response Unit	
For use with TOUCH-TONE telephone (or equivalent).	
	Feature #
For TOUCH-TONE or equivalent operation:	
No special features required	-
Features not permitted:	
EOI Disable	3540
Terminal devices not supported:	
IBM 1001 Data Transmission Terminal	
Rotary dial telephones	
Rotary dial card dialer telephones	

Terminals

Programmable features which change the control or transmission characteristics and which are not shown are not supported. Line adapters and/or data sets must be added as required for the selected terminal control units and communication line facilities. The specifications shown here do not consider combinations of terminal types or lines attached to the same control unit. For a complete description of the prerequisites and limitations applicable to each control unit, see the "Machines" section of the sales manual.

Terminals which are equivalent to those explicitly supported may also function satisfactorily. The customer is responsible for the impact that any changes to the IBM-supplied products or programs may have on such terminals.

	Feature #
1030 Data Collection System - Nonswitched network:	
1031 Input Station - mdls A1 - A7:	None
1031 Input Station - mdls B1 - B7:	None
1032 Digital Time Unit:	None
1033 - 1 Printer:	
Mono Case Printing Element	9575
1035 - 1 Badge Reader:	None
1050 Data Communication System - Nonswitched and Switched Network:	
1051 mdl 1 or mdl 2 Control Unit:	
Keyboard Request (if a 1052 is attached)	4770
Automatic EOB (if a 1052 or 1056 is attached)	1313
Optional feature supported:	
First Printer attachment	4408
1052 mdl 1 or 2 Printer-Keyboard:	
Automatic EOB	1313
Dual Case Printing Element	9571 or 9591
Optional feature supported:	
Forms Feed Control	4452
1053 - 1 Printer:	
Dual Case Printing Element	9571 or 9591
Optional feature supported:	

Forms Feed Control	4452
1054 - 1 Paper Tape Reader:	None
1055 - 1 Paper Tape Punch:	None
1056 mdl 1 Card Reader:	
Optional feature supported:	
Extended Character Reading	3861
1057 - 1 Card Punch:	None
1058 - 1 Printing Card Punch:	
Optional feature supported for 1057 and 1058:	
Extended Character Punching	3860
2260 mdl 1 and mdl 2 Display Station - Nonswitched Network:	
Remote environment - See SRL GA27-2700	
2848 Display Control - mdls 1, 2, and 3:	
Display Adapter	3355 or 3356 or 3357
Optional features supported:	
Line Addressing	4787
Non-destructive Cursor	5340
Non-destructive Cursor Adapter	5341
1053-4 Adapter	7927 or 7928
2260 Display Station mdls 1 and 2:	
Alphameric Keyboard	4766
Optional hardware supported:	
1053 Printer:	None

2260/2848 Display Station and Control - Local Network:

See SRL GA27-2700. The same features specified for 2260 remote environment are required for local support. However, no data set adapters should be specified.

Hardware not supported:

1053 - 4 Printer

2265/2845 Display Station Control - Nonswitched Network, Remote Environment:

2845 Display Control mdl 1:	
Data Set Adapter	9012 or 9013
Display Format	9101 or 9102
Tab Feature	7801
Optional features supported:	
1053 Adapter	7927 or 7928
Line Addressing	4801
Destructive Cursor	3301
2265 Display Station mdl 1:	
Alphameric Keyboard	4766
2740 mdl 1 - Nonswitched Network:	
Record Checking	6114
Terminal to Multiplexer	9700
Dual Case Printing Element	9571 or 9591
Automatic EOB	1313
Optional feature supported:	
Station Control	7479
2740 mdl 1 - Switched Network:	
Record Checking	6114
Transit Control	8028
Terminal to Multiplexer	9700
Dual Case Printing Element	9571 or 9591
Automatic EOB	1313
Dial up	3255
2740 mdl 2 - Nonswitched Network:	
Record Checking	6114
Buffer Receive	1499



IMS/360 (cont'd)

Optional features supported:

Device Adapter (up to 7) 3250

Note: At least one 3277 with keyboard of an appropriate model must be attached to the 3271

3275 Display Station, mdl 1 or 2\*:

Optional features supported:

ASCII Character Generator (A) 1085  
 ASCII Character Generator (B) 1086  
 ASCII Transmission Code 1087  
 Audible Alarm 1090  
 Operator Identification Card Reader 4600  
 66-key EBCDIC Typewriter Keyboard 4630  
 66-key EBCDIC Data Entry Keyboard 4631  
 78-key Operator Console Keyboard 4632  
 78-key EBCDIC Typewriter Keyboard 4633  
 66-key ASCII Keyboard 4634  
 78-key ASCII Typewriter Keyboard 4635  
 Security Keylock 6340  
 Transmission Speed 7820 or 7821  
 Keyboard Numeric Lock 4690  
 Printer Adapter 5550

3277 Display Station, mdl 1 or 2

Optional features supported:

ASCII Character Generator (A) 1085  
 ASCII Character Generator (B) 1086  
 Audible Alarm 1090  
 Operator Identification Card Reader 4600  
 66-key EBCDIC Typewriter Keyboard 4630  
 66-key EBCDIC Data Entry Keyboard 4631  
 78-key Operator Console Keyboard 4632  
 78-key EBCDIC Typewriter Keyboard 4633  
 66-key ASCII Keyboard 4634  
 78-key ASCII Typewriter Keyboard 4635  
 Keyboard Numeric Lock 4690  
 Security Keylock 6340  
 Selector Light Pen 6350

3284 Printer, mdl 1 or 2 (for Attachment to a 3271 or 3272):

Optional features supported:

ASCII Character Set (A) (3271 attach only) 1087  
 ASCII Character Set (B) (3271 attach only) 1088  
 Forms Stand 4450

3286 Printer, mdl 1 or 2 (for Attachment to a 3271 or 3272):

Optional features supported:

ASCII Character Set (A) (3271 attach only) 1087  
 ASCII Character Set (B) (3271 attach only) 1088  
 Forms Stand 4450

3284 Printer, mdl 3 (for Attachment to a 3275):

Optional features supported:

ASCII Character Set (A) 1087  
 ASCII Character Set (B) 1088  
 Forms Stand 4450

33/35 Teletypewriter (ASR):

Feature required:

Four row keyboard

Local Card Reader:

All local 80-column card readers supported by the operating system BSAM access method are supported by IMS/360 local card reader support.

Local Print:

Local print is supported for all printer, tapes, and sequential direct access data sets supported by BSAM.

If direct access data sets are provided, the option is available to switch data sets at EOV or through operator command and print the data set by means of SYSOUT writer while the alternate data set(s) is being filled by IMS/360.

TOUCHTONE telephone or equivalent operation - Switched Network:

This type of telephone is used with the 7770 mdl 3 Audio Response Unit.

SOFTWARE REQUIREMENTS

IMS/360 operates under Operating System (MFT, MVT, VS1 or VS2) and is written in Assembler language. Teleprocessing and batch processing application programs may be written in either Assembler language, COBOL or PL/I. For proper execution of IMS, system definition and system execution must be performed under the same OS release. A new IMS/360 system definition does not make it necessary to recompile user application programs.

If the programming system configuration is MFT, Storage Protection, Interval Timing, and Subtasking are required. The following features are recommended for better performance: PCI Fetch; Resident Access Methods and Resident Reentrant Code; Resident IDENTIFY, SPIE, STAE, and ATTACH functions.

For the Data Base System:

- General Requirements
  - Reserve one user channel end appendage suffix
  - Reserve three user SVC numbers

Program Requirements

Name	Number
Multiprogramming with a Fixed Number of Tasks (MFT)	360S-CI-505
or	
Multiprogramming with a Variable Number of Tasks	CI-535
Assembler F	AS-037
Linkage Editor F	ED-521
OS/360 Utilities	UT-506
SERO, SER1, EREP	DN-527
Primary Data Management	DM-508
Indexed Sequential Access Method (ISAM)	IO-526
Recovery Management (as applicable to processor mdl)	DN-539

If the data base utilities log, accumulator utilities, or statistics utilities are to be used, a sort/merge program is required. Note that of the following only the program product 5734-SM1 supports the 3330 device type for intermediate data storage:

Sort/Merge	360S-SM-023
Sort/Merge Program Product	5734-SM1

If application programs are written in COBOL or PL/I, at least one of the following language translators and one of the associated libraries are needed:

ANS COBOL	360S-CB-545
ANS COBOL Library	360S-LB-546
COBOL F	360S-CB-524
COBOL F Library	360S-LB-525
COBOL E	360S-CB-503
COBOL E Library	360S-CB-504
PL/I F	360S-NL-511
PL/I F Subroutine Library	360S-NL-512

In addition to those shown above, application programs may be compiled by the following language translators:

Full ANS COBOL Version 3	5734-CB2
Assembler H	5734-AS1

For the Data Base/Data Communications System, in addition to the general and program requirements shown above:

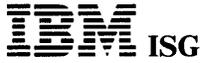
Name	Number
Basic Telecommunications Access Method (BTAM) with communication serviceability features	360S-CQ-513
If 2260 local support is required, add:	
Graphic Programming Services	360S-IO-523
If 7770-3 Audio Response support required: Reserve a second user channel end appendage suffix.	
If 3270, 3270 BTAM	360S-OS-579

COMPATIBILITY

If a user is now operating IMS/360 Version 1, the mechanics of converting to IMS/360 Version 2 are:

1. Make an IMS/360 Version 2 System Definition to create an IMS/360 Version 2 System.
2. Regenerate existing program and data base descriptions and generate application control blocks (PSB, DBD, ACB) using the IMS/360 Version 2 macro-definition library.

No change is required to existing user application programs except as noted under 3270 support information.



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PROGRAM PRODUCTS

PP 5734-XX6.7

Jul 83

Major Revision

**IMS/360 (cont'd)**

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual (GH20-0765) ... IBM System/360 System Summary (GA22-6810) ... System Concepts and Facilities (GC26-6534).*



PROGRAM PRODUCTS

**CICS/DOS - ENTRY (5736-XX6)**  
**CICS/DOS - STANDARD (5736-XX7)**  
**CICS/OS - STANDARD V2 (5734-XX7)**

**PURPOSE**

These systems form an upward compatible family of Data Base/Data Communications (DB/DC) systems providing a common application program interface. They simplify the implementation of terminal-oriented applications and provide an upward migration path. This compatibility exists at the source code level.

**DESCRIPTION**

The CICS System is a general purpose DB/DC interface between the operating system (OS or DOS) and user-written application programs (either ANS COBOL, PL/I or Assembler language). These systems provide the user with the facilities to generate a CICS system configuration applicable to his needs and to define the environment in which the system is to execute. User exits are provided for optional processing as required for specific system operation. Also provided is a macro facility to communicate application program service requests.

Functions necessary to support a DB/DC system and those required to support other standard terminal applications are provided by the CICS systems through the following management facilities.

**Task Management** -- Provides the dynamic multitasking\* facilities necessary for effective, concurrent transaction processing. Functions associated with this facility include priority scheduling, transaction synchronization and control of serially reusable resources.

**Storage Management** -- Controls main storage allocated to CICS. Storage acquisition, disposition, initialization and request queuing are among the services and functions performed by this component of CICS.

**Program Management** -- Provides a multiprogramming capability through dynamic program management while offering a real-time program fetch capability.

**Program Interrupt Management** -- Provides for the interception of program interrupts by CICS to prevent total system termination. Individual transactions that program check are terminated by CICS with a dump (if Dump Management is used), thus preventing the entire CICS partition/region from terminating.

**Time Management** -- Provides control of various optional task functions (system stall detection, run-away task control, task synchronization, etc.) based on specified intervals of time or the time of day.

**Dump Management** -- Provides a facility to assist in analysis of programs and transactions undergoing development or modification. Specified areas of main storage are dumped onto a sequential data set, either tape or disk, for subsequent off-line formatting and printing using a CICS utility program.

**Terminal Management** -- Provides polling according to user specified line traffic control as well as user requested reading and writing. This facility supports automatic task initiation to process new transactions. The testing of application programs is accommodated by the simulation of terminals through sequential devices such as card readers, line printers, disk, tape, etc.

**File Management** -- Provides a data base facility using direct access and indexed sequential data management. This function supports updates, additions, random retrieval and selective retrieval (browsing) of logical data on the data base. CICS/OS provides single-thread access to the Data Language/I Facilities of the IBM Information Management System/360 Version 2 (IMS/360). For complete information on the capabilities of DL/I, refer to the appropriate IMS/360 manuals (GH20-0765, SH20-0910, SH20-0911, SH20-0912).

**Transient Data Management** -- Provides the optional queuing facility for the management of data in transit to and from user defined destinations. This function has been included to facilitate message switching, data collection and logging.

**Temporary Storage Management** -- Provides the optional general purpose "scratch pad" facility. This facility is intended for video display paging, broadcasting, data collection suspension, conservation of main storage, retention of control information, etc.

\* CICS/DOS-Entry employs Quasi-multitasking, i.e., single thread processing using a roll-out/roll-in technique to facilitate conversational processing.

Additional management functions provided by CICS include the following:

**Asynchronous Transaction Processing** -- Provides the capability to read and queue (store) batched input from time-dependent devices and to dequeue and write back to a time-dependent device the output data created by the processing of batched input. Asynchronous transaction processing is performed concurrently with other terminal activity. (Not available for CICS/DOS-Entry.)

**3270 Basic Mapping Support** -- Provides Basic Mapping Support for use with the IBM 3270 Information Display System. The application programmer is provided access to both input and output 3270 data streams without being required to include (or be aware of) any 3270 device-dependent logic. The 3270 data streams are mapped into screen formats which are defined and assembled by use of CICS macro instructions.

**2260 Compatibility** -- Allows the user to run his currently operational 2260-based transactions from an IBM 3270 Information Display System. The Compatibility mode is specified by the user (by transaction and by terminal); operation can be intermixed with IBM 3270 Native mode. Two levels of compatibility are provided: a full screen operation or format mode. The latter is more efficient; however, not all 2260 operations are supportable within the format mode. The level of support can be selected by transaction. Four basic methods of 2260 screen and keyboard operation are supported. In most cases, the user is not required to make any changes to application programs.

In addition to the management functions described, CICS provides the following system service programs:

**Sign On/Sign Off** -- Provides terminal operator identification (security).

**Master Terminal Function** -- Provides dynamic user control of the system. The master terminal operator can change the status and values of parameters used by CICS and thereby alter the operation of the system.

**Supervisory Terminal Function** -- Performs a terminal-oriented subset of the services available to the master terminal. They are limited to the terminals under a given supervisor's jurisdiction.

**System Statistics** -- Provides the capability to dynamically log system statistics.

**Abnormal Condition** -- Intercepts abnormal conditions (except those associated with a terminal) not handled directly by the operating system.

**Terminal Abnormal Condition** -- Intercepts terminal abnormal conditions not handled directly by the operating system.

**System Termination** -- Allows the user to terminate operation of CICS by gathering summary statistics, closing data sets and returning control to the operating system.

**Trace** -- Provides a program debugging facility that reflects the execution of CICS macro instructions by CICS management programs and user-written application programs.

**Dynamic Open/Close** -- Allows the user to dynamically OPEN/CLOSE his data sets during the real-time execution of CICS.

**Time of Day Control:** Provides the capability for CICS to operate on a round-the-clock basis. CICS adjusts the expiration times it maintains in response to changes in the time of day maintained by the operating system, and then resets its date and time of day to the date and time of day maintained by the operating system.

Although the CICS/DOS-Entry system is functionally upward compatible, the throughput capabilities of this system would be significantly less than CICS/DOS-Standard or CICS/OS-Standard V2 in a moderate to large environment because of the technique utilized to function in a small main storage configuration.

**USE**

CICS is a modular program with system generation capabilities. The user selects those modules which meet his unique requirements during the system generation process. Each of the selected modules is resident in main storage during execution of the user's information system. Communication between the user-written application program and CICS is via CICS macro instructions.

Activity within the central processing system is initiated by data from a terminal on the system. All application program requests for terminal and file read-write are processed by the appropriate operating system through CICS. The operating system supervisor and data management services are used by CICS when they are functionally applicable. Features are incorporated which assist in the serviceability of components of the system to provide maximum system availability.

**CUSTOMER RESPONSIBILITIES**

To successfully install and use the CICS system, the customer must have the necessary minimum required machine configuration installed. In addition, he must have the appropriate operating system installed as required by the CICS system to be used ... have a thorough knowledge of the information system application ... train system analysts, programmers and operators in CICS ... design and create a data base ... design terminal formats ... design and implement application programs, using CICS macro instructions, to service his application

PROGRAM PRODUCTS

**CICS/DOS-Entry & Standard  
CICS/OS-Standard V2 (cont'd)**

needs ... train operators for terminal-oriented application operation ... develop procedures to assure adequate security for data in the system ... develop appropriate back-up procedures for his application ... develop conversion procedures and schedules. If the TCAM option is selected, the user must write the required TCAM Message Control Program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum partition/region size for CICS systems is as follows:

CICS/DOS-Entry (5736-XX6)	30K
CICS/DOS-Standard (5736-XX7)	44K
CICS/OS-Standard V2 (5734-XX7)	64K

See "Storage Considerations" for further storage requirements information.

Unless incorporated as standard features on the processing units, the Decimal Arithmetic (#3237) and Interval Timer (#4760) features are required. The configuration must include sufficient I/O devices to support the requirements for system output, system residence, and system data sets. Sufficient direct access storage must be provided to satisfy user information storage requirements and may consist of 2311 Disk Storage Drives and/or the 2314/2319 Direct Access Storage Facilities and/or the 2321 Data Cell Drives, and/or the 3330/3333 Disk Storage.

The appropriate line adapters and telecommunications control units must be included in the system configuration.

CICS/DOS is distributed on 9-track or 7-track tape or optionally on 2316 disk pack.

The following IBM terminals, terminal control units and programmable special features are supported by CICS. The user should be aware that many terminal and control unit special features are transparent to programming, and are therefore readily usable even though not specifically identified. Only those terminals and features supported by both CICS/OS Version 2 and TCAM are applicable for use by CICS application programs which are associated with terminals attached to TCAM.

**Terminals Connected Via Nonswitched Lines**

**Start Stop Transmission**

- 1030 Data Collection System with:  
1031 Control Unit/Input Station and, optionally:  
1033 Printer  
1035 Badge Readers
- 1050 Data Communication System with:  
1051 Control Unit mdl 1 or 2  
1052 Printer Keyboard with, optionally:  
1053 Printer mdl 1  
1056 Card Reader
- 2260 Display Station mdl 1 or 2 with:  
2848 Display Control mdl 1, 2, or 3 with, optionally:  
Line Addressing (#4787), and/or  
1053 Printer mdl 4
- 2265 Display Station mdl 1 or 2 with:  
2845 Display Control with optionally:  
Line Addressing (#4801), and/or  
1053 Printer mdl 4, and/or Tab (#7801)
- 2740 Communication Terminal mdl 1 with, optionally:  
Record Checking (#6114), and/or  
Station Control (#7479)
- 2740 Communication Terminal mdl 2 with, optionally:  
Record Checking (#6114), and/or  
Buffer Receive (#1499)
- 2741 Communication Terminal  
For the CICS/DOS systems, the Transmission Control Unit or ICA must be equipped with 2741 Break (#8055), or equivalent
- 2760 Optical Image Unit attached to a  
2740 Communication Terminal mdl 1 with:  
Record Checking (#6114)
- S/7  
5010 mdls A2-A16 with Asynchronous Com Cntrl (#1610)

**Binary Synchronous Communication**

- S/360 or S/370 via:  
Integrated Communications Attachment (mdls 25 and 135)  
2701 Data Adapter Unit, or  
2703 Transmission Control

- S/360 mdl 20 Processing Unit with:  
Binary Synchronous Communications Adapter (#2074), and  
EBCDIC Transmission Code (#9060), or  
ASCII Transmission Code (#9061), and, optionally:  
Station Selection (#7477)
- 2770 Data Communication System  
2772 Multipurpose Control Unit variety:  
EBCDIC Transmission Code (#9761), or  
ASCII Transmission Code (#9762) and, optionally:  
WACK Response (#9936), and/or  
Buffer Expansion (#1490), and/or  
Conversational Mode (#1910), and/or  
Multi-point Data Link Control (#5010), and  
545 Output Punch, and/or  
1053 Printer, or  
2213 Printer, and/or  
2265 Display Station, and/or  
2502 Card Reader
- 2780 Data Transmission Terminal with:  
EBCDIC Code (#9762), or  
ASCII Code (#9761), or  
6-Bit Transcode (#9760) and, optionally:  
Multi-point Line Control (#5020)
- 1130 Computer System with:  
Synchronous Communications Adapter (#7690)
- 2980 General Banking System  
2972 mdl 8 (RPQ 858160), and/or 2972 mdl 11 (RPQ 858231)  
with optionally: 2980 mdl 1 (RPQ 835509) and/or 2980 mdl 1  
(RPQ 835509) and/or 2980 mdl 2 (RPQ 835505), and/or 2980  
mdl 4 (RPQ 858147), Buffer Expansion (RPQ 858165) for mdls 1,  
2 and 4, and/or Auditor Key (RPQ 858188) for 2980 mdl 2.
- S/3 mdls 6 and 10  
5406 Processing Unit mdls B2-B4, or  
5410 Processing Unit mdls A2-A16, with:  
Binary Synchronous Communications Adapter (#2074) and,  
optionally:  
Station Selection (#7477)
- S/32 (supported as a S/3)  
5320 System Unit (all models) with:  
Binary Synchronous Communications Adapter (#2074)
- 3270 Information Display System  
3271 Control Unit mdl 1 or 2 with, optionally:  
ASCII Transmission Code (#1087)  
3277 Display Station mdl 1 or 2, and/or  
3284 Printer mdl 1 or 2, and/or  
3286 Printer mdl 1 or 2, and/or  
3287 Printer mdl 1 or 2  
(as a 3284-1 or 2/3286-1 or 2 and/or  
3275 Display Station mdl 1 or 2 with:  
Printer Adapter (#5550) for 3284 Printer mdl 3  
and, optionally:  
ASCII Transmission Code (#1087)  
Keyboard Numeric Lock (#4690)  
Selector Pen (#6350)  
Audible Alarm (#1090)  
Security Keylock (#6340)  
Copy (#1550) for 3271 Control Unit

**Terminals Connected Via Switched Lines:**

**Start Stop Transmission**

- 1050 Data Communication System with:  
1051 Control Unit mdl 1 or 2  
1052 Printer Keyboard with, optionally:  
1053 Printer mdl 1  
1056 Card Reader
- 2740 Communication Terminal mdl 1 with:  
Dial-Up (#3255) and, optionally:  
Record Checking (#6114)
- 2741 Communications Terminal with:  
Dial-Up (#3255) ... for the CICS/DOS systems,  
the Transmission Control Unit or ICA must be equipped  
with 2741 Break (#8055), or equivalent
- 2760 Optical Image Unit attached to a  
2740 Communication Terminal mdl 1 with:  
Dial-Up (#3255), and  
Record Checking (#6114)
- S/7  
5010 mdls A2-A16 with: Asynchronous Communications  
Control (#1610)  
Autocall (#1310) on 2702 or Autocall (#1340) on 2703
- 3101 Display Terminal (Models 10, 11, 12, 20,  
21,22) on switched lines 110-1200 bps

PROGRAM PRODUCTS

**CICS/DOS-Entry & Standard  
CICS/OS-Standard V2 (cont'd)**

- TWX Common Carrier Teletypewriter Exchange Terminal Station (mdl 33/35) eight-level code at 110 bps on common carrier switched 150-baud networks

**Binary Synchronous Communication**

- S/360 or S/370 via: Integrated Communications Attachment (mdls 25 and 135) 2701 Data Adapter Unit, or 2703 Transmission Control
- S/360 Mdl 20 Processing Unit with: Binary Synchronous Communication Adapter (#2074), and EBCDIC Transmission Code (#9060), or ASCII Transmission Code (#9061) and, optionally: Automatic Calling (#1315)
- 2770 Data Communication System 2772 Multipurpose Control Unit, with: EBCDIC Transmission Code (#9761), or ASCII Transmission Code (#9762) and, optionally: WACK Response (#9936), and/or Buffer Expansion (#1490), and/or Conversational Mode (#1910), and/or Automatic Answering (#1340), and/or Identification (#4610), or Security Identification (#6310), and 545 Output Punch, and/or 1053 Printer, or 2213 Printer, and/or 2265 Display Station, and/or 2502 Card Reader
- 2780 Data Transmission Terminal with: EBCDIC Code (#9762), or ASCII Code (#9761), or 6-Bit Transcode (#9760) and, optionally: Automatic Answering (#1340)
- 1130 Computing System with: Synchronous Communications Adapter (#7690)
- S/3 mdls 6 and 10 5406 Processing Unit mdls B2-B4, or 5410 Processing Unit mdls A2-A16, with: Binary Synchronous Communications Adapter (#2074) with, optionally: Automatic Calling (#1315)
- S/32 (supported as a S/3) 5320 System Unit (all models) with: Binary Synchronous Communications Adapter (#2074)

**Terminals Connected Via Local Attachment**

- 2260 Display Station mdl 1 or 2 with: 2848 Display Control mdls 1, 2, 3, 21 or 22 with, optionally: Line Addressing (#4787) and/or 1053 Printer mdl 4
- 3270 Information Display System 3270 Control Unit mdl 1 or 2 with: 3277 Display Station mdl 1 or 2, and optionally: 3284 Printer mdl 1 or 2, and/or 3286 Printer mdl 1 or 2, and/or 3287 Printer mdl 1 or 2 (as a 3284-1 or -2 /3286-1 or -2) and, optionally: Keyboard Numeric Lock (#4690) Selector Pen (#6350) Audible Alarm (#1090) Security Keylock (#6340)
- 7770 Audio Response Unit mdl 3 TOUCH-TONE® type telephone, or equivalent equipment, and IBM 2721 Portable Audio Terminal are supported through the 7770 mdl 3 Audio Response Unit

**SOFTWARE REQUIREMENTS**

All CICS modules are coded using S/360 Assembly language. Communications to CICS occur via the CICS macro instructions and the coding which is included in the user-written programs. CICS operates as a single task within a partition (region) and may operate in a dedicated or multiprogramming environment. The selection of the environment is the user's responsibility, as is the selection of system options beyond those required for the operation of CICS.

CICS/DOS-Entry and CICS/DOS-Standard systems operate under the IBM Disk Operating System (DOS). The following components of DOS are required:

- Resident Supervisor:  
2311/2314 360N-SV-474 (Main Storage S/360)  
2311/2314/3330 370N-SV-495 (Main Storage S/370)
- System Control and Basic IOCS, 360N-CL-453/370N-CL-453
- Direct Access Method, 360N-IO-454/370N-IO-454
- Basic Telecommunications Access Method, 360N-CQ-469/370N-CQ-469
- Assembler, 360N-AS-465/370N-AS-465 (14K variant) or Assembler F, 360N-AS-466
- Utilities Group 1, 360N-UT-461
- Utilities Group 2, 360N-UT-462
- Magnetic Tape IOCS, 360N-IO-456/370N-IO-456, and/or Sequential Disk IOCS, 360N-IO-455/370N-IO-455

**Note:** To use the 3330 Direct Access Storage Device, the user must have a DOS System at least as recent as Release 27.

The Interval Timer Option, Decimal Arithmetic Feature and BTAM Teleprocessing feature must be included in the DOS system generation. The interval timer must be reserved for use by CICS during execution of the system.

In addition to the above DOS components, the user may require any of the following:

- Indexed Sequential File Management System, 360N-IO-457/370N-IO-457
- Full ANS COBOL V3 Compiler, 5736-CB2 and Full ANS COBOL Library\*\*, 5736-LM2
- ANS COBOL Subset (DOS), 5736-CB1
- ANS COBOL, 360N-CB-482
- PL/I Optimizing Compiler, 5736-PL1
- PL/I Resident Library, 5736-LM4
- PL/I Transient Library, 5736-LM5
- 3735 Form Description Macros and Utility, 370N-CQ-493

\*\* This does not include support for object code produced by the optimizing option.

**Note:** The user should be aware that ANS COBOL Compiler (360N-CB-482), Full ANS COBOL V3 Compiler (5736-CB2, PL/I Optimizing Compiler (5736-PL1) and Assembler F (360N-AS-466) require a main storage partition larger than the minimum required for operation of the CICS/DOS-Entry system. He should also be aware that if the ANS COBOL Compiler (360N-CB-482) or the Full ANS COBOL V3 Compiler (5736-CB2) is used with the minimum main storage size for the CICS/DOS-Standard system, there is only space for a 10K DOS nucleus.

The CICS/DOS user with ISAM must use the CICS ISAM logic module.

CICS may be assembled under Assembler, 360N-AS-465/370N-AS-465, with the following restrictions:

1. Stage 1 of SYSGEN may cause the following errors:
  - a. IJQ054 Local dictionary full
  - b. IJQ059 Undefined sequence symbol
  - c. Extraneous (irrelevant) MNOTEs between IJQ054 and IJQ059.

These errors may be ignored, and the output from Stage 1 will still be executable; however, some MNOTEs may be lost in final error checking and the results may not be as the user intended.

2. No more than twenty terminal types may be specified in Stage 1 of SYSGEN. This count of twenty terminal types includes terminals of the same type but with different features. (Example: BASIC 2741 and 2741 with checking are considered two terminal types). If this limit is exceeded the following error will occur:

IJQ096 Macro instruction or prototype operand exceeds 127 characters in length.

This error will produce unusable output from Stage 1.

3. The Destination Control Table will require 44K to assemble, therefore will not assemble in the CICS minimum configuration.
4. CICS will assemble under Assembler F, 360N-AS-466, with no errors.

To use Assembler F the installation must have a 2314, 2311 or 3 tape drives for assembler work files.

CICS/OS-Standard Version 2 operates under the IBM S/360 Operating System (OS/360). If access to the Data Language/I (DL/I) facility of the IMS/360 Version 2 Data Base system is provided by the CICS/OS-Standard Version 2 system, the CICS-DL/I interface operates as a separate task within the CICS partition/region. In this case, the user must have a multiprogramming environment. The following components of OS are required:

- Supervisor: MFT, 360S-CI-505, or MVT, 360S-CI-535
- Primary Data Management 360S-DM-508
- Direct Access Method (BDAM), 360S-DM-509
- Basic Telecommunications Access Method (BTAM), 360S-CO-513, and/or Graphic Programming Services, 360S-IO-523
- Assembler F, 360S-AS-037 and/or Assembler H, 5734-AS1
- Linkage Editor (E), 360S-ED-510 or Linkage Editor (F), 360S-ED-521
- Utilities, 360S-UT-506

The Multiple WAIT and Interval Timer options must be included in the OS system generation.

In addition to the above OS components, the user may require any of the following:

- Indexed Sequential Access Method (ISAM), 360S-IO-526
- Full ANS COBOL V3 Compiler and Library, 5734-CB1
- Full ANS COBOL V4 Compiler and Library, 5734-CB2, and Library only, 5734-LM2
- ANS COBOL, 360S-CB-545, and ANS COBOL Library, 360S-LM-546
- PL/I Optimizing Compiler and Libraries, 5734-PL3
- PL/I F, 360S-NL-511, and PL/I F Subroutine Library, 360S-LM-512
- Telecommunications Access Method (TCAM), 360S-CQ-548
- 3735 Form Description Macros and Utility, 360S-CQ-596
- A Type 4 SVC Number to be assigned to CICS for support of the 7770 Audio Response Unit

## PROGRAM PRODUCTS

**CICS/DOS-Entry & Standard  
CICS/OS-Standard V2 (cont'd)**

- IMS (Version 2, Modification Level 2 or later) Data Base System (5734-XX6) and OS system generation options required to handle an IMS Data Communication System.

Note: To use the optional "browsing" feature of CICS File Management, the CICS/OS user must have an operating system at least as current as Release 20.1 of OS.

To use the optional dynamic open/close function, the CICS/OS user must have an operating system at least as current as Release 20.0 of OS.

## PROGRAM PRODUCTS

**SYSTEM/3 DOS/VS RPG II  
CONVERSION PREPROCESSOR  
5735-CV1****PURPOSE**

The S/3 DOS/VS Conversion Preprocessor is a set of programs designed to convert batch (\*) application programs written for the S/3 mdl 10 Disk and mdls 8, 12, 15 RPG II Compilers (5702-RG1, 5704-RG1, 5704-RG2, 5705-RG1) to a form acceptable to the DOS/VS RPG II Compiler (5746-RG1).

\* All programs not using communications support and/or assembler routines.

The Auto Report source programs and library members are also processed. The Conversion Preprocessor exists in two functionally equivalent programs.

- For use on S/3.
- For use under DOS/VS.

**HIGHLIGHTS**

For the conversion of S/3 RPG II source programs, which must have been previously successfully compiled by the S/3 RPG II Compiler, the user provides information about the new system environment by means of control statements. The user must specify:

- Whether all S/3 Disk file specifications are to be converted to VSAM or whether the File Description Specifications will be changed manually.
- The names of DOS/VS sublibraries for S/3 units (for Auto Report Programs only).
- The association of S/3 files and devices with DOS/VS devices and symbolic devices.

The control statements can be used globally for a whole stream of S/3 RPGII source programs and also locally for single programs within the stream.

The following conversions are performed automatically:

- File names of eight characters are reduced to seven characters and checked for non-uniqueness.
- Default values are inserted to avoid unnecessary manual intervention.
- For disk files translated to VSAM files, the file types are converted to corresponding VSAM files types.
- Information that is meaningless in a DOS/VS environment is deleted.
- A check is made for DOS/VS RPG II reserved words.
- Line counter specifications are changed to meet DOS/VS requirements

All conversion changes performed automatically are indicated in information messages. Where the user should check the conversion, warning messages are issued. In the few instances where automatic conversions cannot be performed, error messages are issued indicating that manual action must be taken.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Conversion Preprocessor operates on any IBM S/370 supported by DOS/VS in a minimum virtual partition of 64K. It will also operate on a S/3 mdl 15 or a S/3 mdl 10, mdl 8 and mdl 12 if these latter systems have a minimum of 32K bytes of main storage. In any case, a disk oriented system is required.

**SOFTWARE REQUIREMENTS**

The S/3 DOS/VS RPG II Conversion Preprocessor source code is written in RPG II and can be installed on a system containing either DOS/VS RPG II (5746-RG1) running under DOS/VS Release 34, or DOS/VS Release 34 with the Advanced Functions - DOS/VS, 5746-XE2, program product installed, or S/3 RPG II (5702-RG1, 5704-RG1, 5704-RG2 or 5705-RG1) running under the current S/3 SCP.



**PROGRAMMABLE STORE SYSTEM  
SUBSYSTEM PROGRAM PREPARATION SUPPORT II  
(SPPS II) Version 1 Release 3 Modification 0  
5735-D16****PURPOSE**

Subsystem Program Preparation Support II (SPPS II) supports the 3650 and 3680 Programmable Store Systems. It provides a general purpose programming facility for writing application programs to run in the Programmable Store System store controllers and the programmable terminals. These programs are prepared on the host processor, transmitted to the 3651 or 3684 store controller and executed at the store controller or the programmable terminal.

SPPS II provides support for all models of the 3683 Point of Sale Terminal and 3684 Point of Sale Control Unit, the 3685 Display Control Unit Models 1 and 2, 3286 Display Station Model 1, the 3651 Store Controller Models 25 and 75, the 3653 Model 1P and the 3663 Supermarket Terminal Models 1P and 3P.

**HIGHLIGHTS**

**Subsystem Program Preparation Support II (SPPS II):** SPPS II is the user program facility for the programmable store system. Programs written with SPPS II can support the hardware devices, communicate with the host computer and provide new applications that are not supplied by IBM. SPPS II provides the following additional services:

- SPPS II Assembler language
- SPPS II Macros
- Post Processor

**SPPS II Assembler Language:** SPPS II provides additional Assembler language instructions supported as macros. These instructions are assembled at the host processor and executed at the store controller or the programmable terminal or both. Arithmetic, logical and branching instructions are included in the set.

**SPPS II Macros:** SPPS II macros are executed in the 3651, 3684 or the programmable terminal, depending upon the macro type. The macros, along with assembler instructions, are assembled together at the host processor, then transmitted to the store controller.

- SPPS II supervisory macros are provided to define the message routing path between a terminal program and a controller program, to initialize a user program for execution and allocate system resources and control blocks.
- SPPS II controller to controller communications macros are provided to control the Auxiliary Communication Adapter. Available on the 3651 mdl 75.
- SPPS II Debug Macros are included to provide a diagnostic tool to the SPPS II programmer. The target application is the program to be debugged and the issuing application is the program performing the diagnostic.
- SPPS II macros are provided that execute in the programmable terminal, perform various terminal functions and control terminal operations.

**Post Processor:** SPPS II provides a Post Processor as a standalone program, executing in the host S/370 or 4300. It uses the SPPS II program assembly listing as input and produces a reformatted and edited assembly listing as output.

**CUSTOMER RESPONSIBILITIES**

The customer must create a unique macro library for SPPS II. The user must then install the macros supplied with SPPS II and the Post Processor.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

SPPS is designed to operate on the following IBM machines: System/370; 4300 Processors.

**SOFTWARE REQUIREMENTS**

SPPS II is designed to operate on any IBM System that will support the System/370 Assembler F operating under DOS/VSE, OS/VS1 or OS/VS2 (MVS). For the 3650 PSS user, the SPPS II SCP (5747-CJ2 for DOS or 5744-DA1 for OS) is a co-requisite for the SPPS II program product if the Terminal Display Language (TDL) is to be used.

**COMPATIBILITY**

Existing 3650 user programs assembled by Subsystem Program Preparation Support (SPPS) must be changed to gain the advantages of SPPS II. User programs written for the 3683 and/or the 3684 which perform I/O operations to devices unique to those machines (except LOOP I/O) will not operate in the 3685 and vice versa.

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** Yes



**3680 PROGRAMMABLE STORE SYSTEM/  
SALES APPLICATION  
RELEASE 2.0, MODIFICATION LEVEL 0  
5735-D61**

**PURPOSE**

The 3680 Programmable Store System/Sales Application Program Product provides standard and extended sales transaction functions for a variety of store environments. The control unit and terminal segments programs are written in the Subsystem Program Preparation Support II (SPPS II) language allowing the user to modify them to suit his particular environment. Some of the types of stores for which these programs are intended include:

- Mass merchandisers
- Department stores
- Supermarkets and superettes
- Apparel
- Shoe
- Variety
- Drug
- Speciality
- Convenience

Functions may be added, deleted or changed to adapt the standard functions to the user's unique requirements. The extended functions may be used as described or serve as an example for other, user-designed alterations. These documented alterations, as well as those of the user's own design, are made using the programming capabilities of SPPS II.

**DESCRIPTION**

The programs are designed to be assembled on a S/370 or 4300 host processor operating under VSE/AF, OS/VS1 or OS/VS2 (MVS). A prerequisite is the SPPS II program product, 5735-D16, the language in which this program product is written.

The OS/VS version of Release 2 uses the System Modification Program (SMP) for distribution and service; the VSE/AF version uses the Maintain System History Program (MSHP). SMP and MSHP both provide improved installability and serviceability, and allow the user to better control the function and service level of his system.

The program product consists of two segments: A retail environment and a supermarket environment

The retail segment executes on the 3684 Point-of-Sale/Control Unit mdl 1 or 2 with 3683 Point-of-Sale Terminals, mdl 1, 2 or 3, and will primarily support retail-related point-of-sale environments.

The supermarket segment executes on the 3684 Point-of-Sale/Control Unit mdl 2 with 3683 Point-of-Sale Terminals mdl 1, 2 or 3, and will primarily support supermarket-related point-of-sale environments.

Standard and extended sales functions provided for a retail operational environment by this program product are:

**Standard Sales Functions**

- Price Lookup
- Automatic Price Override
- Department Totals
- Item Movement
- Credit Authorization
- Transaction Logging

**Store Level Options such as:**

- Control Negative Entries
- Maximum Transaction Discount
- Default Transaction Discount
- Activating or Deactivating Functions and Changing Value or Threshold Limits

**Sales Transaction Types**

- Cash Take
- Cash Send
- COD (Cash On Delivery)
- Layaway
- Charge - Credit Plan A
- Charge - Credit Plan B
- Charge - Credit Plan C
- Charge - Credit Plan D

**Other Capabilities During Sales Transactions**

- Operator Guidance through Keying Sequence
- Journal Tape Recording of all Transactions
- Customer Receipt for a Cash Sale
- Sales Check for Charge or Other Transactions Requiring a Document
- Calculate Discounts
- Display Amount Due, Amount Tendered, Change Due, Refund
- Accept Keyboard and/or Wand Input
- Accumulate Transaction Total
- Accumulate Sales Period Totals by Terminal

- Fee Collection
- Modify Ticket Function
- Data Entry

**Non-merchandise Function**

- Allowance
- Discount
- Manual Tax Entry
- Payment
- No Sale Function
- Void Line item
- Void Transaction
- Force Operator to Void
- Multiple Pricing
- Clear Function
- Repeat Entry
- Check Out Mode
- Return-Credit
- Sales Period Totals
- Totals Readout/Reset (3 Types)
- Set Date and Time
- Sign On/Sign Off
- Journal Roll and Sales Check Indication Offline
- Department Totals Report
- Register Totals Report
- Item Price Change
- System Quiesce
- System Status Inquiry

**Extended Sales Functions**

- Cash Default Transaction
- Cashier Mode
- Quantity Keyed First
- Item Lookup Keying
- Department Keys
- Item Descriptor Lookup
- Check Endorsement
- Selective Record Code Logging
- Document Header Alignment by Transaction Type
- Positive Feedback from Wandering
- Cash Drawer Options
- Frank Cashlike Tender Option
- Enter and Record Multiple Cashlike Tender
- Enforce Amount Tendered Entry
- Alternate Cash Transaction Entry
- Transaction Type - Single Key
- Bypass Amount Tendered
- No Sale Key Control
- Prohibit Negative Entries and Operations by Transaction Type
- Wand Price Change Tickets
- Control Over Voiding a Preceding Item
- Automatic Tax Calculation
- Multiple Tax Tables
- Charge Balance Due on Cash Transaction
- Bypass Credit Authorization Offline
- Automatic Total at Sales Check End
- Display Minus Sign for Returns
- Line Item Discount
- Sales Period Totals Option
- Check Authorization
- Minimum Fees for COD, Layaway and Send Transactions
- Dept/Class Validation and Descriptor Lookup
- Bypass Entry of Stock Number
- No Tax of Fees
- Floor Limit Check Authorization Offline
- Floor Limit Credit Authorization Offline
- Multiple Tax Fees
- Modulo Check of Key Entry
- Mask Journal Rolls Totals Printout
- Define Transaction Type Prohibited
- Define Key Entry Sequence for Department/Class/Stock
- Salesperson from Keyboard or Wand
- Fractional Quantity
- Decimal Quantity Entry
- Terminal Security Code
- Bypass Prompt for Account Number

PROGRAM PRODUCTS

**3680 Prog. Store System/Sales Application (cont'd)**

Alphabetic Data Entry During Sales Transaction  
 Additional Accounting Totals Recording  
 Extended Layaway  
 Bypass Amount Tendered  
 Enforce Amount Tendered  
 Class Validation  
 Deposit Limit on C.O.D. and Layaway  
 Enhanced Error Codes  
 Item Movement Accumulation  
 Magnetic Wand  
 Optical Character Read Wand  
 Unique Return Transaction  
 Seven Digit Price Entry  
 Totals Retention During Power Loss  
 UPC/EAN (Bar) Wand  
 Positive Feedback from Wanding  
 Host Positive Credit

Permit Manual Handling of Tender  
 Permit Use of Food Stamp Key  
 Positive Wand Response Not Used  
 Wand Override Number  
 Wand Input of Customer ID Number  
 Support Totals Retention Feature on Terminal  
 Calculate Discounts and Tax Exemption  
 Support Use of a non-IBM Coin Dispenser  
 Change Store Coupon Effect on Taxability  
 Exempt Food Stamp Items from Taxes  
 Permit No Sale during a Transaction  
 Process Trading Stamps  
 Prevent Sales if Cash Drawer High Limit is Exceeded  
 Specify Maximum Entry Limits by Department for Extended Price  
 Specify Quantity Entry Limits  
 Charge Check Fee  
 Specify Negative Entry Limits  
 Specify Void Transaction Maximum  
 Defer Notification of Negative Entry Limit Errors  
 Display Subtotals without Printing  
 Print Non-summarized Messages  
 Specify Validation Station Printing  
 Specify Multiple Line Feeds  
 Print Personalized Message before Store Name  
 Print a Tax Paid Line  
 Specify more than 5 Override Numbers  
 Prevent Entry until Summary Journal Paper Roll is Replaced  
 Support Management Override Key  
 Print Grand Total Descriptors  
 Support Backup Cassette Loading  
 Provide Standalone Mode of Operation  
 Provide Automatic Entry and Exit for Standalone Mode  
 Use of Date, Time, Lane Number during Standalone Sign-on  
 Accumulate Department Counts during Standalone Mode  
 Accumulate Net Department Totals during Standalone Mode  
 Permit Bypassing Check Verification  
 Add Time-stamping for Transaction Log  
 Accumulate Customer Count by Department  
 Compute Taxes in Microcode  
 Permit Reverse Key Sequences  
 Display Alphabetic Characters as Keyed (now integrated into base code)  
 Fast Process for Department/Price Entries  
 Support EAN 13 Item Codes  
 Transaction Log Wrap When Full  
 Terminal Productivity Log Wrap When Full  
 Storage Retention  
 UPC/EAN Bar Code Wand  
 Department Totals Accumulated in Terminal until End of Last Transaction  
 Repeat Last Entry  
 Print Transaction Number on Date/Time Line  
 Terminal System Date Function  
 Short Cashier Pickup in Checkout

Standard and Extended Functions Provided for a Supermarket Operational Environment by this Program Product are:

**Standard Sales Functions**

**Customer Checkout**  
 Sign-on/sign-off for Authorized Operators  
 Special Sign-on/sign-off  
 Automatic Sign-off  
 Item Sale by Quantity or Weight (non-IBM scale optional)  
 Deposit  
 Deposit Return  
 Merchandise Refund  
 Coupons  
 Override Numbers  
 Entry Limit Controls  
 Quantity by Department  
 Minimum/Maximum by Department  
 Negative Entries by Department  
 Maximum Cancel Limit in a Transaction  
 Override Last Entry  
 Repeat Last Entry  
 Cancel and Cancel Last Entry  
 Total Balance Due  
 Food Stamp Balance Due  
 Amount Tendered  
 Correct Tender  
 Tender Change Limits  
 Tender Exchange  
 Upper Limits on Checks Cashied  
 Check Verification (negative)  
 End of Transaction  
 No Sale  
 Void Transaction  
 Exception Logging  
 Price Lookup  
 Item Movement - Quantity, Weight, Amount  
 Department Totals

**Non-Checkout Procedures**  
 Deactivate a Terminal  
 Item Record Price Change  
 Set Date and Time  
 System Status Inquiry  
 System Quiesce

**Extended Sales Functions**

Change the Edit Pattern for Amount Fields  
 Change the Edit Pattern for Weight Fields  
 System Date Format  
 Check Date and Time Integrity Parameters  
 Selective Transaction Logging  
 Checkout Terminal Table Initialization  
 Define the Check Verification Processing Options  
 Alter Department Totals Records  
 Rounding to Multiple Price Units  
 Weight in Thousandths  
 Specify Department Totals Main Storage Buffer  
 Accumulate Net Department Totals in Main Storage  
 Specify Item Movement Main Storage Buffer  
 Prevent Item Movement Updates with Refund Key  
 Alternate Item Record Descriptor Maximum Length  
 Price Override Priority Selection  
 Alternate Department Totals Storage Buffer Format  
 Support Universal Product Code (UPC) System #2  
 Accumulate Data for Checker Time Analysis  
 Change Numeric Field Print Editing  
 Add Department Keys  
 Refund Key Invalid  
 Store Coupon Key Invalid  
 Eliminate Check Verification  
 Eliminate Void Transaction Key Sequence  
 Eliminate Food Stamp Processing  
 Specify Tax Method

**CUSTOMER RESPONSIBILITIES**

Install the Programmable Store System Host Support to:

- Define and maintain the subsystem library (SLIB) and the data sets necessary to support the programmable store subsystem.
- Create the operational environment that will control the functions of control unit and terminal segments of the terminals in the store.
- Provide communications between the host and the store control unit to load the application programs and to recover application program dumps.

Install the Subsystem Program Preparation Support II (SPPS II) Program Product.

Place the 3680 Programmable Store System/Sales Application program release into a predefined data base.

Modify and customize the standard functions as desired.

- Insert and delete source code for IBM extended function and/or user-designed modules.

**Note:** Each extended function will be individually tested with the application base package of standard functions. Incorporating and testing multiple extended functions may require additional design and changes which are the user's responsibility.

Assemble and link edit the 3680 Programmable Store System/Sales Application Program.

Perform application definition.

- Use the Programmable Store System Host Support to:
  - Create Application Definition Record(s).
  - Create Application Load List(s).
- Assemble macro statements.

## PROGRAM PRODUCTS

**3680 Prog. Store System/Sales Application (cont'd)**

Generate user data for files as required (examples):

- Item Record
- Check Verification
- Operator Authorization

RPQs ACCEPTED: Yes

TERMS and CONDITIONS: See PP Index

Load the 3684 diskette units.

- Via Programmable Store System Host Support
  - Application Definition Record
  - 3680 Programmable Store System/Sales Application Programs
- Via user-provided transmission program
  - Initialize user files

**Note:** The allocation, diskette location, size, creation, maintenance, transmission and content of all files are a user responsibility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The 3680 Programmable Store System/Sales Application Program Product is designed to operate with the following minimum hardware configurations:

For the retail operational environment:

Control and terminal segments combined:

- 3684 mdl 1 with journal printer and 56K storage
- 3684 mdl 2 with 56K storage in the control unit segment and terminal segment with journal printer and 40K storage

Terminal segment only:

- 3683 mdl 1, 2 or 3 and journal printer with 40K storage.

For the supermarket operational environment:

Control and terminal segments combined:

- 3684 mdl 2 with 72K storage in the control unit segment and terminal segment with journal printer and 56K storage.

Terminal segment only:

- 3683 mdl 1, 2 or 3 with journal printer and 56K storage.

Additional storage capacity may be required depending on the extended functions and options selected, configurations and user code. Storage requirements must be evaluated at the systems assurance review.

**SOFTWARE REQUIREMENTS**

**Host Requirement:** This program product is designed to be assembled on a S/370 or 4300 host processor with storage sufficient to accommodate the VSE/AF, OS/VS1 or OS/VS2 (MVS) release required by Programmable Store System Host Support. This program product uses the Programmable Store System Host Support which utilizes VSAM and, for transmission of this program product to and from the 3680 Programmable Store System, BTAM for binary synchronous and VTAM or ACF VTAM for SDLC. All execution of this program product code will take place on the 3680 Programmable Store System. Specific release levels are detailed in the Product Availability Notices.

**Programming Language:** The 3680 Programmable Store System/Sales Application Program Product is written in the Subsystem Program Preparation Support II (SPPS II) Program Product language, a corequisite program product.

**Store Environment:** The 3680 Programmable Store System/Sales Application Program Product will support the 3684 and 3683 engineering change levels supported by the latest current level of the Programmable Store System Host Support and SPPS II programs.

**DOCUMENTATION**  
(available from Mechanicsburg)

Documentation for IBM 3680 Programmable Store System/Sales Application retail operational environment:

*Licensed Program Specifications (GH20-5295) ... General Information Manual (GH20-5068) ... Program Reference and Operations Guide (SH20-5609) ... User's Guide (SH20-5610) ... Application Macro Reference (SH20-5532) ... Data Base Reference (SH20-5533) ... Program Logic Manual (LY20-2495)*

Documentation for IBM 3680 Store System Supermarket Environment describing the supermarket operational environment:

*Licensed Program Specifications (GH20-5295) ... General Information Manual (GH20-2461) ... Program Reference and Operations Guide (SH20-5531) ... User's Guide (SH20-5530) ... Application Macro Reference (SH20-5532) ... Data Base Reference (SH20-5533) ... Program Logic Manual (LY20-2571)*

**3680 PROGRAMMABLE STORE SYSTEM/  
STORE ADMINISTRATION APPLICATION  
RELEASE 2  
5735-D62**

**PURPOSE**

The 3680 Programmable Store System/Store Administration Application Program Product provides functions to assist in a variety of administrative tasks and enhances operation of the point-of-sale system in the store. The programs, both control unit and terminal segments, are written in the IBM Subsystem Program Preparation Support II (SPPS II) language allowing the user to modify them to suit his particular environment. Some of the types of stores for which these programs are intended include:

- Mass merchandisers
- Department stores
- Supermarkets and superettes
- Apparel
- Shoe
- Variety
- Drug
- Specialty
- Convenience

Functions may be added, deleted or changed to adapt the standard functions to the user's unique requirements.

**DESCRIPTION**

The programs are designed to be assembled on a S/370 or 4300 host processor operating under VSE/AF, OS/VS1 or OS/VS2 (MVS). Prerequisites are the SPPS II program product, 5735-D16, the language in which this program product is written, and 3680 Programmable Store System/Sales Application program product, 5735-D61, which this program product works with and supports.

The OS/VS version of Release 2 uses the System Modification Program (SMP) for distribution and service; the VSE/AF version uses the Maintain History Program (MSHP). SMP and MSHP both provide improved installability and serviceability, and allow the user to better control the function and service level of his system.

The program product consists of two segments: A retail environment and a supermarket environment.

The retail segment executes on the 3684 Point-of-Sale/Control Unit mdl 1 or 2 with 3683 Point-of-Sale Terminals, mdls 1, 2 or 3, and will primarily support retail-related point-of-sale environments.

The supermarket segment executes on the 3684 Point-of-Sale/Control Unit mdl 2 with 3683 Point-of-Sale Terminals, mdls 1, 2 or 3, and will primarily support supermarket-related point-of-sale environments.

The programs provide the following functions for a retail operational environment:

- Obtain item movement and reset
- Loans and withdrawals
- Cash count data entry
- Change terminal and control unit options
- Data maintenance
- Wand data entry (extended function)
- Void previous transaction (summary form or by line item)
- Re-entry of offline transactions
- Operator training
- Set transaction number
- Specify maximum change options area
- Wandering in non-sales mode

The programs provide the following functions for a supermarket operational environment:

**Base Store Administration Functions**

**Store Support Procedures**

- Authorize transfer or signoff of another terminal
- Batched file maintenance
- Build standalone item records
- Carrying forward tender-on-hand
- Change options
- Close department totals
- Close reporting period
- Data maintenance
- Entering counted tender
- Obtain item movement
- Operator training
- Print manager's messages
- Recording cashier pickups
- Recording loans
- Recording miscellaneous account transactions
- Recording miscellaneous account transactions - privileged
- Shelf label preparation
- Transfer tender-on-hand
- Void previous transaction by line item

**Store Reports**

- Cash report
- Cash drawer position
- Department analysis
- Miscellaneous transaction recap
- Terminal productivity

**Extended Store Administration Functions**

- Standalone item record processing notification
- Long department totals during close reporting period (now integrated into base code)
- Check listing during recording cashier pickup
- Two copies for cashier pickup
- Calculate total to account for during miscellaneous transactions and enter counted tender
- Print option area during change options - change request
- Print option area during change options - execute request
- Print all options during change options
- Reverse key sequence for certain store support procedures
- Open cash drawer in training mode
- Process check listing file during close reporting period procedure
- Specify maximum change options area

Either retail or supermarket operational functions may be selected for any single control unit environment. Simultaneous selection of functions for both the retail and supermarket operational environments is not supported by this program product.

**CUSTOMER RESPONSIBILITIES**

Install the Programmable Store System Host Support to:

- Define and maintain the subsystem library (SLIB) and the data sets necessary to support the programmable store subsystems.
- Create the operational environment that will control the functions of control unit and terminal segments of the terminals in the store.
- Provide communications between the host and the store control unit to load the application programs and to recover application program dumps.

Install the Subsystem Program Preparation Support II (SPPS II) program product.

Install the 3680 Programmable Store System/Sales Application program product.

Place the 3680 Programmable Store System/Store Administration Application program product release into a predefined data base.

Modify and customize the standard functions as desired.

- Insert and delete source code for user designed modifications.

Assemble and link-edit the 3680 Programmable Store System/Store Administration Application program product along with the Sales Application licensed program.

Perform application definition.

- Use the Programmable Store System Host Support to:

- Create Application Definition Record(s).
- Create Application Load List(s).

- Assemble macro statements.

Generate user data for files as required (examples):

- Item Record
- Check Verification
- Operator Authorization

Load the 3684 diskette units.

- Via Programmable Store System Host Support

- Application Definition Record
- 3680 Programmable Store System/Sales Application programs
- 3680 Programmable Store System/Store Administration Application programs

- Via user provided transmission program

- Initialize user files

**Note:** The allocation, diskette location, size, creation, maintenance, transmission and content of all files are a user responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The 3680 Programmable Store System/Store Administration Application program product is designed to operate with the following minimum hardware configurations:

**3680 PSS Store Administration Appl. (cont'd)**

For the retail operational environment:

Control and terminal segments combined:

- 3684 mdl 1 with journal printer and 56K storage
- 3684 mdl 2 with 56K storage in the control unit segment and terminal segment with journal printer and 40K storage

Terminal segment only:

- 3683 mdl 1, 2 or 3 with journal printer and 40K storage

For the supermarket operational environment:

Control and terminal segments combined:

- 3684 mdl 2 with 72K storage in the control unit segment and terminal segment with journal printer and 56K storage

Terminal segment only:

- 3683 mdl 1, 2 or 3 with journal printer and 56K storage

Additional storage capacity may be required depending upon the extended functions options selected, configuration and user code.

**SOFTWARE REQUIREMENTS**

**Host Requirement:** This program product is designed to be assembled on a S/370 or 4300 host processor with storage sufficient to accommodate the VSE/AF, OS/VS1 or OS/VS2 (MVS) release required by Programmable Store System Host Support. This program product uses the Programmable Store System Host Support which utilizes VSAM and, for transmission of this program product to and from the 3680 Programmable Store System, BTAM for binary synchronous and VTAM or ACF/VTAM for SDLC. All execution of this program product code will take place on the 3680 Programmable Store System. Specific release levels are detailed in the Product Availability Notices.

**Programming Language:** The 3680 Programmable Store System/Store Administration Application program product is written in the Subsystem Program Preparation Support II (SPPS II) Program Product language, a corequisite program product.

**Store Environment:** The 3680 Programmable Store System/Store Administration Application program product will support the 3684 and 3683 engineering change levels supported by the latest current level of the Programmable Store System Host Support and SPPS II programs. The 3680 Programmable Store System/Sales Application program product, 5735-D61, is required.

**PROMOTIONAL MATERIAL**

*3680 Programmable Store System Executive Overview Brochure (G520-3340) ... 3680 Programmable Store System Proposal Insert (G221-2365, G221-2366) ... 3680 Programmable Store System Slide Presentation (GV20-0881).*

**DOCUMENTATION**

(available from Mechanicsburg)

Documentation for the IBM 3680 Programmable Store System/Store Administration Application retail operational environment:

*Licensed Program Specifications (GH20-5294) ... General Information Manual (GH20-5068) ... Program Reference and Operations Guide (SH20-5609) ... User's Guide (SH20-5610) ... Application Macro Reference (SH20-5532) ... Data Base Reference (SH20-5533) ... Program Logic Manual (LY20-2505)*

Documentation for the IBM Store System Supermarket Environment describing the supermarket operational environment:

*Licensed Program Specifications (GH20-5294) ... General Information Manual (GH20-2461) ... Program Reference and Operations Guide (SH20-5531) ... User's Guide (SH20-5530) ... Application Macro Reference (SH20-5532) ... Data Base Reference (SH20-5533) ... Program Logic Manual (LY20-2571).*

**RPQs ACCEPTED:** Yes

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCT

**EPIC: SOCRATES (5735-E91)  
EPIC: FAST (5735-E92)  
EPIC: BUDGET/FINANCE (5735-E93)**

[Program 5735-E92 is no longer available, effective June, 1983.]

**PURPOSE**

The EPIC licensed programs provide essential administrative and financial records for elementary and secondary schools, junior and community colleges, four year colleges, and universities. EPIC is written using the American National Standard COBOL subset language for user compilation on 1130, S/3 or on S/360/370 under DOS or OS. The system design of EPIC incorporates many significant features:

**DESCRIPTION**

- General -- System tailoring to the educational institutions' unique requirements for number of periods in a school day, number of semesters in a year, state reporting cycles, etc. All input specifications are described in terms familiar to school administrators and require no detailed knowledge of data processing techniques. Data Files are shared among applications to conserve space requirements.
- SOCRATES Student Scheduling -- A resource allocation facility for constructing an initial master schedule of class offerings, assignment of students to the initial or revised master schedule of classes, and post-scheduling maintenance of the schedule data files.
- FAST Test Scoring -- Contains the full content of widely used 1401-1440 FAST, plus significant improvements including stored conversion tables, scoring keys, and routines for teacher-made tests.
- Budget/Finance Accounting -- Computer-assisted construction of school budget, budgetary control of expenditures, encumbrance and general ledger accounting, vendor payments produced with comprehensive status reports for financial management.
- Student Records and Grade/Attendance Reporting -- Full range of academic achievement and progress reports including statistical analysis of marks. Attendance recording and reporting at the homeroom, school and district levels. The features in each program product are completely independent. Where more than one of the applications is installed by a user, files are shared for common data such as the master schedule and student identification files. A user whose needs are answered by any of the above facilities may readily implement only the function desired. Customers requiring the entire group of EPIC programs may schedule installation in sequence appropriate to their own needs.

**EPIC:SOCRATES (5735-E91)**

The EPIC:SOCRATES program product is used for student scheduling.

**DESCRIPTION**

The EPIC:SOCRATES program product is provided to the user in American National Standard COBOL source form, with a tailoring program used to produce a customized source program appropriate for direct compilation on the user's own system. In addition to adapting the programs to the user's machine configuration for improved performance, the programs are tailored to the unique educational requirements of the institution where appropriate.

**HIGHLIGHTS**

EPIC:SOCRATES accepts as input student course requests, course numbers and titles and a school master schedule of courses with meeting times, teachers and locations. Produced as output are:

- Prescheduling tallies, conflict matrices and verification listings.
- Student schedules.
- Analysis of scheduling effectiveness.
- Updated master schedule listing.
- Utilization analysis of teachers and rooms.
- Class lists and locator cards.
- Drop and add reports.

The main scheduling program capabilities are:

- Schedules classes in any of 99 periods per day, blocked or unblocked, consecutive or non-consecutive period sequences. (\*)
- Schedules classes in any combination of eight user-defined days per cycle. (\*)
- Schedules classes in any combination of five or less semesters per year. (\*)
- Permits classes to be specified as meeting in differing locations for any combination of period, day, and semester meeting times.
- Permits classes to be specified as having differing teachers for any combination of period, day, and semester meeting times.
- Permits classes to be restricted to a single sex, or else will attempt to balance sexes in each class to the ratio observed in the overall requests for the course.

Permits classes to be restricted to an ethnic student group only, or else will attempt to balance between the majority and the minority ethnic groups in each class to the ratio observed in the overall requests for the course.

Permits classes to be restricted to a single ability group, or any range of consecutive ability groups, for students for which ability group codes are provided, or else will mix ability groups in a random manner. Individual students may be coded for random assignment, even though other students are grouped.

Permits students to request specific class sections, or instructors, along with their course requests.

Permits scheduling restrictions given above to be lifted optionally, if such restriction would otherwise result in a rejected course request. Each restriction is individually controllable in this respect.

(\*) When the three features identified with the (\*) symbol are each specified in combination near their maximum size, the total core requirements may exceed the minimum size specified in the system configurations.

**CUSTOMER RESPONSIBILITIES**

Establish required files for EPIC:SOCRATES.

Understand the options available and the data required to implement each.

Assign both an educator and a data processing systems person to implement the system.

Specify the tailoring information necessary to produce the COBOL source programs appropriate to the machine configuration and local requirements, and compile on the system. (Requires availability of suitable ANS COBOL program product compiler.)

Provide a person knowledgeable in COBOL programming to modify formats of input and output documents to meet local needs.

Provide a suitable system (360/370) to retrieve the EPIC programs from the DTR, run the Systems Tailoring Program and place the source modules on disk or cards for entry into the system.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This program product will function on a machine configuration of minimum size, as noted below, with the exception that when certain features modified by the system tailoring program are each specified in combination near their maximum size, the total main storage size may exceed the minimum size specified below. Examples of these specifications are: QS-101, QS-102, and QS-106. In larger installations, however, the program product can make use of the available main and secondary storage capabilities and some of the I/O facilities to promote faster throughput.

**1130 Configuration**

**Minimum**

- Processor 1131, mdl 2C
- Printer 120 or 132 print positions, any model (COBOL-supported)
- DASD Only the single drive in the CPU is required. A second drive in a 2310 is, however, very strongly recommended for all but the very smallest user.
- CRP Any configuration (COBOL-supported)
- Additional Support For:
  - Processor Additional storage
  - DASD Additional disks (COBOL-supported)

**System/360-370 Configuration - DOS or OS**

**Minimum**

- |           | COBOL Compiler   | Minimum Partition for Compilation and Execution                   |
|-----------|--|---|
| Processor | 5736-CB1<br>5736-CB2<br>5734-CB1   | 24K<br>Equal to compiler partition<br>Equal to compiler partition |
| DOS       |  |   |
| OS        |  |   |
| DASD      | One disk drive beyond that required by the Supervisor, and any other programs operative concurrently |   |
| CRP       | Any configuration (COBOL-supported)  |   |
| Console   | Printer-Keyboard   |   |

**EPIC (cont'd)**

**Additional Support For:**

Processor Additional storage  
 DASD Additional disks (COBOL-supported)  
 OMR IBM 3881 mdl 1 Optical Mark Reader (S/370 DOS/VS only).

Mag. Tape As preformatted input from an IBM 3881 mdl 2 only

**System/3 Configuration**

**Minimum**

Processor 5410, mdl A16 (32K bytes)  
 Printer 120 or 132 print positions, any model (COBOL-supported)  
 DASD One 5444 disk drive. Additional disk storage is recommended for all but the smallest user  
 CRP Any configuration (COBOL-supported)  
 Console Printer-Keyboard

**Additional Support For:**

Processor Additional storage  
 DASD Additional 5444 or 5445 (COBOL-supported)  
 Cd-Image IBM 1442 Card Read Punch  
 OMR IBM 3881 mdl 1 Optical Mark Reader

Mag. Tape As preformatted input from an IBM 3881 mdl 2 only

**Note:** System/3 version is distributed on 2 5440 Disk cartridges. Tailoring and compilation procedures distributed with the program require 2 5444 disk drives (one mdl 2 and one mdl 2 or 3).

**SOFTWARE REQUIREMENTS**

The program product is distributed as a master source program written using the American National Standard COBOL subset language, plus certain IBM enhancements. In addition, some Assembler language modules are included.

A special systems tailoring program is used to convert the master source programs so they can produce logically equivalent programs adapted for compilation on the 1130, System/3 and on S/360 and S/370 under DOS or OS. During such conversion, user specifications are accepted to further modify the programs to use additional I/O devices and core size capabilities available on the user's system where required to improve performance.

The programming systems are 1130 Disk Monitor Version 2, Modification level 0; System/3 Model 10 Disk System, Release 7; S/360/370 DOS and S/360/370 OS.

The user is required to provide a suitable ANS COBOL program product compiler on his system, plus a suitable Assembler, to generate object code suitable for execution. These are 1130 ANS COBOL Subset Compiler (5711-CB1) and Assembler (1130-OS-005) ... System/360-370 32K DOS-ANS COBOL Subset Compiler V2M0 Release 2 (5736-CB1), 65K DOS-ANS COBOL Full Compiler V2M0 Release 2 (5736-CB2), Library for execution VMO Release 2 (5736-LM2) and Assembler Release 26 (360N-AS-466) ... S/360/370 OS-ANS COBOL Full Compiler V3M1 (5734-CB1) and Assembler Release 21 (360S-AS-037) ... System/3 ANS COBOL Subset Compiler Release 3.0 (5702-CB1), Overlay Linkage Editor (5702-SC1) and Checkpoint/Restart feature (#6026/#6027).

Other DOS considerations: SYSGEN -- Proper execution of the Systems Tailoring Program requires SYSFIL=XXXX, where XXXX is a disk device ... Access Method -- DAM ... Service Programs -- none.

Other OS considerations: Access Method -- BDAM ... Service Programs -- none.

Other System/3 considerations: SYSGEN -- Proper execution of the restart feature in RAF and 3881 bonus alignment routine requires \$DINQ=YES. This licensed program is designed to operate under the above stated programs and all subsequent releases, versions and modification levels unless stated otherwise in a future revision of this document.

**DOCUMENTATION**

(available from Mechanicsburg)

General Information Manual (GH20-1129).

**TERMS and CONDITIONS:** See PP Index

**EPIC:FAST (5735-E92)**

EPIC:FAST produces timely test scoring results, handling of a wide variety of input, and provides extensive statistical analysis of test scores.

**DESCRIPTION**

EPIC:FAST is provided to the user in ANS COBOL source form with a tailoring program used to produce a customized source program appropriate for direct compilation on the user's own system. The programs are tailored to the user's machine configuration for improved performance.

**HIGHLIGHTS**

EPIC:FAST Test Scoring contains the full content of widely-used 1401-1440 FAST plus significant improvements including stored conversion tables and scoring keys. EPIC:FAST accepts responses punched in the 1401 FAST answer card and provides utilities to convert 1401 FAST conversion tables, Student ID, and raw score cards to EPIC:FAST format.

EPIC:FAST accepts as input raw scores from punched cards plus response input from optical mark readers in addition to 1401 FAST answer cards. Responses are scored according to correct responses provided in cataloged scoring keys. Raw scores are converted through the use of conversion tables cataloged into the systems.

Users of EPIC:SOCRATES or EPIC:Student have the capability of using the student data base created by these products to establish a test file. EPIC:FAST provides the capability of selecting students who were defined to EPIC:SOCRATES or EPIC:Student and transferring the pertinent information to the test files. Although EPIC:FAST does not provide a program to post the test results to EPIC:Student records, the data is available for the user to permanently record the results to his data base.

The capability for comparison of local norms at the group, school, region and district level for the current test period is provided. EPIC:FAST also provides the capability to accumulate the test results at the school, region and district level for comparison against the current test results. A student's local percentiles derived from the local norms are shared in his test record.

The user may define tests to be administered at any level and process the results to produce the same analysis and reports which can be achieved with standardized tests.

**CUSTOMER RESPONSIBILITIES**

- Establish required files for EPIC:FAST.
- Understand the options available and the data required to implement each.
- Assign both a test administrator and a data processing systems person to implement the system.
- Specify the tailoring information necessary to produce the COBOL source programs appropriate to the machine configuration and local requirements, and compile on the system. (Requires availability of suitable ANS COBOL program product compiler.)
- Provide a person knowledgeable in COBOL programming to modify formats of input and output documents to meet local needs.
- Provide a suitable system to retrieve the EPIC programs from the DTR, run the system tailoring program and place the source modules on disk or cards for entry into the system. Minimum configuration for tailoring on S/360 and S/370 is the minimum configuration plus one tape drive.
- Design and acquire preprinted forms for turnaround documents.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The program product functions on a machine configuration of minimum size as noted below. In larger installations, the program product can make use of the available main and secondary storage capabilities and some of the I/O facilities to promote faster throughput and to support all features at their maximum sizes.

**1130 Configuration**

**Minimum**

Processor 1131, mdl 2C (16K words)  
 DASD Only the single drive in the CPU is required. A second drive in a 2310 is, however, very strongly recommended for all but the very small user.  
 Printer 120 or 132 print positions, any model (COBOL-supported)  
 CRP Any configuration (COBOL-supported)

**Additional Support For:**

Processor Additional storage  
 DASD Additional disks (COBOL-supported)

**EPIC (cont'd)**

**System/3 Configuration**

**Minimum**

Processor 5410, mdl A16 (28.5K bytes)  
 DASD One 5444 disk drive. Additional disk storage is recommended for all but the smallest user  
 Printer 120 or 132 print positions, any model (COBOL-supported)  
 CRP Any configuration (COBOL-supported)  
 Console Printer-Keyboard  
 Additional Support For:  
 Processor Additional storage  
 DASD Additional 5444 or 5445 (COBOL-supported)  
 Cd-Image IBM 1442 Card Read Punch  
 OMR IBM 3881 Model 1 Optical Mark Reader  
 Mag. Tape As preformatted input from an IBM 3881 mdl 2 only  
 System 360/370 Configuration - DOS or OS

**Minimum**

Processor	COBOL Compiler	Minimum Partition for Compilation and Execution
DOS	5736-CB1	24K
	5736-CB2	Equal to compiler partition.
OS	5734-CB1	Equal to compiler partition.
DASD	One disk drive beyond that required by the Supervisor, and any other programs operative concurrently.	
Printer	120 or 132 print positions, any model (COBOL-supported).	
CRP	Any configuration (COBOL-supported).	
Console	Any OS/DOS support console.	

**Additional Support For:**

Processor Additional storage.  
 DASD Additional disk devices currently supported by COBOL.  
 Tape Magnetic tape produced by 3881.

**If attachable, the following devices and features:**

OMR IBM 1231 Optical Mark Page Reader (360).  
 IBM 2501 Optical Mark Reader Special Feature (370).  
 IBM 3505 Optical Mark Reader Special Feature (370).  
 IBM 3881 Optical Mark Reader (S/370 DOS/VS only).  
 Col-Binary IBM 2540 (2821 Control Unit requires special feature #1990).  
 Cd-Image IBM 2501 with Card Image Special Feature (360).  
 IBM 3505 Card Image Standard Feature (370).  
 Mag. Tape As preformatted input from 3881 mdl 2 only.

**SOFTWARE REQUIREMENTS**

The program product is distributed as a master source program written using the American National Standards COBOL subset language, plus certain IBM extensions. In addition, some Assembler language modules are included.

A special system tailoring program is used to convert the master source programs to produce logically equivalent programs adapted for compilation on the 1130, System/3 and on S/360 and S/370 under DOS or OS. During such conversion, user specifications are accepted to further modify the programs to use additional I/O devices and core size capabilities available on the user's system where required to improve performance.

**The operating systems are:**

1130: Disk Monitor Version 2, Modification 0  
 System/3: Model 10 Disk System  
 S/360 or S/370: DOS  
 S/360 or S/370: OS

The user is required to provide a suitable ANS COBOL program product compiler on his system, plus a suitable Assembler in order to generate object code suitable for execution. These are:

1130: ANS COBOL Subset Compiler (5711-CB1) and Assembler (1130-OS-005)  
 System/3: IBM System/3 Subset American Standard COBOL (5702-CB1), Release 3.0. Overlay Linkage Editor (5702-SC1, and Checkpoint/Restart feature (#6026/6027)  
 S/360/370: DOS ANS COBOL Subset Compiler and Library (5736-CB1), Release 2 (V2M0)  
 DOS ANS COBOL Full Compiler (5736-CB2), Release 2 (V2M0), and Library for execution (5736-LM2), Release 2 (V2M0)  
 Assembler (360N-AS-466) or DOS/VS Assembler  
 S/360/370: OS ANS COBOL Full Compiler (5734-CB1), V3M1.  
 Assembler (360S-AS-037)

**Other System/3 considerations:**

SYSGEN Proper execution of forms alignment routines requires \$DINQ=YES.

**Other DOS considerations:**

SYSGEN: Proper execution of the Systems Tailoring Program requires SYSFIL=XXXX, where XXXX is a disk device.

Access Method: DAM access method is required.

Service Programs: None

**Other OS considerations:**

Access Method: BDAM access method is required.

Service Programs: None

This program product is designed to operate under the above stated programs and all subsequent releases, versions, and modification levels unless stated otherwise in a future revision of this document.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual* (GH20-1131).

**TERMS and CONDITIONS:** See PP Index

**EPIC:BUDGET/FINANCE (5735-E93)**

The EPIC:Budget/Finance program product provides essential administrative and financial records for elementary and secondary schools, junior and community colleges, four-year colleges, and universities. EPIC:Budget/Finance was written using the ANS COBOL subset language for user compilation on the IBM 1130, System/360 and System/370 under OS or DOS, and on the System/3.

**DESCRIPTION**

EPIC:Budget/Finance is provided to the user in ANS COBOL source form with a tailoring program used to produce a customized source program appropriate for direct compilation on the user's own system. The programs are tailored to the user's machine configuration for improved performance.

Budget/Finance Accounting - Computer-assisted construction of school budget, budgetary control of expenditures, encumbrance and general ledger accounting, vendor payments produced with comprehensive status reports for financial management.

**HIGHLIGHTS**

EPIC:Budget/Finance is a series of interrelated programs designed to automate construction of the school budget and the accounting procedures in educational institutions. The program product includes procedures and programs to facilitate control of expenditures, starting with budgeted funds, including all types of accounting transactions, payment of amounts owed to vendors, and culminating with a range of status reports for financial management.

This program is designed to furnish control of expenditures. Compatibility with the United States Office of Education published financial guidelines in the area of Planning, Programming and Budgeting System (PPBS) is intrinsic in the program design. Each institution is given the prerogative of choosing its unique account code structure. Therefore, the program product is adaptable to the majority of educational organizations. Using the Budget/Finance package as the financial application hub, education administrators will be able to subsequently

**EPIC (cont'd)**

automate related procedures such as payroll and stores or supplies control.

**USE**

The system is used to control the educational institution's budget already in effect and to help prepare the next year's budget.

The programs also furnish the user with control over daily encumbrance accounting transactions.

**CUSTOMER RESPONSIBILITIES**

The customer must provide the necessary personnel with knowledge of their budgeting and accounting practices to structure the chart of accounts and establish the administrative and data processing procedure for data collection, posting and control.

He must also provide and implement a plan for conversion from his present system.

Provide a suitable system to retrieve the EPIC programs from the DTR, run the System Tailoring Program and place the source modules on disk or cards for entry into his system. Minimum configuration for tailoring on S/360 and S/370 is the minimum configuration plus one tape drive. System/3 tailoring requires two 5444 disk drives (one mdl 2 and one mdl 2 or 3). 1130 systems must use a S/360 or S/370 and punch out the tailored source programs.

Provide a person knowledgeable in COBOL programming to modify formats of input and output documents to meet local needs.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This program product will function on a machine configuration of minimum size as noted below. In larger installations, however, the program product can make use of the available main and secondary storage capabilities and some of the I/O facilities to promote faster throughput.

**1130 Configuration****Minimum**

Processor 1131, mdl 2C (16K words)  
 Printer 120 or 132 print positions, any model (COBOL-supported)  
 DASD Only the single drive in the CPU is required. A second drive in a 2310 is, however, very strongly recommended for all but the very smallest user.  
 CRP Any configuration (COBOL-supported)

**Additional Support For:**

Processor Additional storage  
 DASD Additional disks (COBOL-supported)

**System/3 Configuration****Minimum**

Processor 5410, mdl A16 (32K bytes)  
 Printer 120 or 132 print positions, any model (COBOL-supported)  
 DASD One 5444 disk drive. Additional disk storage is recommended for all but the smallest user  
 CRP Any configuration  
 Console Printer-Keyboard

**Additional Support For:**

Processor Additional storage  
 DASD Additional 5444 or 5445 (COBOL-supported)

**System/360 - 370 Configuration - OS or DOS****Minimum**

Processor Any 360/370 processor with a minimum core size required for the Supervisor, plus the COBOL compiler or 24K, whichever is greater.  
 Printer 120 or 132 print positions, any model (COBOL-supported).  
 DASD One disk drive beyond that required by the Supervisor, and any other programs operative concurrently.  
 CRP Any configuration (COBOL-supported).  
 Console Printer-Keyboard.

**Additional Support For:**

Processor Additional storage.  
 DASD Additional disks (COBOL-supported).

**SOFTWARE REQUIREMENTS**

The program product is distributed as a master source program written using the American National Standard COBOL subset language, plus certain IBM enhancements. In addition, some Assembler language modules are included.

A special systems tailoring program is used to convert the master source programs so they can produce logically equivalent programs adapted for compilation on the IBM 1130, System/3, and on S/360 and S/370 under OS or DOS. During such conversion, user specifications are accepted to further modify the programs to use additional I/O device and core size capabilities available on the user's system where required to improve performance.

The operating systems are 1130 Disk Monitor Version 2, Modification Level 11; System/3 Model 10 Disk System, Release 7; S/360/370 DOS and S/360/370 OS (MFT.MVT).

The user is required to provide a suitable ANS COBOL program product compiler on his system, plus a suitable Assembler, to generate object code suitable for execution. These are 1130 ANS COBOL Subset Compiler V1M1 (5711-CB1) and Assembler (V2M11 (1130-OS-005) ... System/360-370 DOS ANS Subset COBOL Compiler (5736-CB1), DOS Full ANS COBOL Version 3 Compiler (5736-CB2), Full ANS COBOL Library (5736-LM2) and Assembler Release 26 (360N-AS-466) ... S/360/370 OS Full ANS COBOL Version 3 Compiler and Library (5734-CB1) and Assembler Release 21 (360S-AS-037) ... System/3 ANS COBOL Subset Compiler Release 3.0 (5702-CB1), Overlay Linkage Editor (5702-SC1) and Checkpoint/Restart feature (#6026/#6027).

Other DOS considerations: SYSGEN -- Proper execution of the System Tailoring Program requires SYSFIL=XXXX, where XXXX is a disk device ... Access Method -- DAM ... Service Programs -- none.

Other OS considerations: Access Method--BDAM ... Service Programs--none.

Other System/3 Considerations: System/3 Version is distributed on one 5440 disk cartridge. Tailoring and compilation procedures distributed with the licensed program can make use of the available main and secondary storage capabilities and some of the I/O facilities to promote faster throughput.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual* (GH20-1132)

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**3650 PROGRAMMABLE STORE SYSTEM  
PHARMACY APPLICATION/STORE ENVIRONMENT  
Release 2, Modification Level 0  
PASE (5735-H11)**

**PURPOSE**

The IBM 3650 Programmable Store System Pharmacy Application/Store Environment Program Product provides a base set of functions to support the operation of a pharmacy either with or without the POS Application/Retail Environment. The program modules are written in the IBM Subsystem Program Preparation Support II language, allowing the user to modify or add function as required to suit a particular operation.

The pharmacy application operates in an environment where responsibilities can be shared between pharmacy and headquarters personnel. The host system communicates with the pharmacy application through the store data base. The host sends control information, such as price changes, to the store(s) and retrieves operational information, such as the pharmacy log, for audit and host applications processing.

**HIGHLIGHTS**

The Pharmacy Application Program Product provides the following set of functions:

- Open pharmacy
- Prescription processing, which includes
  - Patient and family medical history maintenance and retrieval
  - Drug lookup through an access code or National Drug Code number
  - Expansion of coded SIGNA (usage instruction)
  - Patient prescription profiling
  - Prescription pricing, both retail and third party
  - Third party data collection
  - Automatic label generation
  - Automatic refill processing
- File inquiry, which includes
  - Display of patient records, including prescription profile
  - Display of prescription records
  - Drug price inquiries
- Cancel prescription, for return to stock
- Maintenance functions, which include
  - Add/alter drug files
  - Add/alter Doctor file
  - Add/alter SIGNA expansion file
  - Add/alter price exception file
  - Enter offline prescription data
  - Produce controlled substances report
  - Purge prescription records from files
- Logging of all pharmacy transactions, including prescription activity and file maintenance operations
- Shutdown pharmacy operations
- Report functions, which include:
  - Controlled substance report
  - Patient tax deduction listing

Additional Functions for the 3685/3686 Environment:

- Nursing home processing
- Daily prescription reporting

**CUSTOMER RESPONSIBILITIES**

- Install the Programmable Store System Host Support to:
  - Define and maintain the subsystem library (SLIB) and the data sets necessary to support the programmable store subsystem.
  - Create the "operational environment" that will control the functions of the controller and terminals in the Pharmacy.
  - Provide communications between the host and the pharmacy controller to load the application programs and to recover application program dumps.
- Install the Subsystem Program Preparation Support II (SPPS II) Program Product.
- Place the 3650 Programmable Store System Pharmacy Application/Store Environment program release into a predefined data base.
- Modify and customize the standard functions as desired.
  - Insert and delete source code and/or user designed modules.
- Assemble and link edit the 3650 Programmable Store System Pharmacy Application/Store Environment.
- Perform application definition.
  - Use the Programmable Store System Host Support to:
    - Create Application Definition Record(s).

- Generate user files as required (examples):
  - Drug File
  - Pharmacy File
  - SIGNA Expansion File
- Load the Pharmacy Controller File.
  - Via Programmable Store System Host Support
    - Application Definition Record
    - 3650 Programmable Store System Pharmacy Application/Store Environment programs
  - Via user provided transmission program
    - Initialize user files

**Note:** The allocation, file location, size, creation, maintenance, transmission and content of all files are a user responsibility.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The 3650 Programmable Store System Pharmacy Application/Store Environment Program Product is designed to operate with the following hardware configuration as a minimum:

- Controller: One of the following with 76K storage: 3651 mdl B25, B75, C25, C75 or D75.
- Terminals: One 3685 Display Control Unit mdl 2 with 88K bytes of storage and the label printer feature (#8726) and one 3686 Display Station mdl 1 or one 3275 mdl 3 display station, and the 3653 mdl 1P point of sale terminal with 36K storage and the Label Detect, RPQ Number 8Q0076.

Additional storage capacity may be required in the store controller depending on the options selected, the mix of concurrently running functions, and the number of other terminals attached to the controller.

**SOFTWARE REQUIREMENTS**

**Host Requirement:** This program product is designed to be assembled on a S/370 host processor with sufficient storage to accommodate DOS/VS, OS/VS1, or OS/VS2 releases required by the Programmable Store System Host Support, and subsequent releases and modification levels unless otherwise stated. The 3650 Programmable Store System Host Support (5744-D16 for OS/VS and 5747-D16 for DOS/VS), utilizes VSAM, and, for transmission of this program product to and from the store controller, BTAM for binary synchronous communications, and VTAM or ACF/VTAM for SDLC. All execution of this program product code will take place on the 3650 Programmable Store System.

**Programming Language:** The Pharmacy Application program modules are written in the Subsystem Program Preparation Support II programming language, a corequisite program product (5735-D16).

**Store Environment:** The 3650 Programmable Store System Pharmacy Application/Store Environment Program will support the 3651 engineering change level that is supported by the latest current level of the IBM 3650 Programmable Store System Host Support and SPPS II programs.

**COMPATIBILITY**

The Pharmacy Application is one of several Program Products which operate with the 3650 Programmable Store System. These program products together with user-written programs, make up a compatible family of applications that can be used to support a wide variety of store environments. Other Program Products in this application family include:

- Point of Sale Application/Retail Environment
- Point of Sale Application/Report Customizer
- Point of Sale Application/Store Data Management

**DOCUMENTATION:** (available from Mechanicburg)

*The General Information Manual: 3650 Programmable Store System Pharmacy Application/Store Environment, GH20-2189 and the Licensed Program Design Objectives: 3650 Programmable Store System Pharmacy Application/Store Environment, GH20-4581, are available as unlicensed documentation at no charge. Availability of other licensed and unlicensed documentation will be announced prior to program availability.*

**TERMS and CONDITIONS:** See PP Index

## INFORMATION/SYSTEM 5735-OZS

### PURPOSE

Information/System is an interactive retrieval program designed for use with its companion features and products. Information/System is the base for all Information/System features and products. The applications that the user wishes to perform determine which companion features and products he should select for use with Information/System.

The companion products to Information/System are:

#### 1. Information/MVS (5665-955)

The Information/MVS product is a consolidated collection of IBM technical data of interest to data processing staffs responsible for planning, installing, supporting and tuning IBM systems, subsystems and components appropriate to the MVS, VM/370, VSE and VS1 environments.

#### 2. Information/VM-VSE (5668-919)

The Information/VM-VSE product is a consolidated collection of IBM technical data of interest to data processing staffs responsible for planning, installing, supporting and tuning IBM systems, subsystems and components appropriate to the VM/370 and VSE environments.

The companion features to Information/System are:

#### 1. Information/Management

Information/Management provides integrated problem management, change management and configuration management applications usable by data processing personnel of various skill levels.

#### 2. Information/Access

Information/Access is used with Information/Management to assist system programmers at data processing installations in the resolution of suspected IBM software problems and in the planning of preventive service changes to IBM programs.

**Operating Environments:** Information/System operates in the following environments:

- MVS, with the Time Sharing Option (TSO), or with the Network Communications Control Facility (NCCF).
- VM/370, with the Conversational Monitor System (CMS).
- VSE, with the Interactive Computing and Control Facility (ICCF).

The current release of Information/System for the MVS environment is Release 2.1; Release 2.1 supports the Information/MVS and Information/VM-VSE products and the Information/Management and Information/Access features. The current release of Information/System for the VM/370 and VSE environments is Release 1.2. Release 1.2 supports the Information/VM-VSE and Information/MVS products.

### INFORMATION/SYSTEM RELEASE 1.2

Information/System Release 1.2 for VM/370 and VSE is an interactive program product that provides data processing personnel, operating in the VM/CMS (Conversational Monitor System) environment or in the DOS/VSE ICCF (Interactive Computing and Control Facility) environment, with keyword access to a wide range of selected technical information regarding IBM products. The information is contained in optional data products.

The Information/VM-VSE product is a consolidated collection of IBM technical data of interest to data processing staffs responsible for planning, installing, supporting and tuning IBM systems, subsystems and components appropriate to the VM/370 and VSE environments.

The Information/MVS product is a consolidated collection of IBM technical data of interest to data processing staffs responsible for planning, installing, supporting and tuning IBM systems, subsystems and components appropriate to the MVS, VM/370, VSE and VS1 environments.

Either product may be installed with the Information/System Release 1.2 for VM/370 and VSE base product.

For purposes of simplicity, the Information/VM-VSE and the Information/MVS products will be referred to generically as Information/Data, and any references to Information/Data will imply references to both Information/VM-VSE and Information/MVS. Where individual references are required for purposes of clarification, the full product names, Information/VM-VSE and Information/MVS, will be used.

### HIGHLIGHTS OF INFORMATION/SYSTEM RELEASE 1.2

- Interactive retrieval facility for keyword searches of the data.
- Designed for ease-of-use.

- Load program to load the Information/Data product into the user system.
- Capability to insert user data.
- Ability to optionally print selected screens or entries.

### DESCRIPTION OF INFORMATION/SYSTEM RELEASE 1.2

INFORMATION/SYSTEM in conjunction with Information/Data is a productivity tool designed for use by data processing personnel supporting an MVS, VM/370, VSE or VS1 environment. It consists of an interactive information retrieval facility designed to provide access to the Information/Data files via previously assigned keywords, and of the appropriate programs for loading the data base.

Design objectives of Information/System and the companion information/Data products are to:

- Make the data available to the user online and on the user's system.
- Simplify and speed keyword searches of information.
- Integrate IBM technical information from many sources.
- Broaden the amount of technical information available to users.
- Keep the information up to date by addition of new data and by purging the out-of-date material.
- Enable users to add information to Information/Data.

The Information/System interactive retrieval facility provides the user with a set of commands to access the data provided by Information/Data through display terminals. The retrieval facility provides a keyword search function through which the user can search documents by specifying one or more previously assigned keywords connected by Boolean operators ('and', 'or', 'not'). The search can include all the document types or can be restricted only to selected types (e.g., EWS, PTF cover letters). The user can display the complete stored text of the documents or the titles only.

The user also has the option to search all of Information/Data or to limit the search only to any new entries added since the previous distribution tape.

Other Functions of Information/System include:

- Sequential display of contiguous data entries of Information/Data.
- A PRINT command to allow the user to print a section of a document or entire documents for later reference.
- A keyword glossary to expedite and facilitate the search process.
- A FIND command to locate specific words inside a pre-identified document.
- A HELP facility is built into Information/Data to describe error conditions and to suggest corrective actions.

### HIGHLIGHTS OF INFORMATION/DATA

- Online, consolidated collection of technical information from many IBM sources.
- Periodic updates to the Information/Data products to provide current information.
- Self-instruction and usage assistance information.

### DESCRIPTION OF INFORMATION/DATA

Technical information from a number of development, system and support locations worldwide is edited, structured and incorporated into Information/Data.

Types of information in Information/Data include:

- Selected IBM system support center flashes, memos, question and answer logs and technical articles produced by the support organization responsible for the subject element. Selected lengthy articles are abstracted and ordering information is included. (Occasionally, such documents are added as an additional file on the distribution tape.)
- Technical descriptions of recent IBM programming announcements.
- Service information on selected IBM software products including early warning system (EWS) data and systems engineering communications (SECOM).
- Status information on selected program products, installed user programs and field developed programs. Included is information on availability, feature numbers, optional features and documentation order numbers.
- A selection of Program Temporary Fix (PTF) cover letters and Program Level Change (PLC) information that may be used in

**INFORMATION/SYSTEM (cont'd)**

conjunction with the EWS file to locate appropriate fixes for identified problems.

- Brief descriptions of schedules for some of the education courses that IBM is conducting.
- An interactive HELP file designed to assist the user in making the most effective use of Information/System. A part of this file is a self-instruction tutorial for new users of the system.
- A keyword glossary giving alphabetical access to all keywords, whether abbreviated, hyphenated or misspelled by the author, which enhances the ability to find the required document.

The major products addressed by Information/Data include:

- Systems - S/370, 4300, 8100 Information System, industry and cross-industry terminal systems, storage and printing units.
- Programming - Operating systems, compilers and assemblers, access methods, DB/DC products, emulators, job entry subsystems, utilities and interactive products.

After the initial distribution to new users, a tape containing all updates to Information/VM-VSE or Information/MVS (depending on which product the user has chosen to use) since the last update will be distributed periodically to licensed users of Information/VM-VSE or Information/MVS to maintain a current level of technical information.

The updates of Information/Data are distributed by the standard IBM distribution centers. The distribution tapes are available in 9-track/1600 bpi and 9-track/6250 bpi. Utility programs in Information/System merge the updates into the existing data base for VM/370 and VSE users.

During the installation process, users have the option to:

- Insert their own data into Information/Data.
- Select only those types of data from Information/Data that are likely to be relevant to their environment.

All the IBM-provided Information/Data material must be regarded as working documents intended to assist the professional data processing personnel. The information does not provide formal IBM recommendations or documentation. The information provided is intended for use by data processing personnel who are sufficiently familiar with the necessary background material to understand the topics discussed and to use the information within the proper context and with the proper safeguards.

The technical material included in Information/Data addresses a wide variety of IBM products that are commonly used in an MVS, VM/370, VSE or VS1 installation. Although the main objective of Information/Data is to assist the user with useful, timely and up-to-date information, there is no commitment to provide exhaustive or complete information on any product addressed.

The customer may make printed copies of limited portions of the Information/Data products for use within the customer's organization, for purposes of maintenance and improvement of the customer's data processing installation.

**CUSTOMER RESPONSIBILITIES**

In order to use Information/System, the customer should have installed the minimum machine and software configuration as described in the "Specified Operating Environment".

If the Information/System user data insertion facility is used, the customer has the responsibility to ensure that the data inserted conforms to the specified format.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Information/System for VM/370 and VSE is designed to operate on any IBM processing unit that meets the minimum specifications of the supported operating system environments described under "Software Requirements".

An IBM 3270 display terminal or equivalent display device that supports a screen of at least 24 lines by 80 characters must be available. When a larger screen is used, Information/System runs in IBM 3277 mdl 2 compatibility mode. Devices supported by Information/System include the following IBM display stations:

- 3275 mdls 2 and 12
- 3276 mdls 2, 3, 4, 12, 13 and 14
- 3277 mdl 2
- 3278 mdls 2, 3, 4 or 5
- 3279 mdls 2A and 3A

**SOFTWARE REQUIREMENTS**

Information/System for VM/370 and VSE is the base product required by each of its products. This product is used in the VM/370 and VSE

environments. In the VM/370 environment, Information/System operates under the Conversational Monitor System (CMS). In the VSE environment, Information/System operates under the Interactive Computing and Control Facility (ICCF). The details of each environment are as follows:

- VM/370 Release 6 with BSEPP or SEPP, or with VM/SP.
  - VSE/VSAM
- DOS/VSE with VSE/Advanced Functions
  - VSE/VSAM
  - VSE/ICCF
- The IBM DOS/VS Sort/Merge program product (5746-SM2) or a compatible sort/merge product is required by the Information/System utilities to support user data insertion facilities for Information/MVS and Information/VM-VSE.

**Storage Estimates:** The amount of virtual storage required for Information/System code, work areas and VSAM areas is variable and depends on the function being performed.

In the VM/370 environment, a minimum CMS virtual machine size of 960K bytes (K=1,024) is required. Information/System requires no change to the nucleus. However, VSAM must be generated in the nucleus.

In the VSE environment, a minimum ICCF interactive partition size of 400K bytes is required. Information/System requires no change to the nucleus. However, since VSAM is reentrant, it may be included in the Shared Virtual Area (SVA).

Direct access storage requirements for the data products vary with the amount of data selected by the user. Information/VM-VSE requires approximately 80 to 100 megabytes of direct access storage for an untailored data base. Information/MVS requires approximately 180 to 200 megabytes of direct access storage for an untailored data base.

**DOCUMENTATION**  
(available from Mechanicsburg)

Information/System for VM/370 and VSE Program Summary (GC34-2068) and Information/System for VM/370 and VSE General and Pre-Installation Information (GC34-2069) are available. Other documents available are listed in General and Pre-Installation Information Manual.

RPQs ACCEPTED: No

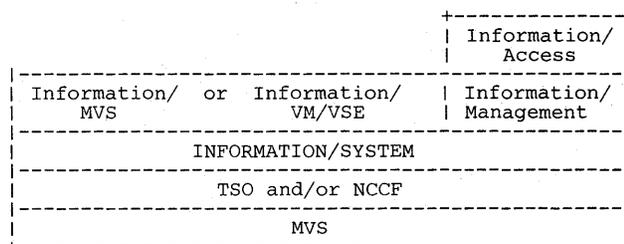
**INFORMATION/SYSTEM RELEASE 2.1**

**DESCRIPTION**

Information/System Release 2.1 operates in the MVS/TSO and MVS/NCCF environments and supports the Information/MVS and Information/VM-VSE products and the Information/Management and Information/Access features. Information/System Release 2.1 provides the base for the features and products. The applications that the user wishes to perform determine which features or products he should select for use with Information/System Release 2.1.

- Retrieval of selected IBM technical information requires Information/System and the Information/MVS or Information/VM-VSE product.
- Implementation of the problem management, change management and configuration management applications requires Information/System and the Information/Management feature.
- Information/Access is used with Information/System and Information/Management to assist system programmers at data processing installations in the resolution of suspected IBM software problems and in the planning of preventive service changes to IBM programs.

The following diagram illustrates the relationship of Information/System to the supported operating environments, and the interrelationships among the various Information/ System Release 2.1 features and products.



**INFORMATION/SYSTEM (cont'd)**

The combinations of operating environments supported by Information/System Release 2.1 and its features and products are shown in the following table.

TSO NCCF	Information/System R2.1 Under MVS
Information/MVS	X
Information/VM-VSE	X
Information/Management	X
Information/Access	X

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Information/System operates on any IBM hardware configuration that supports MVS Release 3.8, MVS/SP Version 1, or MVS/SP Version 2 (operation is in 24-bit mode).

An IBM 3270 display terminal that supports a screen of at least 24 lines by 80 characters must be available. Devices supported by Information/System include the following IBM display stations:

- 3275 mdls 2 or 12
- 3276 mdls 2, 3, 4, 12, 13, or 14 in 3277 mdl 2 compatibility mode
- 3277 mdl 2
- 3278 mdls 2, 3, 4 or 5
- 3278 mdls 2A and 3A

To use the full capabilities of Information/System or any of its features and products, a printer such as an IBM 1403, 3211 or 3800 is required.

**SOFTWARE REQUIREMENTS**

Information/System executes as an interactive application under NCCF or TSO on OS/VS2 MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode). Two PTFs are required for VSAM to allow proper protocol for multiple users concurrently sharing the same VSAM data set. These PTFs are UZ22906 (PUT tape 7901) and UZ27104 (PUT tape 7909). A PTF is available for operating in the NCCF/TCAM environment.

Information/System is the base product required by each of its features and products.

Information/System operates directly under the Time Sharing Option (TSO) running on OS/VS2 MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode) with the current releases of the Virtual Telecommunications Access Method (VTAM) or the Telecommunications Access Method (TCAM). A TCAM MCP generation may be required by the installation to obtain full-screen mode in the TSO/TCAM environments.

In addition, Information/System runs as standard commands under the Network Communications Control Facility (NCCF) running on OS/VS2 MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode) with Advanced Communication Function/Virtual Telecommunications Access Method (ACF/VTAM Version 1 or ACF/VTAM Version 2) or Advanced Communication Function/Telecommunications Access Method (ACF/TCAM). Information/System can run under both TSO and NCCF concurrently.

The Information/System utilities used with Information/MVS or Information/VM-VSE require the IBM OS/VS Sort/Merge program product (5740-SM1) or a compatible Sort/Merge product.

**PERFORMANCE CONSIDERATIONS**

Information/System is an application that executes as a problem program. When Information/System is installed but not operational, there is no performance impact on the base system other than that caused by an increase in external storage requirements.

Information/System executes concurrently with other TSO or NCCF applications. The effect of Information/System is the same as similar terminal applications in these environments. The response time for any particular operation varies with the complexity of the function, the speed of the processor or other devices and the current system load. Base system supervisor facilities may be used to establish the amount of service that any particular user receives.

**DOCUMENTATION**

(available from Mechanicsburg)

*Information/System Release 2 Program Summary (GC34-2053) ... Information/System Release 2 General and Pre-Installation Information (GC34-2027).* Other documents available are listed in the *General and Pre-Installation Information Manual*.

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No

**INFORMATION/SYSTEM RELEASE 2.1 with INFORMATION/MVS or INFORMATION/VM-VSE**

Information/System Release 2.1 for MVS is an interactive program product that provides data processing personnel, operating in MVS/TSO or MVS/NCCF, with keyword access to a wide range of selected technical information regarding IBM products. The information is contained in the optional data products, Information/MVS or Information/VM-VSE.

The Information/MVS product is a consolidated collection of IBM technical data of interest to data processing staffs responsible for planning, installing, supporting and tuning IBM systems, subsystems and components appropriate to the MVS, VM/370, VSE and VS1 environments.

The Information/VM-VSE product is a consolidated collection of IBM technical data of interest to data processing staffs responsible for planning, installing, supporting and tuning IBM systems, subsystems, and components appropriate to the VM/370 and VSE environments.

Either product may be installed with the Information/System Release 2.1 base product.

For purposes of simplicity, the Information/MVS and Information/VM-VSE products will be referred to generically as Information/Data, and any references to Information/Data will imply references to both Information/MVS and Information/VM-VSE. Where individual references are required for purposes of clarification, the full product names, Information/MVS and Information/VM-VSE will be used.

**HIGHLIGHTS OF INFORMATION/SYSTEM RELEASE 2.1**

- Interactive retrieval facility for keyword searches of the data.
- Designed for ease-of-use.
- Load program to load the Information/Data product into the user system.
- Capability to insert user data.
- Ability to optionally print selected screens or entries.

**DESCRIPTION OF INFORMATION/SYSTEM RELEASE 2.1**

Information/System in conjunction with Information/Data is a productivity tool designed for use by data processing personnel supporting an MVS, VM/370, VSE or VS1 environment. It consists of an interactive information retrieval facility designed to provide access to the Information/Data files via previously assigned keywords, and of the appropriate programs for loading the data base.

Design objectives of Information/System and the companion Information/Data product are to:

- Make the data available to the user online and on the user's system.
- Simplify and speed keyword searches of information.
- Integrate IBM technical information from many sources.
- Broaden the amount of technical information available to users.
- Keep the information up to date by addition of new data and by purging the out-of-date material.
- Enable users to add information to Information/Data.

The Information/System interactive retrieval facility provides the user with a set of commands to access the data provided by Information/Data through display terminals. The retrieval facility provides a keyword search function through which the user can search documents by specifying one or more previously assigned keywords connected by Boolean operators ('and', 'or', 'not'). The search can include all the document types or can be restricted to selected types (e.g., EWS, PTF cover letters). The user can display the complete stored text of the documents or the titles only.

The user also has the option to search all of Information/Data or to limit the search only to any new entries added since the previous distribution tape.

Other functions of Information/System include:

- Sequential display of contiguous data entries of Information/Data.
- A PRINT command to allow the user to print a section of a document or entire documents for later reference.
- A keyword glossary to expedite and facilitate the search process.
- A FIND command to locate specific words inside a pre-identified document.
- A HELP facility is built into Information/MVS to describe error conditions and to suggest corrective action.

## PROGRAM PRODUCTS

**INFORMATION/SYSTEM (cont'd)****HIGHLIGHTS of INFORMATION/DATA**

- Online, consolidated collection of technical information from many IBM sources.
- Periodic updates of the Information/Data product to provide current information.
- Self-instruction and usage assistance information.

**DESCRIPTION OF INFORMATION/DATA**

Technical information from a number of development, system and support locations worldwide is edited, structured and incorporated into Information/Data.

Types of information in Information/Data include:

- Selected IBM system support center flashes, memos, question and answer logs and technical articles produced by the support organization responsible for the subject element. Selected lengthy articles are abstracted and ordering information is included. (Occasionally, such documents are added as an additional file on the distribution tape.)
- Technical descriptions of recent IBM programming announcements.
- Service information on selected IBM software products including early warning system (EWS) data and systems engineering communications (SECOM).
- Status information on selected program products, installed user programs and field developed programs. Included is information on availability, feature numbers, optional features and documentation order numbers.
- A selection of Program Temporary Fix (PTF) cover letters and Program Level Change (PLC) information that may be used in conjunction with the EWS file to locate appropriate fixes for identified problems.
- Brief description of schedules for some of the education courses that IBM is conducting.
- An interactive HELP file designed to assist the user in making the most effective use of Information/System. A part of this file is a self-instruction tutorial for new users of the system.
- A keyword glossary giving alphabetical access to all keywords, whether abbreviated, hyphenated or misspelled by the author, which enhances the ability to find the required document.

The major products addressed by Information/Data include:

- Systems - S/370, 4300, 8100 Information System, industry and cross industry terminal systems, storage and printing units.
- Programming - Operating systems, compilers and assemblers, access methods, DB/DC products, emulators, job entry subsystems, utilities and interactive products.

Information/Data will be distributed periodically to licensed users of Information/Data to provide an updated level of technical information.

The update of Information/Data is distributed by the standard IBM distribution centers. The distribution tapes are available in 9-track/1600 bpi and 9-track/6250 bpi. Utility programs in Information/System merge the updates into the existing data base.

During the installation process, users have the option to:

- Insert their own data into Information/Data.
- Select only those types of data from Information/Data that are likely to be relevant to their environment.

All the IBM-provided Information/Data material must be regarded as working documents intended to assist the professional data processing personnel. The information does not provide formal IBM recommendations or documentation. The information provided is intended for use by data processing personnel who are sufficiently familiar with the necessary background material to understand the topics discussed and to use the information within the proper context and with the proper safeguards.

The technical material included in Information/Data addresses a wide variety of IBM products that are commonly used in an MVS, VM/370, VSE or VS1 installation. Although the main objective of Information/Data is to assist the user with useful, timely and up-to-date information, there is no commitment to provide exhaustive or complete information on any product addressed.

The customer may make printed copies of limited portions of the Information/Data product for use within the customer's organization for purposes of maintenance and improvement of the customer's data processing installation.

**CUSTOMER RESPONSIBILITIES**

In order to use Information/System, the customer should have installed the minimum machine and software configuration as described in the "Specified Operating Environment".

If the Information/System user data insertion facility is used, the customer has the responsibility to ensure that the data inserted conforms to the specified format.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Information/System operates on any hardware configuration that supports MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode).

An IBM 3270 display terminal that supports a screen of at least 24 lines by 80 characters must be available. Devices supported by Information/System include the following IBM display stations:

- 3275 mdls 2 or 12
- 3276 mdls 2, 3, 4, 12, 13 or 14 in 3277 mdl 2 compatibility mode
- 3277 mdl 2
- 3278 mdls 2, 3, 4 or 5
- 3279 mdls 2A and 3A

To use the full capabilities of Information/System or any of its features and products, a printer such as an IBM 1403, 3211 or 3800 is required.

**SOFTWARE REQUIREMENTS**

Information/System executes as an interactive application under NCCF or TSO on OS/VS2 MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode). Two PTFs are required for VSAM to allow proper protocol for multiple users concurrently sharing the same VSAM data set. These PTFs are UZ22906 (PUT Tape 7901) and UZ27104 (PUT Tape 7909). A PTF is available for operating in the NCCF/TCAM environment.

Information/System is the base product required by each of its features and products.

Information/System operates directly under the Time Sharing Option (TSO) running on OS/VS2 MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode) with the current releases of the Virtual Telecommunications Access Method (VTAM) or the Telecommunications Access Method (TCAM). A TCAM MCP generation may be required by the installation to obtain full-screen mode in the TSO/TCAM environments.

In addition, Information/System runs as standard commands under the Network Communications Control Facility (NCCF) running on OS/VS2 MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode) with Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM Version 1 or ACF/VTAM Version 2) or Advanced Communication Function/Telecommunications Access Method (ACF/TCAM). Information/System can run under both TSO and NCCF concurrently.

The Information/System utilities used with Information/MVS or Information/VM-VSE require the IBM OS/VS Sort/Merge program product, 5740-SM1, or a compatible Sort/Merge product.

**PERFORMANCE CONSIDERATIONS**

Information/System is an application that executes as a problem program. When Information/System is installed but not operational, there is no performance impact on the base system other than that caused by an increase in external storage requirements.

Information/System executes concurrently with other TSO or NCCF applications. The effect of Information/System is the same as similar terminal applications in these environments. The response time for any particular operation varies with the complexity of the function, the speed of the processor or other devices, and the current system load. Base system supervisor facilities may be used to establish the amount of service that any particular user receives.

**Storage Estimates:** Direct access storage requirements for the data products vary with the amount of data selected by the user. Information/MVS requires approximately 180 to 200 megabytes of direct access storage for an untailed data base. Information/VM-VSE requires approximately 80 to 100 megabytes of direct access storage for an untailed data base.

**INFORMATION/SYSTEM (cont'd)**

**INFORMATION/SYSTEM RELEASE 2.1  
with INFORMATION/MANAGEMENT**

Information/Management is a licensed feature of Information/System Release 2.1, and is used with Information/System Release 2.1 to support the system management processes of:

- Reporting, tracking and resolving problems detected at the data processing installation.
- Planning, coordinating and monitoring changes for the data processing installation.
- Maintaining information about the system inventory of hardware and software components which make up the data processing installation.

Through interactive applications for problem, change and configuration management, Information/System and Information/Management can help managers and data processing personnel to:

- Ensure that all problems receive proper attention until they are resolved.
- Define responsibility for problem resolution and change implementation within the organization and monitor problem and change status.
- Improve the management decision-making process by providing easy access to current information about problem and change status, priority, assignments, exception condition, etc.
- Organize and monitor the planning, scheduling and implementation of changes and thereby minimize their disruptive effect on the installation.
- Maintain a history of problems and changes and their impact on the installation, in order to improve the problem and change management process and to identify trends.
- Better utilize clerical personnel for performing standard problem, change and configuration management tasks.
- Consolidate configuration information, thereby eliminating problems caused by conflicting information and reduce the total effort required to maintain system and network component information.
- Obtain more rapid response to problems by maintaining central control of information on vendor maintenance.
- Improve the level of service provided to data processing users.

**HIGHLIGHTS**

- Full-screen prompting aids inexperienced and occasional users.
- Single-line input alternative saves time for experienced users.
- Extensive online tutorial and help facilities ease usage and data entry.
- Standardized stored response chains reduce training requirements.
- A powerful search facility enhances data base inquiry.
- Duplicate problem recognition aided by standard structured method of describing problem symptoms.
- Problem management application
  - Problem reporting, assignment and tracking are supported.
  - Selectable levels of function satisfies varying needs of individual installations.
  - Interactive inquiry makes desired information readily available.
  - Report capability provides management information.
- Change management application
  - Supports change request, planning and implementation.
  - Supports tracking of change approvals.
  - Interactive inquiry makes desired information readily available.
  - Report capability provides management information.
- Configuration management application
  - Supports a single source of current, accurate information about system components.
  - Supports interrelationships among hardware and software components.
  - Provides configuration management information (e.g., vendor and finance information) to assist many support activities at the installation.
  - Interactive inquiry makes desired information readily available.

- Report capability provides management information.
- Integrated applications relate problem, change and configuration management information.
- Input validation reduces data entry errors.
- Customized reporting facility satisfies additional reporting needs of individual installations.
- Journalling of data base changes provides audit trail.
- Authorization facility controls usage of data.
- Data base integrity and recovery facilities protect installation's investment in the data base.
- NPDA problem entry eliminates unnecessary keying of communication network problem data.

**APPLICATION DESCRIPTION**

Information/Management supports the creation, updating, inquiry and reporting of entries in the Information/Management data base that contains information about problems which occur in the data processing installation, changes which are planned for the installation and hardware and software components within the installation.

**Ease of Use:** Conversational data entry and extensive help and tutorial facilities allow Information/Management to be used easily and effectively by a variety of professional and nonprofessional data processing personnel including system and network operators, system and application programmers, managers, user help desk personnel, data control clerks and data entry personnel.

Inexperienced users can communicate with Information/Management through a conversational dialog. The user is asked what he wants to do through full-screen displays and responds by selecting one of the possible courses of action presented on the display, or by supplying requested data. Online tutorials are available to provide instruction on Information/Management facilities. These tutorials can be used to gain a general level of knowledge prior to using an unfamiliar facility of Information/Management or to answer specific questions which may arise during a dialog. In the latter case, the user can leave the dialog to browse the tutorial for the desired information and return to the point of departure.

Once the user has indicated what he wants to do, he is presented with data entry displays that ask for the data necessary for the operation he wishes to perform. Help screens are available. Thus, with the dialog, the user need know only what operation he wishes to perform and the data he wishes to enter.

While the dialog method provides ease-of-use for the unfamiliar user, a time-saving shortcut is provided for the experienced user. In a single line of input, he may chain responses for all the display screens he can anticipate, bypassing the dialog and reaching the desired screen directly. These two methods of input, dialog and response chaining, can be intermixed as needed by the individual user.

Another input shortcut helps users with low levels of training to use Information/Management effectively, and offers further time savings for experienced users. Standard operations that are frequently performed at the installation, such as opening certain types of problems, requesting certain types of changes and displaying or reporting certain types of information about problems, changes and system components, can be defined once by trained personnel and stored for subsequent use. The user then simply enters the name of the stored response chain for the operation he wishes to perform and Information/Management processes all the stored responses, filling in all the data that has been defined as being constant. Typically, the response chain would be built to take the user directly to a data entry screen, allow him to enter the variable data that changes by problem, change or component, then take him directly to the next data entry screen, and so on.

Inquiry into the Information/Management data base is easily accomplished. Any combination of entry characteristics (i.e., data field contents) can be selected to perform complex searches using Boolean (i.e., AND, OR, NOT) logic specifying combinations of field values, 'ignore' positions, and ranges. In a single command, a pre-stored response chain may be used, by-passing many screens, to directly access the desired data screen. Identification numbers and abstracts of criteria are displayed at the conclusion of the search. From these, the user selects either those entries for which he desires a more detailed display or requests a report of the entries found by the search.

**Duplicate Problem Recognition:** The ability to recognize a problem as being a duplicate of another is an important part of the problem resolution process. Information/Management facilitates the job of recognizing duplicate installation problems by its method of describing problem symptoms in a structured manner.

**Network Problem Determination Application (NPDA) Problem Open:** With the growing requirement to manage networks in addition to other activities throughout the system, integration of these two areas is essential. Our management solutions take advantage of the initial data

**INFORMATION/SYSTEM (cont'd)**

capture by NPDA and use Information/Management to track these problems to resolution. This integrates the areas of problem data capture with system administrative and management facilities.

Operating under NCCF, the interface to NPDA gives the user the option to automatically enter NPDA-detected problems into the Information/Management data base, thus reducing the need for reentering data for communication network management problems.

**Problem Management Application:** The problem management application assists in the management of hardware, software, facilities, procedures and documentation problems that arise at the data processing installation. After detection, new problems can be entered, automatically from NPDA, or through a series of data entry screens that accept a wide variety of administrative and symptom information, including problem description, open date and time, owner, priority, status, problem type, impact, failing component, location and, later, resolution data.

Installations initially implementing a basic level of function can make use of a single, comprehensive problem entry screen to capture the information they need. Installations requiring a higher level of function can make use of a series of problem entry screens to capture a greater amount of detail. As the problem progresses through the resolution cycle, it can be assigned to individuals or groups responsible for those phases of resolution; a record of these assignments is kept. The problem information can be updated as additional information becomes available.

The copy capability can be used to create a new entry similar to an existing one. Instead of having to reenter each item of input, a similar, existing entry can be copied and modified as appropriate.

The search capability displays all problem entries meeting selection criteria specified by the user. The selection criteria can range from straightforward to complex. This enables, for example, a system programmer to determine what new problems have been assigned to him; a problem analyst to determine what are the high priority problems he should be working on; or a manager to determine whether a vendor's repair response time is satisfactory.

In addition to displays of selected problem information, a variety of printed reports are available:

- Problem Management Calendar Report - Lists problems by date of occurrence.
- Periodic Problem Status Report - Lists problems opened, closed and priority 1 holdovers for this period as well as providing totals for the various kinds of problems.
- Problem Assignee Report - Lists problems by assignee in date entered sequence.
- Utilizing the powerful search capability, various other reports are available.
- Generalized report capability - Provides the user with a mechanism for creating customized reports from the Information/Management data base.

**Change Management Application:** The change management application assists in the management of changes planned for and being made to the hardware, software, facilities, procedures and documentation within the data processing installation. Change requests are entered through a series of data entry screens requesting description of the change, components affected, priority, reason for the change, identification of the change requestor, coordinator, implementor and other responsible parties, and fallback plans. As the change progresses through the implementation cycle, it can be assigned to individuals or groups responsible for those phases of implementation; a record of these assignments is kept. The entire change can be broken down into separate change activities that can be scheduled and tracked individually.

When the change request is entered, a list of individuals who must approve it is generated. Different individuals can be specified by the installation for different types of changes (e.g., hardware, new software installation, software service application, etc.). Each individual can enter his approval, or disapproval and reason.

The copy capability can be used to create a new entry similar to an existing entry. Instead of having to reenter each item of input, a similar, existing entry can be copied and modified as appropriate. This can be especially useful for such tasks as adding new terminals to the network and movement of spare terminals in and out of storage.

The search capability displays all change entries meeting selection criteria specified by the user. The selection criteria can range from straightforward to complex. This enables, for example, a change coordinator to determine whether a new GEN will be finished in time to support a new hardware installation; or a manager to determine whether schedule slippages for certain change activities expose the schedule for the entire change.

In addition to displays of selected change information, printed reports are available:

- Change Management Calendar Report - Lists problems by date required.
- Periodic Change Review Report - Lists changes targeted for completion last period, this period and next period.
- Change Approver Summary Report - Lists, by approver, summary information for each change requiring approval.
- Change Approver Detail Report - Lists, by approver, summary and detail information for each change requiring approval.
- Change and Activity Report - Lists changes or activities by planned start date.
- Changes with Related Activities Report - Lists each change and all the activities associated with that change.
- Utilizing the powerful search capability, various other reports are available.
- Generalized report capability - Provides the user with a mechanism for creating customized reports from the Information/Management data base.

**Configuration Management Application:** The configuration management application provides a means to maintain a single source of accurate, current, centralized and readily available information about the inventory of hardware and software system components. Component information can be entered through a series of data entry screens requesting component name, description, status, location, component vendor identification, service vendor identification, responsible party, financial data and connections to other components.

The copy capability can be used to create a new entry similar to an existing entry. Instead of having to reenter each item of input, a similar, existing entry can be copied and modified as appropriate. This can be especially useful for such tasks as making new data base entries for a large number of similar components.

The search capability displays all configuration management entries meeting a selection criteria specified by the user. The selection criteria can range from straightforward to complex. This ready source of configuration management information can assist:

- The problem analyst in the resolution of system and/or communication network problems by making available information such as location, on-site contact and service vendor identification.
- The change requestor, change coordinator and change implementor in the change planning process by making available information such as location, interconnections, current status and EC level.
- Hardware EC level management and software release and service level management by providing a readily accessible, current and centralized source of information about levels of all system components.
- The operations staff by providing a readily accessible, current list of off-site contacts for remote equipment.
- Management in coordinating system-wide service and repair activities by providing centralized, current information on component status and service vendor identification.
- Management in capacity planning and resource control by providing a current base of information about all system components.

In addition to displays of selected system inventory information, printed reports are available:

- Inventory by Location Report - Lists summary information for each component at that location.
- Configuration Map - Lists the connection interrelationship of all components.
- Utilizing the powerful search capability, various other reports are available.
- Generalized report capability - Provides the user with a mechanism for creating customized reports from the Information/Management data base.

**Integrated Applications:** Interrelationships among problems, changes and system inventory components can be described and subsequently retrieved through the integration of information in a single data base and the search capabilities of Information/Management. This enables, for example, problem analysts to determine whether recent changes have been made to a problem component, or determine the location and offsite contact for a suspected problem component; or change coordinators to plan changes necessary to resolve a certain problem or plan software upgrades based on current levels.

**Input Validation:** An optional capability of Information/Management allows for the definition of valid input for data entry fields. Up to nine unique user responses can be defined. Information/Management then monitors all data entered in these fields and rejects as invalid those not meeting the specification. Input validation cannot be used with certain problem symptom data entry fields. These fields must remain as

## INFORMATION/SYSTEM (cont'd)

defined by IBM in order to preserve the integrity of the structured method of problem symptom description introduced to enhance duplicate problem recognition.

**Customized Reports:** Facilities are provided to create reports from user-specified selection criteria that identify data to be extracted from the Information/Management data base and placed in a separate data set. User-written programs can then perform any desired operations on this data and make the results available in any format.

**Data Base Change Journaling:** Changes made to certain fields in data base entries cause the previous contents of those fields to be journaled into history portions of the entry. This facility provides an audit trail, which can be displayed or printed, of changes made to key information.

**Data Base Usage Authorization:** Facilities are provided for a system administrator to identify create/update and delete authority. With this capability, Information/Management functions can be restricted to only those needing them to perform their job.

**Data Base Integrity and Recovery Facilities:** The Information/Management data base consists of one data set containing entries and a corresponding data set providing "quick-search" indices for these entries. The ability to recover from damage to the entry data set is also provided. Updates can optionally be journaled to a log. Should the entry data set become damaged, it can be updated from the log after being restored from the point where last saved. When an inconsistency is found between data sets, the index data set can be reconstructed from the entry data set, reestablishing consistency.

### SPECIFIED OPERATING ENVIRONMENT

Information/Management operates in all environments supporting Information/System Release 2.1.

### HARDWARE REQUIREMENTS

Information/Management operates on any IBM hardware configuration that supports MVS 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode).

An IBM 3270 display terminal that supports a screen of at least 24 lines by 80 characters must be available. Devices supported by Information/Management include the following IBM display stations:

- 3275 mdls 2 or 12
- 3276 mdls 2, 3, 4, 12, 13 or 14 in 3277 mdl 2 compatibility mode
- 3277 mdl 2
- 3278 mdls 2, 3, 4 or 5
- 3279 mdls 2A and 3A

To use the full capabilities of Information/Management, a printer such as an IBM 1403, 3211 or 3800 is required.

### SOFTWARE REQUIREMENTS

Information/System is the base product required by each of its features and products. Information/System must be installed before the Information/Management feature can be used. Information/Management executes as an interactive application under NCCF or TSO on OS/VS2 MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode). Two PTFs are required for VSAM to allow proper protocol for multiple users concurrently sharing the same VSAM data set. These PTFs are UZ22906 (PUT Tape 7901) and UZ27104 (PUT Tape 7909). A PTF is available for operating in the NCCF/TCAM environment.

Information/System operates directly under the Time Sharing Option (TSO) running on OS/VS2 MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode) with the current releases of the Virtual Telecommunications Access Method (VTAM) or the Telecommunications Access Method (TCAM). A TCAM MCP generation may be required by the installation to obtain full-screen mode in the TSO/TCAM environments.

In addition, Information/System runs as standard commands under the Network Communications Control Facility (NCCF) running on OS/VS2 MVS Release 3.8; MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode) with Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM Version 1 or ACF/VTAM Version 2) or Advanced Communications Function/Telecommunications Access Method (ACF/TCAM). Information/System can run under both TSO and NCCF concurrently.

### COMPATIBILITY

The problem management application of Information/Management may be used in conjunction with the problem determination facilities of the Network Problem Determination Application (NPDA). When a network operator, problem analyst or other user of NPDA determines that a network communication problem exists, he can command NPDA to gather the key symptom and administrative information about that problem and transfer it to Information/Management. Information/Management then automatically opens a new entry in the problem data base using the information received from NPDA and

returns to the NPDA operator the Information/Management problem number. The facilities of Information/Management can then be used to manage that problem. A PTF for NPDA, Release 2, is available to support this function.

The problem management application of Information/Management may also be used in conjunction with the problem determination facilities of the MVS Interactive Problem Control System (MVS/IPCS). After using MVS/IPCS to gather information to be used in determining the source of a software problem, the problem analyst enters this information into the Information/Management problem data base. From then on, the facilities of Information/Management can be used to manage that problem.

### MIGRATION

MVS installations using the Account Network Management Program (ANMP), Interactive Problem Control System (IPCS) problem management function, or other problem, change or configuration management applications should be encouraged to convert to Information/Management by beginning to use Information/Management for all new problems and changes occurring after a given start date. Migration aids will be available for installations using ANMP. MVS customers actively involved in planning for the installation of ANMP should evaluate going directly to Information/Management.

### PERFORMANCE CONSIDERATIONS

Information/Management is an application that executes as a problem program. When Information/Management is installed but not operational, there is no performance impact on the base system other than that caused by an increase in external storage requirements.

Information/Management executes concurrently with other TSO or NCCF applications. The effect of Information/Management is the same as similar terminal applications in these environments. The response time for any particular operation varies with the complexity of the function and the data sets used, the speed of the processor or other devices and the current system load. Base system supervisor facilities may be used to establish the amount of service that any particular user receives.

The Information/Management data base has been designed so that entries that match the search argument can be quickly determined and retrieved. This is accomplished through the use of a separate index from the primary or entry data base. Even though every field in the data base can be used as a search argument, the search times are primarily dependent on the number of search arguments and the number of resulting matches and are not significantly affected by the size or number of entries in the data base.

## INFORMATION/SYSTEM RELEASE 2.1

### with INFORMATION/ACCESS

#### PURPOSE

Information/Access is a licensed feature of Information/System Release 2.1 that is used with Information/System and Information/Management to assist system programmers at data processing installations in the resolution of suspected IBM software problems and in the planning of preventive service changes to IBM programs.

- APAR Search
  - Enables installations to request a search of the CSSF data base for APAR information in order to assist in determining whether a new problem is already known to IBM.
- APAR and PTF Request
  - Enables establishments to:
    - Obtain APAR or PTF descriptive data needed to resolve a problem at the installation.
    - Obtain APAR fixes and selected PTFs prior to PUT Tape availability.
    - Submit a request to provide a corrective fix not currently available.
    - Obtain notification of subsequent changes to APAR or PTF status.
- Preventive Service Inquiry
  - Enables installations to obtain planning information about IBM software preventive service upgrades.

#### HIGHLIGHTS

Information/Access, in conjunction with Information/System and Information/Management, provides:

- Ease-of-Use
  - Full-screen prompting aids inexperienced and occasional users.

**INFORMATION/SYSTEM (cont'd)**

- Single-line input alternative saves time for experienced users.
- Extensive online tutorial and help facilities aid usage and data entry.
- Stored response facility reduces time required to perform repetitive operations.
- Ability to create complex boolean search arguments provides a powerful data base inquiry capability.
- **CSSF Access**
  - Installation can control scheduling of CSSF connection.
  - Single copy of duplicate results maintained to conserve disk space.
  - Customer access to CSSF improves installation productivity.
  - The user is allowed to select a BSC TP port in one of his 3705s.
- **APAR Search**
  - Search of CSSF APAR information enhances ability to recognize duplicate problems.
  - Duplicate problem recognition aided by new method of describing problem symptoms.
  - Duplicate problem recognition further aided with common search arguments for local and CSSF data base searches.
  - Multi-operating system establishments can obtain information about other IBM software systems.
- **APAR and PTF Request**
  - Temporary fixes or bypasses can be obtained.
  - Notification of changes in APAR and PTF status facilitates planning for problem resolution.
  - Installations can request pre-release APAR fixes and PTFs for field testing.
  - Multi-operating system establishments can obtain information about other IBM software systems.
  - Format of most MVS and VS1 PTFs and many APAR fixes are designed for direct application by SMP. For other IBM software systems such as VSE or VM, the format of most PTFs and APAR fixes are in the format required by those systems.
- **Preventive Service Inquiry**
  - Latest available planning information can be obtained.
  - Notification of APARs written against preventive service upgrades requested by the customer facilitates planning for application of preventive service.
- **CSSF requests and results may be related to problems, changes or configuration data from Information/Management.**
- **Log of key Information/Access activities provides audit trail.**
- **Data base integrity and recovery facilities protect installation's investment in the data base.**
- **Telephone connection to Customer Software Support Facility (CSSF) is through a toll-free number.**

**DESCRIPTION**

**Ease-of-Use:** Information/Access can be used easily and effectively by systems programmers through the variety of data input methods available and the help and tutorial facilities. With the facilities of Information/System and Information/Management, users unfamiliar with Information/Access can communicate with it through a conversational dialog. The user is asked what he wants to do through full-screen displays and responds by selecting one of the possible courses of action presented on the display. Online tutorials are available to provide instruction on Information/Access facilities. These tutorials can be used to gain a general level of knowledge prior to using an unfamiliar facility of Information/Access or to answer specific questions which may arise during a dialog. In the latter case, the user can leave the dialog to browse the tutorial for the desired information and return to the point of departure.

Once the user has indicated what he wants to do, he is presented with data entry displays that ask for the data necessary for the operation he wishes to perform. Help screens are available. Thus, with the dialog, the user need know only what operation he wishes to perform and the data he wishes to enter.

While the dialog method provides ease-of-use for the unfamiliar user, a time-saving shortcut is provided for the experienced user. In a single line of input, he can chain Information/Access responses for all the display screens he can anticipate, bypassing the dialog and reaching the desired screen directly. These two methods of input, dialog and response chaining, can be intermixed as needed by the individual user.

Another input shortcut allows Information/Access response chains to be built and stored for standard operations that are frequently performed at the installation. These operations include all three major Information/Access functions. Standard defaults are supplied automatically by the stored response chain, saving keystrokes and time.

The installation's Information/Access data base is actually an extension of the Information/Management data base. Inquiry into the Information/Access data base, for both CSSF requests and results, is accomplished using the Information/Management search and display capabilities. Search examines the data base and locates entries meeting the search selection criteria specified by the user. Any combination of entry characteristics (i.e., data field contents) can be selected and complex searches can be performed using Boolean (i.e., AND, OR, NOT) logic specifying combinations of field values, 'ignore' positions and ranges. Identification numbers and abstracts of the CSSF requests and results in the Information/Access data base entries that meet the selection criteria are displayed at the conclusion of the search. From these, the user selects those entries for which he desires a more detailed display. With these facilities, the user can perform such searches as looking for all of his outstanding CSSF requests and their status, for results newly returned from CSSF, for results available for a particular APAR, and for results available for a particular Information/Management problem or change.

**CSSF Access:** Access to CSSF by Information/Access is common for each of its three functions (APAR search, APAR and PTF request and preventive service inquiry), only the content of the CSSF request is different. Information/Access is entered by first entering Information/Management and then selecting Information/Access as the function desired. Information/Access is then used to construct a properly formatted CSSF request from user input and place it in a new entry in the Information/Access or local, data base and in the transmission queue data set.

Requests awaiting transmission to CSSF are assigned a weighting factor based on the priority and age of the request. These weighting factors are used to determine the need for making a connection to CSSF. The priority is used to determine the order of transmission to CSSF. When the 3705 autocal feature is not used to connect to CSSF, the connection is made by the system operator dialing the CSSF telephone number. The installation can develop its own criteria for connection scheduling based on these weighting factors. Information on how to obtain telephone numbers and CSSF usage authorization will be provided at availability. Access to CSSF is controlled by the use of security codes.

After the connection to CSSF has been made, all accumulated stored requests are transmitted to CSSF for processing. Results are transmitted back to Information/Access during that connection or a subsequent connection and stored as new entries in the Information/Access data base. The Information/System facilities for local data base search, display and print can then be used to view or print the results of the CSSF request. When the CSSF result is no longer needed by the requestor or other designated user, it can be purged.

To conserve disk space and reduce response time, Information/Access maintains only one copy of any APAR data, PTF or upgrade received from CSSF. Subsequent users requesting any CSSF information already requested by a previous user are given access to it. This master copy is kept by Information/Access until the last requestor has purged his request for the information.

Using Information/Access, the installation can obtain the information it needs directly from CSSF under the control of installation personnel and procedures. This can increase productivity of installation personnel involved in problem resolution and planning.

A user may select a 3705 for transmission to/from the Customer Software Support Facility (CSSF). For the 3705, support is provided for switched line (manual or autocal) communications using Binary Synchronous point-to-point contention protocol. The BTAM access method is required and the 3705 must be equipped with a lineset and a modem which provide 4800 bps and if desired, autocal.

The 3705 support provides the user with DIALING and LINE statistics in addition to those provided in the SYS1.LOGREC by BTAM ERP (Error Recording Program). Commands are also provided to display line status and control line activation/deactivation at the system operator's console.

**APAR Search:** Since the majority of software service work is involved in rediscoveries of known defects, the ability to recognize a problem as being a duplicate of another is an important part of the problem resolution process. Information/System, Information/Management and Information/Access facilitate the job of recognizing duplicates of suspected IBM software problems in two ways. First, they allow the same problem symptom selection criteria to be used in searching the installation's Information/Management problem data base and APAR information in CSSF through Information/Access.

Using Information/Management, a search argument can be constructed to determine whether a certain problem has already occurred at the installation by searching the Information/Management data base. If there is no match and if the problem is a suspected IBM software

## INFORMATION/SYSTEM (cont'd)

problem, the user can use the Information/MVS search argument to search the Early Warning System (EWS) data in Information/MVS. If the problem is not found, he would utilize the same search argument used in Information/Management to search the more current information in the remote CSSF data base by invoking Information/Access.

Second, duplicate problem recognition is facilitated by the structured and consistent manner of describing problem symptoms used by Information/Management.

The Information/Access APAR Search facility enables the user to submit requests for CSSF APAR data on problems similar to the one he may be experiencing in order to determine whether this problem is known to have occurred elsewhere. Since CSSF contains the latest available IBM information about IBM software problems, APAR search can be of major importance to installations needing the latest information to help resolve problems.

With the availability of the IBM Support Center for MVS, a licensed user of Information/Access may use this program product to request a search of the CSSF data base. This search will then be considered equivalent to the Level 1 search. After completing 'problem source identification' and performing the search, if no resolution to the problem is found, the customer, having identified the failing component, may request access to the Level 2 queue, bypassing the Level 1 search and further reducing problem resolution time.

To request APAR data from CSSF, the Information/Access user simply enters the command for APAR search, responds to a data entry display screen similar to those used by Information/Management and enters administrative information about the request, such as identification of the CSSF library to be searched (e.g., MVS, VS1, VM, Program Products). The problem symptom search argument previously created using the facilities of Information/Management is used as the basis for the CSSF APAR search request. Through access to CSSF, the user will be provided with licensed program data for those programs for which the user is licensed by IBM.

If CSSF finds between one and ten APARs meeting the selection criteria, CSSF diagnostic information pertaining to each APAR is returned. This information may include the APAR description, status, closing code and temporary fix. If between eleven and twenty-five APARs have been found, an abstract of each APAR is returned. From this information the user can determine whether he wants more complete CSSF information on one or more APARs (which he can request using the APAR and PTF Request function) or whether he should refine his search argument and resubmit the request to CSSF. If more than twenty-five APARs have been found, no APAR information is returned. The user should refine his search argument and resubmit the request to CSSF.

**APAR and PTF Request:** APAR and PTF Request enables the user to:

- Obtain APAR or PTF descriptive data, APAR temporary fixes or PTFs needed to resolve a problem at the installation. PTFs and many APAR fixes are transmitted in machine readable format, ready for installation.
- Obtain notification of subsequent changes to APAR or PTF status. This information is useful for determining such things as when an open APAR is closed, when a PTF is available for a problem at the installation and whether a PTF has been found to be in error. When no longer needed, this CSSF status change notification can be discontinued.
- Submit a request to provide a corrective fix not currently planned to address the problem he is experiencing. Should this correction subsequently be determined unnecessary by either the customer or IBM, the request may be cancelled.
- Request APAR fixes and PTFs prior to their general availability by indicating that the installation is willing to field test them. IBM may select the installation as a field test site and will request a report on its experience with the preliminary fix. Information/Access provides the facilities for submitting these reports to CSSF.

To request APAR and PTF data from CSSF, the user simply enters the information needed to make up the CSSF request, using the input facilities described earlier.

When a machine-readable PTF is included in the CSSF results, it is automatically copied to a user-specified data set in order to be made available for further processing. Similarly, for those requests where CSSF has included an APAR fix with the CSSF results, the fix can be made machine-readable by using the facilities of Information/Access to copy it to a sequential data set. If the PTF or fix is in, for example, SMP format, it can then be installed by SMP. User-specified data sets can be named according to installation conventions. PTFs are no longer accessible from CSSF when generally available on a PUT Tape.

Corrective service is available for all IBM licensed programs for which FE provides support.

**Preventive Service Inquiry:** Preventive Service Inquiry enables the user to submit CSSF requests for information about IBM software changes (upgrades - e.g., PUT Tapes). The information accessible by the use of this facility includes:

- APAR text data including temporary fixes.
- Installation information and service related special hints and warnings.
- Service upgrade documentation clarification and corrections.
- Upgrade Modification Set (UMS) which defines modifications to be made to the upgrade.

A user requesting Preventive Service Inquiry data for an upgrade is also notified of any changes to that information occurring subsequent to the servicing of that request.

For those results which include a UMS, the UMS may be made machine-readable by using the facilities of Information/Access to copy it to a sequential data set. The application of the UMS is described in the cover letter for the upgrade.

Preventive Service Inquiry information is important in planning the application of upgrades in such a manner that the efficient operation of the installation is maintained.

**Integrated Applications:** Any CSSF request can be associated with a problem, change or configuration component described in the Information/Management data base. APAR Search information can be related to the problem being resolved. Fix and preventive service planning information can be related to the problem causing them, the change requiring them or to the software component being changed. This relational capability assists the installation in managing all problem, change and configuration management related activities.

**Audit Trail:** To provide an audit trail of CSSF usage, an optional facility is provided which allows the user to selectively log all system operator communications involving CSSF, all CSSF telephone connections and all hardware communication interface activity. The log can be selectively printed using an Information/Access utility.

### DATA BASE INTEGRITY and RECOVERY FACILITIES

The Information/Access data base consists of one data set containing entries and a corresponding data set providing quick-search indices for these entries. To prevent loss of data base integrity due to inconsistency between these data sets (which could occur as a result of external system problems), consistency is checked each time an entry is retrieved. If an inconsistency is found, the index data set can be reconstructed from the entry data set reestablishing consistency.

The ability to recover from damage to the entry data set is also provided. Updates can optionally be journaled to a recovery log. Should the entry data set become damaged (by an external system problem), after being restored from the point where last saved, it can be updated from the recovery log.

### SECURITY

Security controls should be considered for implementation by the customer. See Product Announcement for further details.

**Response Time:** The amount of time as seen by the user from entry of his CSSF request until receipt of his response depends upon such factors as the installation's CSSF connection scheduling procedure, the number and priority of CSSF requests awaiting transmission from the installation, the number of requests incoming and waiting at CSSF, and the amount of information transmitted by CSSF.

Access to the Customer Software Support Facility (CSSF) data base at any given time is dependent upon the Customer Software Support Facility (CSSF) system resources and is subject to the level of demand by all users.

The CSSF data base contains licensed information regarding IBM licensed programs and information regarding system control programming (SCP). (SCP as used here refers to system control programming function that is not licensed by IBM.) Information/Access licensees may retrieve data for programs for which they are licensed; SCP data is retrievable by all Information/Access licensees.

The CSSF data base is made available for access exclusively by the Information/Access licensee. The Information/Access licensee may not make or permit any manner of access to any form of the licensed CSSF data or parts thereof except to his employees or IBM employees, or to other persons acting for the licensee, as authorized in the Agreement for IBM Licensed Programs.

IBM reserves the right to limit access to the CSSF data base so as to optimize this capability for all users, and to define the contents and currency of the data contained in the SSF data base. IBM shall not be liable or deemed to be in default for any delays or failure in performance or interruption of service.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

Information/Access operates on any IBM hardware configuration that supports MVS 3.8 or MVS/SP Version 1.

**INFORMATION/SYSTEM (cont'd)**

An IBM 3270 display terminal that supports a screen size of at least 24 lines by 80 characters must be available. Devices supported by Information/Access include the following IBM display stations:

- 3275 mdls 2, -12
- 3276 mdls 2, -3, -4, -12, -13, -14 in 3277 mdl 2 compatibility mode
- 3277 mdl 2
- 3278 mdls 2, -3, -4, -5
- 3279 mdls 2A, -3A

For Information/Access, a user may select an IBM 3705 Communications Controller for data transmission to and from CSSF.

3705 support is provided for switched line (manual or autocal) communications using Binary Synchronous point-to-point contention protocol. The 3705 must be equipped with a lineset and a modem which provide 4800 bps and, if desired, autocal.

For 3705 binary synchronous (BSC) support, Information/Access utilizes Basic Telecommunications Access Method (BTAM). With BTAM, Information/Access requires either the Partitioned Emulation Program (PEP) or the Emulation Program (EP).

An Information/Access implementation of System Network Architecture (SNA) using Network Control Program (NCP) support of switched lines is planned.

**SOFTWARE REQUIREMENTS**

Information/System is the base product required by each of its features and products. In addition, Information/Access requires Information/Management.

Information/Access operates in all environments supported by Information/System Release 2.1 except for MVS/SP Version 2.

Information/System operates directly under the Time Sharing Option (TSO) running on OS/VS2 (MVS) Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode) with the current releases of the Virtual Telecommunications Access Method (VTAM) or the Telecommunications Access Method (TCAM). A TCAM MCP generation may be required by the installation to obtain full-screen mode in the TSO/TCAM environments.

In addition, Information/System runs as standard commands under the Network Communications Control Facility (NCCF) running on OS/VS2 MVS Release 3.8, MVS/SP Version 1 or MVS/SP Version 2 (operation is in 24-bit mode) with Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM Version 1 or ACF/VTAM Version 2) or Advanced Communications Function/Telecommunications Access Method (ACF/TCAM). Information/System can run under both TSO and NCCF concurrently.

For 3705 binary synchronous (BSC) support, Information/Access utilizes Basic Telecommunications Access Method (BTAM).

**PERFORMANCE CONSIDERATIONS**

Information/Access is an application that executes as a problem program. When Information/Access is installed but not operational, there is no performance impact on the base system other than that caused by an increase in external storage requirements.

Information/Access executes concurrently with other TSO or NCCF applications in the user's system. The effect of Information/Access is the same as similar terminal applications in these environments. The response time for any particular operation varies with the complexity of the function and the data sets used, the speed of the processor or other devices and the current system load. Base system supervisor facilities may be used to establish the amount of service that any particular user receives.

Information/Access queries to CSSF are batched and any delays in CSSF responses will not affect user system performance. Response times from CSSF are dependent upon such factors as the installation's CSSF connection scheduling procedure, the number and priority of CSSF requests awaiting transmission from the installation, the number and priority of requests incoming and waiting at CSSF and the amount of information transmitted by CSSF.

PROGRAM PRODUCTS

**ADVANCED COMMUNICATIONS FUNCTION  
FOR TCAM (ACF/TCAM) VERSION 1  
OS/VS (5735-RC1)**

**PURPOSE**

Advanced Communications Function for TCAM (ACF/TCAM) is a program product for users of OS/VS1 and OS/VS2 (SVS and MVS) that can provide capabilities for data communication in a network with a single S/370 or with multiple S/370s. MVS support includes support of the MVS/System Extensions program product.

**HIGHLIGHTS**

Support of SNA-SDLC devices attached to ACF/NCP/VS or NCP/VS via switched lines.

Support of a remote 3705-I or 3705-II Communications Controller with ACF/NCP/VS.

ACF/TCAM/TSO support of the 3790 system with 3270 data stream compatibility.

Support of 3705-I and 3705-II multiple channel attachment capabilities through ACF/NCP/VS.

Support of message traffic pacing inbound, through ACF/NCP/VS, from terminals that support inbound pacing.

Improved tuning capability through pageable control blocks.

Extended serviceability through support of the ACF/NCP/VS capability for concurrent trace of up to eight lines attached to a 3705.

Extended availability through improved switched network backup support for SNA-SDLC devices.

New capability for dynamic collection of tuning statistics.

Designed to run with the *latest current level*\* of NCP/VS as well as ACF/NCP/VS and the latest current versions of the Emulator Program (EP/VS) and Partitioned Emulator Programming (PEP).

\* Latest current level means the SCP level of TCAM or VTAM, or SCP version of NCP/VS, PEP or EP/VS shipped most recently at the time of the initial availability of ACF/TCAM.

**ADVANTAGES**

**Support of SNA-SDLC devices via switched lines:** ACF/TCAM support of SNA-SDLC devices is extended to those attached to ACF/NCP/VS or NCP/VS via switched lines. Identification checking, telephone numbers and call scheduling are handled by ACF/TCAM. ACF/TCAM operator control permits specification of both the terminal to call and the line to use. In addition, several operator display enhancements are offered, including the capability to display:

The line, given a terminal name.

The terminal name, given a line.

The line status, plus the capability to indicate lines that are actually connected to a terminal and those that are available for calls.

**Remote 3705 Support:** Support of remote 3705-II with ACF/NCP/VS extends the communications network beyond the locally-attached 3705.

**ACF/TCAM/TSO Support for Remote 3790:** ACF/TCAM/TSO provides support for the remotely-attached 3790 Communication System with 3270 data stream compatibility, available on the 3790 system as #9165 Configuration Support.

**Multiple Channel Attachment:** Support of the multiple channel attachment capability of ACF/NCP/VS expands the sharing capabilities of a 3705-I or a 3705-II. This may permit more economical use of one communications controller where a 3705-II can support a maximum of four ACF/TCAM host systems. (Some of the four may be ACF/VTAM or the latest current level of TCAM; one may be the latest current level of VTAM.) Also, this sharing capability allows one 3705-I to support a maximum of two ACF/TCAM host systems. (One may be ACF/VTAM or the latest current level of TCAM or VTAM.)

**Inbound Pacing:** Pacing of inbound message traffic can help avoid buffer overrun. ACF/TCAM provides this function as a user-selectable session establishment function.

**Pageable Control Blocks:** ACF/TCAM allows a choice of either fixed or pageable storage for certain tables and control blocks for NCP/VS or ACF/NCP/VS-attached stations. This gives the ACF/TCAM users considerable flexibility in managing their storage requirements and in tuning throughput and response time.

**Multiple Line Trace:** Multiple line trace support provides the capability to trace concurrently a maximum of eight lines attached to a 3705 with ACF/NCP/VS.

**Improved Switched Network Backup:** Improved switched network backup support for SNA-SDLC devices allows (a) control units associated with a failed or deactivated nonswitched line to be reactivated through an alternate, switched line, or (b) terminals associated with a failed or deactivated control unit (switched or nonswitched) to continue to receive communication support through reconfiguration to a backup, switched control unit.

**Statistical Recording:** Enhanced statistical recording provides the capability to collect traffic counts, error counts, unavailable network elements and ACF/TCAM resource pool utilization. This information is available to the user through operator control display.

**MULTISYSTEM NETWORKING FACILITY**

The ACF/TCAM Multisystem Networking Facility is a feature for the ACF/TCAM program product. It extends the capabilities of ACF/TCAM to support the implementation of intersystem communication among multiple S/370s operating with OS/VS1 and/or OS/VS2 (SVS and/or MVS). MVS support includes support of the MVS/System Extensions program product.

**HIGHLIGHTS**

The ACF/TCAM Multisystems Networking Facility supports cross-system message routing through which data may be transmitted across systems to its destination without host intervention, after initial session establishment.

The ACF/TCAM Multisystem Networking Facility can support cross-system communication for the following types of configurations:

Multiple S/370 configurations where each host processor has a network controlled by ACF/TCAM with the Multisystem Networking Facility and ACF/NCP/VS. Optionally, some of the host processors may have networks controlled by ACF/VTAM with the Multisystem Networking Facility and ACF/NCP/VS.

A network controlled by a single S/370 with two access methods, ACF/TCAM and ACF/VTAM, each with its own Multisystem Networking Facility in conjunction with ACF/NCP/VS.

Combinations of the above types of configurations.

The ACF/TCAM Multisystem Networking Facility, in conjunction with ACF/NCP/VS, enables the user to have cross-system communication, providing resource sharing, program sharing, distributed processing and increased resource availability through the facilities described below:

Support of communication, via ACF/NCP/VS, between an ACF/TCAM device message handler, sub-system or user-written application program on one host system and:

An SNA-SDLC device controlled by ACF/TCAM or ACF/VTAM on a different host system.

A BSC or start-stop device controlled by ACF/TCAM on a different host system.

A 3270 BSC device controlled by ACF/VTAM on a different host system.

A corresponding ACF/TCAM message handler or user-written application program or ACF/VTAM user-written application program on a different host system.

If the communication links which connect the host system configuration described above pass through one or more intermediate system configurations, message traffic can be routed through the local ACF/NCP/VS of each intermediate configuration, without involving the intermediate S/370 processor(s).

Support of the capability for one ACF/TCAM host system to assume control of a 3705 with ACF/NCP/VS that is channel-attached to a different ACF/TCAM (or ACF/VTAM) host that fails or is deactivated. This support applies to adjacent 3705s with ACF/NCP/VS. Appropriate system definitions and network operator procedures are required.

An active 3705 with ACF/NCP/VS and its resources can continue in an active state without re-IPL unless it also fails or is deactivated.

If the 3705-II with ACF/NCP/VS is to be re-IPLed while its channel-attached host is unavailable, it must be re-IPLed as a remote communications controller; however, as a remote communications controller, communication links to communications controllers other than its local are not supported.

Ability of a network operator to control the eligibility for communication between a message handler, application or terminal in the ACF/TCAM host system and message handlers, applications or terminals in a different ACF/TCAM or ACF/VTAM host system. The operator may determine which terminals and applications are currently eligible for such cross-system communication.

Ability for testing of links between local 3705s with ACF/NCP/VS.

Support of backup switched or nonswitched links between local 3705s with ACF/NCP/VS.

Support of a shared cross-system terminal table entry pool that provides improved storage management capability, and the capability to dynamically reconfigure an ACF/TCAM network.

## PROGRAM PRODUCTS

**ACF/TCAM Version 1 (cont'd)**

Support of message traffic pacing between message handlers in different ACF/TCAM processors.

**ADVANTAGES**

Enhances application processing and access to information between multiple S/370 networks. For example, a user-written TCAM message handler may provide processing and data base access on one ACF/TCAM host on behalf of user-written message handlers, application programs or terminals on different ACF/TCAM or ACF/VTAM hosts.

Permits distributed processing and expands resource sharing capabilities between multiple S/370 networks as well as between a S/370 and a communications subsystem such as the 3790.

Permits a wide range of multiple S/370 configurations to support orderly applications growth with Systems Network Architecture.

Can minimize redundant network applications.

Permits interconnection of S/370 networks with the complete range of low end to high end processors and virtual operating systems that support ACF/TCAM or ACF/VTAM.

ACF/TCAM offers the multisystem user the capability to minimize control blocks by providing a shared terminal table entry pool. With this support, the multisystem user does not have to define a terminal table entry (TTE) and destination queue control block for every logical unit in every host system environment; those that are shared between operating systems need be defined only once. In addition, this shared TTE pool offers the user the capability to add, through operator control, cross-system logical units to the network without requiring system redefinition in other than the owning host. This shared pool is supported only for main storage queuing.

A communications management configuration permits certain communications management functions (such as terminal ownership, session establishment or loading of ACF/NCP/VS) to be consolidated in one of the processors that are connected by the multiple channel attachment capability of ACF/NCP/VS and the 3705 Communications Controller.

Other local processors are freed for applications processing.

The communications management processor can be backed-up by another local processor.

Excess capacity in the communications management processor can be used to run applications.

Functions, such as user-written ACF/TCAM transaction routing and message switching, can be accomplished in the communications management processor

**SINGLE and MULTISYSTEM CONSIDERATIONS**

Communications Controller Support: ACF/TCAM operates with the following communications controllers:

- 3704 Communications Controller
- 3705-I Communications Controller
- 3705-II Communications Controller

**PLANNING CONSIDERATIONS**

Machine and estimated storage requirements will be provided in an update to the *Advanced Communications Function for TCAM General Information* prior to the availability of ACF/TCAM for each operating system. TCAM/NCP/VS-Direct and ACF/TCAM require the following features in support of the Compare and Swap instruction: Conditional Swapping (#1051) on the 3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

ACF/TCAM operates in a VM/370 Virtual Machine which supports the required release of the operating system (OS/VS1, OS/VS2 (SVS or MVS)).

ACF/TCAM operation in a VM/370 environment is intended for use in program development and testing and other uses where performance is not critical. Operation of ACF/TCAM under VM/370 Release 3, even with the virtual machine assist feature, may add significant additional processor overhead. If your customer has specific throughput or terminal response requirements, you should plan to benchmark under VM/370 to ensure that any proposed configuration will meet the customer's performance needs.

Each OS/VS virtual machine in which ACF/TCAM resides requires a dedicated sub-channel address to a 3705-I or 3705-II with ACF/NCP/VS or the latest current level of NCP/VS.

Functions supported by the latest current level of TCAM/NCP/VS Direct and NCP/VS are also supported by ACF/TCAM and the latest current level of NCP/VS or ACF/NCP/VS.

The following functions are supported by ACF/TCAM in conjunction with the latest current level of NCP/VS or with ACF/NCP/VS:

- Support of SNA-SDLC devices via switched lines.

TCAM/TSO support for remote 3790 with 3270 data stream compatibility.  
Pageable control blocks.  
Improved switched network backup.  
Statistical recording.

The following functions are supported by ACF/TCAM only in conjunction with ACF/NCP/VS:

- Remote 3705-II.
- Inbound pacing.
- Multiple channel attachment.
- Multiple line trace.
- Multisystem Networking Facility.

In a mixed ACF/TCAM - ACF/VTAM multisystem environment, ACF/VTAMs ability to access device characteristics of terminals controlled by ACF/TCAM is limited to those indicators defined and maintained by ACF/TCAM. In particular, the ability to determine the following 3270 device characteristics are not supported:

- Whether the device has the selector light-pen feature.
- Whether the device is a printer.
- The physical device address (used in the copy function).

Use of ACF/TCAM requires the concurrent installation of prerequisite TCAM system control programming (SCP). This prerequisite SCP should only be installed by ACF/TCAM users.

**CUSTOMER RESPONSIBILITIES**

To install and use ACF/TCAM, the customer must:

- Design the single system network.
- Order and install all required communications equipment.
- Have prerequisite TCAM SCP installed.
- Install ACF/TCAM.
- Define the network to ACF/TCAM.
- Install NCP/VS or ACF/NCP/VS (unless all terminals are local, i.e., channel-attached to the host).
- Define the network to NCP/VS or ACF/NCP/VS.

To install and use the Multisystem Networking Facility feature the customer must:

- Design the multisystem network.
- Order and install any additional communications equipment (e.g., intersystem links between interconnected 3705s).
- Have prerequisite TCAM SCP installed.
- Install ACF/TCAM.
- Install ACF/NCP/VS.
- Install the Multisystem Networking Facility.
- Define the multisystem network to ACF/TCAM and ACF/NCP/VS in each system.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The following functions supported by ACF/TCAM are supported with the latest current level of NCP/VS or with ACF/NCP/VS:

- Support of SNA-SDLC devices via switched lines.
- TCAM/TSO support for remote 3790.
- Pageable control blocks.
- Improved switched network backup.
- Statistical recording.

The following functions supported by ACF/TCAM also require support by ACF/NCP/VS:

- Remote 3705-II.
- Inbound pacing.
- Multiple line trace.
- Multiple Channel attachment.

**SOFTWARE REQUIREMENTS**

Use of the ACF/TCAM requires the concurrent installation of prerequisite system control programming (SCP). This prerequisite SCP should only be installed by ACF/TCAM users.

**COMPATIBILITY**

ACF/TCAM retains compatibility with the latest current level of TCAM. ACF/TCAM offers compatibility with the latest current level of NCP/VS as well as ACF/NCP/VS.

Where related IBM programs (for example, CICS/VS, TSO, SSS) operate with the latest current level of TCAM, compatibility is retained for the levels of those programs that are current at the availability of ACF/TCAM on the appropriate operating system release. Recompile of the related IBM programs is not required.

Compatibility is retained for existing user programs that utilize the latest current level of TCAM. However, such user programs may require

**ACF/TCAM Version 1 (cont'd)**

changes to take advantage of the multisystem networking capabilities offered by ACF/TCAM.

TCAM through VTAM is not provided with ACF/TCAM.

Program products which run under the control of CICS/OS/VS and/or CICS/DOS/VS and operate with VTAM and/or TCAM will operate with ACF/VTAM and/or ACF/TCAM (including the Multisystem Networking Facility). Program products which do not violate the CICS macro interfaces will require no modification to provide equivalent terminal function under ACF/VTAM and ACF/TCAM to that provided under VTAM and TCAM. Representative products which have been verified not to violate these interfaces are:

Advanced Text Management System II (ATMS II/OS/VS and ATMS II/DOS/VS)

Display Management System/VS (DMS OS/VS and DMS DOS/VS)

Planning Control and Decision Evaluation System/Interactive (PLANCODE/I OS/VS and PLANCODE/I DOS/VS)

Storage and Information Retrieval System (STAIRS/VS, STAIRS/DOS/VS, and STAIRS/VS - TLS)

Alpha Search Inquiry System

Life Inquiry/Data Entry

**PERFORMANCE and STORAGE CONSIDERATIONS**

An overall objective of ACF/TCAM is to have a positive effect on performance. Facilities to help accomplish this objective include:

Reduction of the fixed portion of the control block working storage from 122 bytes per logical unit to less than 20 bytes per logical unit.

The shared terminal table entry pool which allows for further control block storage reduction for logical units that are shared between operating systems.

The capability provided through the Multisystem Networking Facility to access any application from any supported terminal provides potential for storage savings by the elimination of duplicate application programs among multiple hosts.

In some cases, such as for cross-system session initiation and termination, the additional system function of multisystem networking will require increased ACF/TCAM resources.

The design objectives for ACF/TCAM path lengths for a single system environment are approximately equal to a TCAM/NCP/VS Direct environment for the same function and terminals. Specifically, the ACF/TCAM path lengths are estimated to be approximately 5% greater than TCAM/NCP/VS - Direct equivalents.

**DOCUMENTATION** (available from Mechanicsburg)

*Introduction to Advanced Communications Function (GC30-3033) ... ACF/TCAM General Information Manual (GC30-2050).*

**TERMINALS SUPPORTED**

ACF/TCAM supports the following terminals, programmable features, transmission control units and communications controllers. Programmable features which change the control of transmission characteristics and which are not shown are not supported. Attempts to use ACF/TCAM with unsupported features can cause unpredictable results.

The user should be aware that many terminal and control unit special features are transparent to programming and are therefore readily usable even though not specifically identified. Note that the appropriate line adapters and hardware attachment features must be included in the system configuration.

Terminals that are functionally equivalent to those specifically supported by ACF/TCAM may also function satisfactorily with ACF/TCAM; the customer is responsible for establishing equivalency. IBM assumes no responsibility for the impact that any changes to the IBM-supplied programs or products may have on such terminals.



PROGRAM PRODUCTS

ACF/TCAM Version 1 (cont'd)

ACF/TCAM DEVICE SUPPORT

	Single System Support ACF/TCAM via EP/VS	Single System & Multisystem Support(1) ACF/TCAM via NCP/VS or ACF/NCP/VS	Single System Support TSO with ACF/TCAM via EP/VS	Single System Multisys Support(1) TSO with ACF/TCAM via NCP/VS or ACF/NCP/VS
<b>S/S Terminals</b>				
1030	x	-	-	-
1050	x	x	x	x
1060	x	-	-	-
2260	x	-	x	-
2265	x	-	x	-
2740-1,-2	x	x	-	-
2741	x	x	x	x
2760	x	-	-	-
3101, as CPT-TWX	x	x	x	x
3232-51 as CPT-TWX	x	x	x	x
6733 as CPT-TWX 33/35	x	x	x	x
AT&T 83B3 or WU 115A				
line control type	x	x	-	-
CPT-TWX (M33/35) line				
line control type	x	x	x	x
WT Telegraph (CCITT 2&5)	x	x	-	-
<b>BSC Terminals</b>				
2772	x	x	-	-
2780	x	x	-	-
2922	x	-	-	-
2972-8,-11	x <sup>3</sup>	x <sup>3</sup>	-	-
3275-1,-2	x <sup>3</sup>	x <sup>3</sup>	x <sup>3</sup>	x <sup>3</sup>
3670	x	-	-	-
3735	x	x	-	-
3741-2,-4	x	x	-	-
3747	x	x	-	-
1131	x	x	-	-
1826	x	x	-	-
5110	x	x	-	-
S/3	x	x	-	-
S/360-20	x	x	-	-
S/360 (4)	x	x	-	-
S/370 (4)	x	x	-	-
<b>SDLC Terminals</b>				
3271-11,-12	-	x <sup>3</sup>	-	x <sup>3</sup>
3275-11,-12	-	x <sup>3</sup>	-	x <sup>3</sup>
3601	-	x	-	-
3602	-	x	-	-
3614	-	x <sup>3</sup>	-	-
3624	-	x <sup>3</sup>	-	-
3694	-	x	-	-
3767-1,-2,-3	-	x	-	x
3770 (5)	-	x	-	x <sup>6</sup>
3791	-	x	-	x <sup>7</sup>

Notes:

- (1) Single system support is provided through ACF/NCP/VS or NCP/VS. Multiple Systems Support is provided through ACF/NCP/VS.
- (3) Nonswitched support only.
- (4) S/360 mdls 25, 30, 40, 50, 65, 65MP, 67 (65 mode), 75, 85, 91, 195 with either BOS, BPS, DOS, OS; S/370 mdls 115 - 168MP with either BOS, BPS, DOS, OS, DOS/VS, OS/VS1 or OS/VS2.
- (5) 3771-1, -2, -3, -4; 3773 -1, -2, -3, -4; 3773 -P1, -P2, -P3; 3774-1, -2; 3774-P1, -P2; 3775-P1; 3776-1, -2, -3, -4; 3777-1, -3. The 3776-3, -4 and the 3777-3 may be half duplex or duplex data communications. Duplex operation requires PTF 607 or higher for SSP for ACF/NCP/VS. This PTF is incorporated in Release 2 of SSP for ACF/NCP/VS.
- (6) In 3767 compatibility mode.
- (7) TSO support applies only to 3790 with 3270 data stream compatibility.

PROGRAM PRODUCTS

ACF/TCAM Version 1 (cont'd)

COMPATIBILITY MODE (1)

	Single System Support ACF/TCAM via EP/VS	Single System & Multisystem Support <sup>2</sup> ACF/TCAM via NCP/VS or ACF/NCP/VS	Single System Support TSO with ACF/TCAM via EP/VS	Single System & Multisystem Support <sup>2</sup> TSO w/ACF/TCAM via NCP/VS or ACF/NCP/VS
<b>S/S Terminals</b>				
3767-1,-2 (2740-1)	x	x	-	-
3767-1,-2 (2740-2)	x <sup>3</sup>	x <sup>3</sup>	-	-
3767-1,-2 (2741)	x	x	x	x
CMCST (2741)	x	x <sup>4</sup>	x	x
S/7 (2740-1)	x	x	-	-
5100 (2741)	x	x	x	x
5110 (2741)	x	x	x	x
<b>RSC Terminals</b>				
3274-1C,21C,31C,51C (3271-1,2)	x <sup>3</sup>	x <sup>3</sup>	x <sup>3</sup>	x <sup>3</sup>
3276-1,-2,-3,-4 (3271-1,2)	x <sup>3</sup>	x <sup>3</sup>	x <sup>3</sup>	x <sup>3</sup>
3771-1,-2,-3 (2772)	x	x	-	-
3773-1,-2,-3,-P1, P2,-P3 (2772)	x	x	-	-
3773-1,-2,-P1, P2 (2772)	x	x	-	-
3775-1,-P1 (2772)	x	x	-	-
3776-1,-2 (2772/3780)	x	x	-	-
3771-1 (2772/3780)	x	x	-	-
3780 (2772)	x	x	-	-
5265 (3741-2,-4)	x	x	-	-
5275 (3275-1,-2)	x <sup>3</sup>	x <sup>3</sup>	x <sup>3</sup>	x <sup>3</sup>
8100/DPPX (3271)	x	x	x	x
8100/DPPX/SP (3271)	x	x	x	x
System/7 (System/3)	x	x	-	-
System/32 (System/3)	x	x	-	-
System/34 (System/3)	x	x	-	-
System/38 (System/3)	x	x	-	-
<b>SDLC Terminals</b>				
3274-1C,21C,31C,51C (3791)	-	x <sup>6</sup>	-	x <sup>6</sup>
3276-11,12,13,14 (3791)	-	x <sup>6</sup>	-	x <sup>6</sup>
3770 (3767)	-	x <sup>5</sup>	-	x <sup>5</sup>
8100/DPPX (3791)	-	x <sup>6</sup>	-	x <sup>6</sup>
8100/DPPX/SP (3791)	-	x <sup>6</sup>	-	x <sup>6</sup>
System/34 (3770)	-	x	-	x
System/34 (3791)	-	x	-	x

Notes:

- (1) The terminal type in parenthesis designates the programming support provided by ACF/TCAM, e.g., System/7 (2740-1) means the System/7 is supported as a 2740-1.
- (2) Single System Support is provided through ACF/NCP/VS or NCP/VS. Multiple System Support is provided through ACF/NCP/VS.
- (3) Nonswitched support only.
- (4) Switched support only.
- (5) Supported as an interactive 3767 -- applies to 3771-1, -2, -3; 3773-1, -2, -3; 3774-1, -2; and 3775-1 only.
- (6) Buffer size of 960, 2560 and 3540 also supported.
- (7) TSO support applies only to 8100/DPPX or DPPX/SP with 3270 Data Stream Compatibility.

Communications Controllers

3705-II Remote

*Local Terminals	TCAM	TSO
2260	x	x
2715-1	x	-
3272-1,-2	x	x
7770-3	x	-

\* Local devices are not supported by ACF/TCAM for cross-system communications with the ACF/TCAM Multisystem Networking Facility.

PROGRAM PRODUCTS

**5735-RC2 - ACF/VTAM R1 (OS/VS)  
5746-RC3 - ACF/VTAM R1 (DOS/VS)  
ADVANCED COMMUNICATIONS FUNCTION  
FOR VTAM RELEASE 1 (ACF/VTAM)**

**PURPOSE**

Advanced Communications Function for VTAM Version 1 (ACF/VTAM) is for users of DOS/VS, OS/VS1 and OS/VS2 (SVS and MVS) that can provide new capabilities for data communication in a network with a single S/370 or with multiple S/370s. These capabilities described below are added to VTAM functions as described in the pages for each SCP (DOS/VS, OS/VS1, and OS/VS2).

**HIGHLIGHTS**

Support of communication between two user-written ACF/VTAM application programs, through record Application Program Interface (API) extensions.

Support of message traffic pacing between application programs, or inbound from 3770, 3276, 3650, 3601/3602/3694 terminals operating in SNA/SDLC transmissions mode.

Support of a remote 3705-II Communications Controller with ACF/NCP/VS.

Support of 3705-I and 3705-II multiple channel attachment capabilities through ACF/NCP/VS.

Expansion of VTAM network operator DISPLAY command to provide more information about network resources and elements.

Dynamic buffer pool allocation capability.

Designed to run with the latest current level \* of NCP/VS as well as ACF/NCP/VS.

Capability for dynamic collection of tuning statistics.

Extended serviceability through support of the ACF/NCP/VS capability for concurrent trace of up to eight lines attached to a 3705.

Extended availability through improved switched network backup support for SNA-SDLC devices.

For all operating systems, execution of ACF/VTAM in a problem program partition, region or address space, rather than as a system task.

Extended serviceability through improved tracing support under DOS/VS, equivalent to ACF/VTAM support under OS/VS1, MVS and SVS.

\* Latest current level means that SCP level of VTAM or TCAM or SCP version of NCP/VS shipped most recently at the time of initial availability of ACF/VTAM.

**DESCRIPTION**

**Advantages**

**Application-to-Application Communication:** Communication between two user-written ACF/VTAM Version 1 applications offers users greater flexibility to design and implement more efficient application processing in a network. For example, a single user-written application may provide centralized processing for other user-written applications as well as terminal users. This may eliminate duplicate processing support, and optimize the use of system resources among multiple application programs.

**Inbound Pacing:** Pacing of inbound message traffic for a user application program can help avoid buffer overrun. ACF/VTAM provides this function as a user-selectable session establishment function.

**Remote 3705-II:** Support of remote 3705-II with ACF/NCP/VS offers the advantages of the new communications controller capabilities for 3705-II.

**Multiple Channel Attachment:** Support of the multiple channel attachment capability of ACF/NCP/VS expands the sharing capabilities of a 3705-I or a 3705-II. This may permit more economical use of one communications controller, where a 3705-II can support a maximum of four ACF/VTAM host systems, running under any combination of DOS/VS or OS/VS operating systems. (Some of the four may be ACF/TCAM or the latest current level of TCAM 10; one may be VTAM 2.0.) Also, this sharing capability allows one 3705-1 to support a maximum of two ACF/VTAM host systems. (One may be ACF/TCAM or VTAM 2.0 or TCAM 10.)

**Operator DISPLAY Command:** DISPLAY command capabilities permit a network operator (or programmed operator application) to obtain more information about the status of network resources; that is, nodes, lines terminals, logical units, physical units, application programs and buffers. Such information may be useful for status purposes, for performance analysis or to determine if an action is required for a failing element in the network.

**Dynamic Buffer Allocation:** Can dynamically allocate main storage for buffer pools according to message traffic loads and availability of main storage resources. This gives the user considerable flexibility to

optimize the use of main storage for buffer pools and determine buffer pool space requirements that are consistent with throughput and response time.

**Tuning Statistics:** A new tuning statistics function permits dynamic accumulation of data about the I/O interface to a channel-attached communications controller or a channel-attached 3790. Such data may aid a user in determining and selecting optimum values for start parameters and network definition.

**Multiple Line Trace:** Provides the capability to trace concurrently a maximum of eight lines with ACF/NCP/VS.

**Improved Switched Network Backup:** Improved switched network backup support for SNA-SDLC devices allows (a) control units associated with a failed or deactivated nonswitched line to be reactivated through an alternate, switched line, or (b) terminals associated with a failed or deactivated control unit (switched or nonswitched) to continue to receive communication support through reconfiguration to a backup, switched control unit.

**VTAM as a User Task:** Permits the operator to unconditionally terminate ACF/VTAM, without waiting for resources to be released. Upon termination, all system resources acquired by ACF/VTAM are released, and the partition, region or address space may be used for other purposes.

**Improved Trace Support (DOS/VS):** Permits activity trace records produced by ACF/VTAM (line, buffer, I/O and tuning statistics trace data) to be written to additional media.

**TPRINT:** Improvements include:

Device SYSLIST output to tape, disk or hardcopy.

TPRINT as a job step independent of ACF/VTAM, which may be active or inactive, as well as a subtask under ACF/VTAM.

Trace and TPRINT failures are isolated from ACF/VTAM, which continues to operate in the event of such failures.

**MULTISYSTEM NETWORKING FACILITY**

The ACF/VTAM Multisystem Networking Facility is a feature for the ACF/VTAM program product. It extends the capabilities of ACF/VTAM to support the implementation of intersystem communication among multiple S/370s operating with DOS/VS, OS/VS1 and/or OS/VS2 (SVS and/or MVS).

**HIGHLIGHTS**

The ACF/VTAM Version 1 Multisystem Networking Facility supports cross-system message routing, through which data may be transmitted across systems to its destination without host intervention after initial session establishment.

The ACF/VTAM Multisystem Networking Facility Version 1 can support cross-system communication for the following types of configurations:

Multiple S/370 configurations, operating with any combination of DOS/VS or OS/VS operating systems, where each host processor has a network controlled by ACF/VTAM with the Multisystem Networking Facility and ACF/NCP/VS. Optionally, some of the host processors may have networks controlled by ACF/TCAM with the Multisystem Networking Facility and ACF/NCP/VS.

A network controlled by a single S/370 with two access methods, ACF/VTAM and ACF/TCAM, each with its own Multisystem Networking Facility, in conjunction with ACF/NCP/VS.

Combinations of the above types of configurations.

The ACF/VTAM Multisystem Networking Facility, in conjunction with ACF/NCP/VS, enables the user to have cross-system communications providing resource sharing, distributed processing and increased resource availability through the facilities described below:

Support of communication, via ACF/NCP/VS, between an ACF/VTAM subsystem or user-written application program on one host system and:

An SNA-SDLC device controlled by ACF/VTAM Version 1 or ACF/VTAM Version 2 or ACF/TCAM on a different host system.

A 3270 BSC device controlled by ACF/VTAM or ACF/TCAM on a different host system. (Selected 3270 features are supported between ACF/VTAM and ACF/TCAM host systems, as discussed below under "Planning Considerations".)

Support of communications, via ACF/NCP/VS, between an ACF/VTAM user-written application program on one host system and a corresponding user-written ACF/VTAM application program, or an ACF/TCAM message handler or user-written application program on a different host system.

**(ACF/VTAM) R1 (cont'd)**

If the communication links which connect the host system configurations described above pass through one or more intermediate system configurations, message traffic can be routed through the local ACF/NCP/VVS of each intermediate S/370 Processor.

Support of the capability for one ACF/VTAM host system to assume control of a 3705 with ACF/NCP/VVS that is channel-attached to a different ACF/VTAM (or ACF/TCAM) host that fails or is deactivated. This support applies between adjacent 3705s with ACF/NCP/VVS. Appropriate system definitions and network operator procedures are required.

An active 3705 with ACF/NCP/VVS and its associated terminals can continue in an active state without re-IPL, unless it also fails or is deactivated.

If the 3705-II with ACF/NCP/VVS is to be re-IPLed while its channel-attached host is unavailable, it must be re-IPLed as a remote communications controller; however, as a remote communications controller, communication links to communications controllers other than its local are not supported.

Ability of a network operator to control (using the VARY command) which applications and terminals controlled by the ACF/VTAM host are eligible to communicate with applications or terminals controlled by a different ACF/VTAM (or ACF/TCAM) host system. Also, the operator may determine (using a DISPLAY command) which terminals and applications are currently eligible for such cross-system communication.

Ability for testing of links between local 3705s with ACF/NCP/VVS.

Support of backup switched or leased SDLC links between local 3705s with ACF/NCP/VVS.

**Advantages:** Enhances application processing and screening of information between multiple S/370 networks. For example, a user-written VTAM application program may provide processing and data base access on one ACF/VTAM host on behalf of user-written application programs or terminals on different ACF/VTAM hosts.

Permits distributed processing and expands resource sharing capabilities between multiple S/370 networks as well as between a S/370 and a communications subsystem such as the 3790.

Permits a wide range of multiple S/370 configurations to support orderly applications growth with Systems Network Architecture.

Can minimize redundant network applications.

Permits interconnection of S/370 networks with the complete range of low end to high end processors and virtual operating systems that support ACF/VTAM or ACF/TCAM.

A communications management configuration permits certain communications management functions (such as terminal ownership, session establishment or loading of ACF/NCP/VVS) to be consolidated in one of the processors that are connected by the multiple channel attachment capability of ACF/NCP/VVS and the 3705 Communications Controller.

Other local processors are freed for applications processing.

The communications management processor can be backed up by another local processor.

Excess capacity in the communication management processor can be used to run applications.

Functions such as user-written transaction routing and message switching applications can be accomplished in the communications management processor.

**Single and Multisystem Considerations**

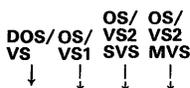
**Communications Controller Support:** ACF/VTAM operates with the following communications controllers:

3704 Communications Controller (as supported by the latest current level of NCP/VVS that is available when ACF/VTAM becomes available).

3705-I Communications Controller (as supported by ACF/NCP/VVS or the latest current level of NCP/VVS that is available when ACF/VTAM becomes available).

3705-II Communications Controller (as supported by ACF/NCP/VVS or the latest current level of NCP/VVS that is available when ACF/VTAM becomes available).

**Related IBM Programs:** The following summarizes relationships in a networking environment:



*	*	*	*	DB/DC	CICS/VS IMS/VS	ACF/ VTAM
*	*			RJE	POWER/VS JES1/RES JES2/RJE	
*	*		*	Interactive	TSO VSFC	
*	*	*	*	Device Support	BTP SSS	
*	*	*	*	Network Operation Support Program		
*	*	*	*	User Application Programs		

To  
ACF/VTAM  
or ACF/TCAM  
devices --  
same or  
different  
host  
system (See  
Note).

**Note:** Refer to pages on individual systems for information on programming for specific SNA (and non-SNA) devices.

**Planning Considerations:** Machine and estimated storage requirements are provided in an update to the *Advanced Communications Function for VTAM General Information Manual*.

ACF/VTAM requires the following features in support of the Compare and Swap instruction: Conditional Swapping (#1051) on 3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

ACF/VTAM operates in a VM/370 virtual machine which supports the required release of the operating system (DOS/VS, OS/VS1, OS/VS2, SVS or MVS).

ACF/VTAM operation in a VM/370 environment is intended for use in program development and testing and other uses where performance is not critical. Operation of ACF/VTAM under VM/370 Release 3, even with the virtual machine assist feature, may add significant additional processor overhead. If your customer has specific throughput or terminal response requirements, you should plan to benchmark under VM/370 to ensure that any proposed configuration will meet the customer's performance needs.

Each DOS/VS or OS/VS virtual machine in which ACF/VTAM resides requires a dedicated subchannel address to a 3705-I or 3705-II with ACF/NCP/VVS or the latest current level of NCP/VVS.

Functions supported by the latest current levels of VTAM and NCP/VVS are also supported by ACF/VTAM and NCP/VVS Release 5.0 or ACF/NCP/VVS.

The following functions are supported by ACF/VTAM in conjunction with NCP/VVS Release 5.0 or with ACF/NCP/VVS:

- Application-to-Application Communication.
- Inbound Pacing.
- Operator DISPLAY Command.
- Dynamic Buffer Allocation.
- Tuning Statistics.
- Improved Switched Network Backup.
- Improved Trace Support.

The following functions are supported by ACF/VTAM only in conjunction with ACF/NCP/VVS:

- Remote 3705-II.
- Multiple Channel Attachment.
- Multiple Line Trace.
- Multisystem Networking Facility.

In a mixed ACF/VTAM - ACF/TCAM multisystem environment, ACF/VTAM's ability to access device characteristics of terminals controlled by ACF/TCAM is limited to those indicators defined and maintained by ACF/TCAM. In particular, the ability to determine the following 3270 SDLC device characteristics is not supported:

- Whether the device has the selector light-pen feature.
- Whether the device is a printer.
- The physical device address (used in the copy function).

Use of ACF/VTAM requires the concurrent installation of prerequisite VTAM system control programming (SCP) which will be available concurrent with ACF/VTAM. This prerequisite SCP should only be installed by ACF/VTAM users. ACF/VTAM requires the level of Virtual Storage Access Method (VSAM) that is current at the time ACF/VTAM is made available.

PROGRAM PRODUCTS

(ACF/VTAM) R1 (cont'd)

CUSTOMER RESPONSIBILITIES

To install and use ACF/VTAM, Version 1 the customer must:

- Design the single system network.
- Order and install all required communications equipment.
- Have prerequisite VTAM SCP installed.
- Install ACF/VTAM Version 1.
- Define the network to ACF/VTAM.
- Install NCP/VS or ACF/NCP/VS (unless all terminals are local, i.e., channel-attached to the host).
- Define the network to NCP/VS or ACF/NCP/VS.

To install and use the Multisystem Networking Facility feature, the customer must:

- Design the multisystem network.
- Order and install any additional communications equipment (e.g., intersystem links between interconnected 3705s).
- Have prerequisite VTAM SCP installed.
- Install ACF/VTAM.
- Install ACF/NCP/VS.
- Install the Multisystem Networking Facility.
- Define the multisystem network to ACF/VTAM and ACF/NCP/VS in each system.

COMPATIBILITY

ACF/VTAM Version 1 retains compatibility with ACF/VTAM Version 2 or VTAM Level 2. ACF/VTAM offers compatibility with NCP/VS Release 5.0 as well as with ACF/NCP/VS.

Where related IBM programs (for example, CICS/VS, IMS/VS, POWER/VS, JES1/RES, JES2/RJE, TSO, VSPC, BTP and SSS) operate with the latest current level of VTAM Level 2, compatibility is retained for the level(s) of those programs that are current at the availability of ACF/VTAM on the appropriate operating system release. Recompilation of the related IBM programs is not required.

Most user-written VTAM application programs that use the Application Program Interface (API) of VTAM Level 2 will continue to operate with ACF/VTAM without change and without recompilation when operating in a single domain environment. Possible exceptions to this and other considerations for moving from VTAM Level 2 to ACF/VTAM are in Appendix D of the *Advanced Communications Function for VTAM (ACF/VTAM) Conceptual Planning Manual (GC38-0282)*. To take advantage of the multisystem networking capabilities offered by ACF/VTAM, changes to user programs may be required.

Program products which run under the control of CICS/OS/VS and/or CICS/DOS/VS and operate with VTAM and/or TCAM will operate with ACF/VTAM and/or ACF/TCAM (including the Multisystem Networking Facility). Program products which do not violate the CICS Macro Interfaces as described in the sales pages will require no modification to provide equivalent terminal function under ACF/VTAM and ACF/TCAM to that provided under VTAM and TCAM. Representative products which have been verified not to violate these interfaces are:

- Advanced Text Management System II (ATMS II/OS/VS and ATMS II/DOS/VS).
- Display Management System/VS (DMS OS/VS and DMS DOS/VS).
- Planning Control and Decision Evaluation System/Interactive (PLANCODE/I OS/VS and PLANCODE/I DOS/VS).
- Storage and Information Retrieval System (STAIRS/VS, STAIRS/DOS/VS, and STAIRS/VS-TLS).
- Alpha Search Inquiry System.
- Life Inquiry/Data Entry.
- Interactive Training System (ITS).

PERFORMANCE and STORAGE CONSIDERATIONS

The design objective for ACF/VTAM record mode path lengths for a single system environment is approximately equal to that for a VTAM 2.0 environment for the same function. Response times in a multisystem environment will depend on the number of 3705s with ACF/NCP/VS traversed and other network load factors. The design objective for ACF/VTAM record mode for OS/VS and DOS/VS is to have the overall real storage requirement approximately equal to or less than that of VTAM 2.0. Specific user storage requirements will be dependent on the specific configuration.

The design objective is to reduce significantly the overall control block storage requirement per logical unit for OS/VS and DOS/VS. In addition, the objective is to reduce the fixed storage requirement for control blocks per logical unit for OS/VS from its current level (approximately 88 bytes), to a level approaching that currently available on DOS/VS systems (8 bytes).

The capability provided through the Multisystem Networking Facility to access any application from any supported terminal offers potential for storage savings by the elimination of duplicate application programs among multiple hosts.

Final information on path lengths and fixed storage requirements will be available when ACF/VTAM is available.

DOCUMENTATION  
(available from Mechanicsburg)

*Introduction to Advanced Communications Function (GC30-3033) ... ACF/VTAM General Information Manual (GC38-0254) ... ACF/VTAM Concepts and Planning (GC38-0282) ... Network Operation Support Program General Information Manual (GC38-0251)*

**Terminals Supported by ACF/VTAM and the Multisystem Networking Facility Feature:** ACF/VTAM supports the following listed terminals. Programmable features which change the control of transmission characteristics and which are not shown are not supported. Attempts to use ACF/VTAM with unsupported features can cause unpredictable results.

The user should be aware that many terminal and control unit special features are transparent to programming and are therefore readily usable even though not specifically identified. Appropriate line adapters and hardware attachment features must be included in the system configuration.

Terminals that are functionally equivalent to those specifically supported by ACF/VTAM may also function satisfactorily with ACF/VTAM; the customer is responsible for establishing equivalency. IBM assumes no responsibility for the impact that any changes to the IBM-supplied programs or products may have on such terminals.

ACF/VTAM Terminal Support Chart (1)

S/S Terminals	Single System Support	Multisystem Support (3)
1051	X	-
2740-1	X	-
2740-2	X(5)	-
2741-1	X	-
3101, as CPT-TWX	X(4)	-
3232-51	X	-
3767-1,-2 (2740-1)	X	-
3767-1,-2,-3 (2740-2)	X(5)	-
3767-1,-2 (2741)	X	-
5100 (2741)	X	-
5110 (2741)	X	-
6733 (CPT-TWX 33/35)		
CMCST (2741)	X	-
System/7 (2740-1)	X	-
AT&T 83B3 or WU 115A	X(5)	-
line control type		
CPT-TWX (M33/35)	X(4)	-
line control type		
WT Telegraph	X(5)	-
<b>BSC Terminals</b>		
2772	X	-
2780	X	-
2972-8,-11	X	-
3271-1,-2	X(5)	X(5)
3274-1C,-21C,-31C,-51C		
(3271-1,-2)	X(5,6)	X(5,6)
3275-1,-2	X(5)	X(5)
3276-1,2,3,4(3771,-1,2)	X(5,6)	X(5,6)
3735	X	-
3741-2,-4	X	-
3747-1	X	-
3771-1,-2,-3 (2772)	X	-
3773-1,-2,-3 (2772)	X	-
3773-P1,-P2,-P3 (2772)	X	-
3774-1,-2 (2772)	X	-
3774-P1,-P2 (2772)	X	-
3775-1 (2772)	X	-
3775-P1 (2772)	X	-
3776-1,-2 (2772/3780)	X	-
3777-1 (2772/3780)	X	-
3780 (2772)	X	-
5275 (3275-1,-2)	X(5)	X(5)

PROGRAM PRODUCTS

(ACF/VTAM) R1 (cont'd)

5285/5288		
(3271-2)	X(5)	X(5)
5937 (3271-1,-2)	X(5)	X(5)
8100/DPPX (3271)	X(5,6)	X(5,6)
8100/DPPX/SP (3271)	X(5,6)	X(5,6)
S/3	X	-
System/7 (System/3)	X	-
System/32 (System/3)	X	-
System/34 (System/3)	X	-
System/34 (3271)	X(5)	X(5)
System/36 (System/3)	X	-
System/36 (S/360)	X(2)	-
System/36 3271)	X(5)	X(5)
System/38 (S/3)	X	-
System/38 (3271)	X(5)	X(5)
S/370 (note 2)	X	-
<b>SDLC Terminals</b>		
3271-11,-12	X(5)	X(5)
3274-1C,-21C,-31C,-51C		
(3791)	X(6)	X(6)
3275-11,-12	X(5)	X(5)
3276-11,12,13,14, (3791)	X(6)	X(6)
3601	X	X
3602	X	X
3614	X(5)	X(5)
3624	X(5)	X(5)
3631	X(5)	X(5)
3632	X(5)	X(5)
3651-A50,-B50	X	X
3651-A60,-B60	X	X
3661	X(4)	X(4)
3694	X	X
3767-1,-2,-3	X	X
3771-1,-2,-3,	X	X
3773-1,-2,-3	X	X
3773-P1,-P2,-P3	X	X
3774-1,-2	X	X
3774-P1,-P2	X	X
3775-1	X	X
3775-P1	X	X
3776-1,-2,-3,-4	X(7)	X(7)
3777-1,-3,-4	X(7)	X(7)
3791	X	X
3791/3760	X	X
and 3762	X	X
5285/5288 (3274-1C)	X	X
5285/5288 (3770)	X	X
5520 (3791,3730)	X	X
8100/DPPX	X(6)	X(6)
8100/DPPX/SP	X(6)	X(6)
8775-11,-12		
(3274)	X(9)	X(9)
System/32 (3770)	X	X
System/34 (3770)	X	X
System/34 (3791)	X	X
System/34 (3274)	X(5)	X(5)
System/36 (3770)	X	X
System/36 (3791)	X	X
System/36 (3274)	X	X
System/38 (3770)	X	X

Local Terminals Channel Attachment Only

3272-1,-2	X	-
3274-1A,-21A,-31A		
(3791)	X	-
3274-1B,21B		
(3272-1,2)	X	-
3791	X	-
3791/3760	X	-
and 3762	X	X
4331 Loop Adapter		
(3274-1A)	X(8)	-

Notes: Support provided:

- The terminal type in parentheses designates the programming by ACF/VTAM, e.g., S/7 (2740-1) means the S/7 is supported as a 2740-1.
- S/370 mdls 115-168MP, whether DOS/VS, OS/VS1 or OS/VS2.

- All terminals not supported here, but supported on a single system can communicate across systems via a user-written application, using ACF/VTAM's application-to-application communication capability.
- Switched connection only.
- Nonswitched connection only.
- Buffer sizes of 960, 2560 and 3440 also supported.
- The 3776-3,-4 and 3777-3,-4 may be half duplex or duplex data communications. Duplex operation requires PTF 607 or higher for SSP for ACF/NCP/VS and also requires a PTF for ACF/VTAM. These PTFs will be incorporated in the following announced releases:  
SSP for ACF/NCP/VS Release 2.  
ACF/VTAM Release 2 on OS/VS1 Release 6.7.  
ACF/VTAM Release 2 on OS/VS2 Release 3.8.  
ACF/VTAM Release 2 on DOS/VSE.
- ACF/VTAM does not support the attachment of the 3644 or 8775 with Downstream Loadable Functions to the 4331 Loop Adapter Feature.
- 8775 base function only. ACF/VTAM does not support the 8775 with downstream Loadable Functions.

ACF/VTAM ENCRYPT/DECRYPT FEATURE

The ACF/VTAM Encrypt/Decrypt Feature is a feature for the ACF/VTAM program product. It extends the capabilities of ACF/VTAM to support cryptographic sessions in a single or multiple-domain network operating with OS/VS1 and/or OS/VS2 (MVS).

HIGHLIGHTS

- Operates with ACF/VTAM during sessions between a terminal and an application in a single or multiple system environment, and between applications in a multiple system environment.
- The ACF/VTAM Encrypt/Decrypt Feature allows the network operator or installation management to define a logical unit as requiring session level cryptography.
- Permits single-domain and multiple-domain cryptography.
- Permits encryption and decryption of messages during logical unit to logical unit sessions. All messages in a session or only selected messages in a session may be specified as requiring encryption.
- Applications can select encryption on a session basis.
- ACF/VTAM applications generally will not require alteration to run with the Encrypt/Decrypt Feature. Several new SNA sense codes dealing with unrecoverable errors associated with the Encrypt/Decrypt Feature have been introduced. Some application programs may have to be changed to properly handle these new sense codes.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Processor requirements are those specified for ACF/VTAM.

Applications can use the Encryption/Decryption function on sessions with the following terminals:

3276 Control Unit/Display Station mdls 11, 12, 13 and 14 with the Encrypt/Decrypt feature #3680 installed.

3776 Communication Terminal mdls 3 and 4 and 3777 Communication Terminal mdl 3 with the Encrypt/Decrypt Feature #3680 installed.

SOFTWARE REQUIREMENTS

- The ACF/VTAM Encrypt/Decrypt feature needs the Programmed Cryptographic Facility program product (5740-XY5).
- It can be used with OS/VS2 (MVS) Release 3.7 with the following prerequisite selectable units:

	Single Domain	Multiple Domain
ACF/VTAM Multisystem Networking Facility feature (SU34)		X
ACF/VTAM program product (SU35)	X	X
ACF/VTAM SCP (SU40)	X	X

## PROGRAM PRODUCTS

**(ACF/VTAM) R1 (cont'd)**

- It can be used with OS/VS1 Release 6.0 with the following prerequisite selectable units:

	Single Domain	Multiple Domain
ACF/VTAM Program Product (SU7)	X	X
ACF/VTAM Multisystem Networking Facility feature (SU8)		X
ACF/VTAM SCP (SU15)	X	X

**COMPATIBILITY**

The ACF/VTAM Encrypt/Decrypt feature needs the Advanced Communications Function for VTAM (ACF/VTAM) (5735 RC2), feature #9001, for both single and multiple-domain operation. Multiple-domain operation also needs the ACF/VTAM Multisystem Networking Facility, feature #6009.

ACF/VTAM applications generally will not require alteration to run with the Encrypt/Decrypt feature. Several new SNA sense codes dealing with unrecoverable errors associated with the Encrypt/Decrypt feature have been introduced. Some application programs may have to be changed to properly handle these new sense codes.

**DOCUMENTATION**

(available from Mechanicsburg)

*ACF/VTAM Encrypt/Decrypt Feature Licensed Program Design Objectives (GC38-0288) ..... ACF/VTAM Encrypt/Decrypt Feature Licensed Program Specification (GC38-0285) ..... ACF/VTAM Encrypt/Decrypt Feature Logic (for OS/VS) (LY27-8024).*

**RPQs Accepted:** No

**5735-RC2 - ACF/VTAM R2 (OS/VS)  
5746-RC3 - ACF/VTAM R2 (DOS/VS)  
ADVANCED COMMUNICATIONS FUNCTION  
FOR VTAM RELEASE 2 (ACF/VTAM)**

**PURPOSE**

Advanced Communications Function for VTAM Version 1 Release 2 (ACF/VTAM R2) is for users of DOS/VSE, OS/VS1 and OS/VS2 (MVS) that can provide additional capabilities for problem determination, network operation and data communications in a network with a single host system or with multiple host systems. ACF/VTAM V1 R2 is designed to operate with ACF/NCP/VS Release 1 or with ACF/NCP/VS Release 2. Some of the additional capabilities provided by ACF/VTAM R2 are supported only in conjunction with ACF/NCP/VS R2. A summary of this support appears under the section entitled "Migration and Planning Considerations".

To support multiple S/370 networks, a user must install the ACF/VTAM R2 Multisystem Networking Facility feature.

**HIGHLIGHTS**

**Problem Determination and Network Operation:** Includes additional functions that can assist in optimizing management and control of a user's data communications installation.

- Enhanced SDLC data link test.
- Terminal connectivity test.
- Intensive mode recording of SDLC data link errors.
- Dynamic display of ACF/NCP/VS storage.
- Dynamic dump of ACF/NCP/VS storage.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices under ACF/NCP/VS R2.
- Enhanced Network operator control for sessions termination.
- Support of the Network Communications Control Facility (NCCF) program product and its related Network Problem Determination Application (NPDA) program product.
- VARY command enhancements.
- Allow the LOGMODE, USS and INTERPRET tables to reside outside of the pageable link pack area (PLPA). (OS/VS2 MVS only).
- VTAM Internal Trace enhancements.
- DISPLAY command enhancements.

**Additional Data Communication Capabilities:** Include improved flexibility for sessions operations and enhanced device support.

- Negotiable session initialization parameters.
- Application-to-application parallel sessions.
- Support of selected Start/Stop devices through the Record Applications Program Interface (API) via the Network Terminal Option program product.
- Support of the channel-attached 3270 systems and 3790 systems in a multiple processor network, using the Multisystem Networking Facility feature.
- Usability enhancements associated with channel-attached device support.
- Usability enhancements to Unformatted Systems Services (USS).
- ACF/VTAM R1 and R2 supports the 3790 Communication System inbound message traffic pacing function. (Also supports 8100 and 3730 systems upon availability.)

**VTAM 2.0 and ACF/VTAM V1 R1 Compatibility Considerations**

- ACF/VTAM V1 R2 supports only record mode operations. It does not support basic mode operations including the SDLC/BSC path function of NCP/VS 5.0 and ACF/NCP/VS R1. Support for selected Start/Stop devices is provided on the Record API by the Network Terminal Option program product. Other Start/Stop and BSC devices (except BSC 3270) previously supported by basic mode operations are not directly supported by ACF/VTAM R2. ACF/NCP/VS R2 provides an interface through which these non-SNA devices can be supported via user-written NCP code.
- In a multisystem networking environment, message traffic from a terminal to a target host, or from a host to a terminal, or from one application program to another application program, can only be routed through intermediate ACF/NCP/VS systems, not through intermediate host processors.

**Time Sharing Option (TSO) with ACF/VTAM V1 R2 (MVS only):** Includes new support for the following products:

- Supports the 2741 Communications Terminal, the Western Union Teletypewriter Exchange Services (TWX mdl 33/35), and the

World Trade Teletypewriter Terminal (WTTY) through the Network Terminal Option program product.

**SUMMARY and ADVANTAGES of ACF/VTAM V1 R2**

**Problem Determination and Network Operation Functions**

**Enhanced SDLC Data Link Test:** Offers the capability to dedicate one station on an SDLC link to testing while allowing the remaining stations on that link to remain active. When a station comprises a cluster control unit and its attached devices, the control unit is dedicated to the test and its attached devices are deactivated.

**Terminal Connectivity Test:** Provides the capability of initiating an echo test from the terminal end of a session to determine that a terminal and its connection to ACF/VTAM R2 are functioning properly. The test does not interfere with other stations on the link or with other devices on the same control unit.

**Intensive Mode Recording of SDLC Data Link Errors:** A network operator can dynamically invoke and terminate recording of information about temporary errors that may be occurring on an SDLC data link. This capability supplements existing support that records permanent error information and permits a user to collect additional information on SDLC data link errors. This detailed information may preclude the need for more specific testing to re-create an error.

**Dynamic Display of ACF/NCP/VS Storage:** Allows a network operator to display any contiguous 256 bytes of ACF/NCP/VS storage without disrupting normal ACF/NCP/VS operation. This display capability, provided in hexadecimal representation on a network operator console, can be useful in dynamically evaluating network problem situations.

**Dynamic Dump of ACF/NCP/VS Storage:** A network operator can invoke a dump of ACF/NCP/VS R1 or R2 storage from a channel-attached or SDLC-attached 3705. Since ACF/NCP/VS continues to operate during the dump process, the dump will represent ACF/NCP/VS status over a period of time. The dump contents are recorded and printed via the facilities of the appropriate System Support Program (SSP) for the ACF/NCP/VS and can be useful in dynamically evaluating network problem situations.

**Dynamic Reconfiguration of Nonswitched SNA-SDLC Devices under ACF/NCP/VS R2:** Allows the network operator to selectively add or delete supported nonswitched SNA-SDLC devices, without disrupting other network functions. The capability supplements the ACF/NCP/VS generation process, and supports temporary configurations in a non-disruptive fashion until a permanent network control program generation can be done.

**Increased Network Operational Flexibility and Control of Network Resources:** Via the \*VARY operator command, the operator can terminate a specific session between a network terminal and an ACF/VTAM R2 application program which may have other terminal sessions in operation at the same time. This permits a session to be cancelled without interfering with the remaining sessions or without termination of the application program. The application program sessions also may be connected to ACF/VTAM or ACF/TCAM application programs, as well as terminals, on the same host system or a different host system.

The VARY inactivate command has been enhanced to:

- Allow the specification of an individual application program. This will result in the automatic scheduling of termination processing for all network resources associated with the application program's existing sessions and will deactivate the application program.
- Allow the specification of an application program major node containing active application programs. This will result in the automatic scheduling of deactivations for all the active application programs defined in the major node.
- Allow the specification of an SDLC line which has active terminal cluster controllers, other than 3705s, attached to it. The terminal cluster controllers will be automatically scheduled for deactivation and upon completion, the SDLC line will be deactivated.

The VARY activate command has been enhanced to:

- Provide the Network Operator with a means of applying more consistent control over the scope of a resource's activation. Prior to ACF/VTAM R2 the activation of a resource's subordinate resources was based on their initial activation status. With ACF/VTAM R2 the network operator can specify either that the specific resource, the resource and all its subordinate resources regardless of initial activation status or the resource and all its subordinate resources with initial activation status are to be activated.
- Allow the specification of an individual application program within an application program major node. This facility enables the network operator to activate an individual application program that has been previously deactivated.

## ACF/VTAM R2 (cont'd)

The LOGMODE, INTERPRET and DSS tables may now reside outside of the pageable link pack area (PLPA) (OS/VS2 MVS only): Moving these tables to SYS1.VTAMLIB could reduce the user's PLPA requirements and allows the user to modify the tables without requiring a re-IPL of the operating system.

**VTAM internal trace enhancements:** The following serviceability facilities have been added to the VTAM internal trace capability:

- The ability to terminate or initiate the VTAM Internal Trace facility at VTAM initialization time.
- The ability to have the VTAM Internal Trace records recorded on an external file in a DOS/VSE environment. This capability continues to be available in OS/VS1 and OS/VS2 MVS environments.
- The data formats and contents of certain VTAM Internal Trace records have been enhanced. For example, the user exit records now contain the resource names of the session partners.

**Display Command Enhancements:** With ACF/VTAM R2, when a network resource is displayed an indication of its status, as known by ACF/VTAM, is included in the display output. This information provides both detailed status to the network operator and serves also as an aid for problem determination. When appropriate, the resource's status will have an identifier appended to it indicating that it is either a virtual resource (i.e., a Network Terminal Option resource) or, has been reconfigured by the Dynamic Reconfiguration facility or, in the case of network backup, has been acquired from another host system's domain.

For increased network operator awareness, enhancements have also been made to the application program and cross domain resource displays. With ACF/VTAM R2, additional session and resource status information is included in the display output to aid the network operator in resource management.

**Support of the Network Communications Control Facility (NCCF) Program Product:** ACF/VTAM R2 provides an interface to support the problem determination and network operation facilities offered by this program product.

**Additional Data Communication Capabilities:** ACF/VTAM R2 can support additional functions and device options that significantly increase a users capability to transfer and access data in a single or multiple system environment.

**Negotiable Session Initialization Parameters:** Permits increased application program control of sessions between user-written application programs that reside within a single host system or across different host systems. During session initialization, two application programs (via the ACF/VTAM R2 application program macro interface) can dynamically exchange certain session parameters to establish and/or modify transmission control and integrity of session data. With this capability, it may be possible for a user to simplify the predefined installation of intercommunicating application programs.

**Application-to-application parallel sessions:** Adds the flexibility for multiple sessions to operate concurrently between two user-written application programs that reside within a single host system or across different host systems.

**Network Terminal Option Program Product Support:** Provides support to users that want to move to a SNA data communications environment while continuing to access the following non-SNA terminal devices:

- 2740 Communications Terminal mdl 1 (nonswitched and switched).
- 2741 Communications Terminal (nonswitched and switched).
- Western Union Teletypewriter Exchange Services (TWX mdl 33/35).

Access to these devices is now provided via the ACF/VTAM R2 record mode operations. ACF/VTAM R2 in conjunction with ACF/NCP/VS R2 permits these devices to participate in a multisystem as well as a single system environment.

TSO/VTAM supports the 2741, TWX mdl 33/35, and WTTY terminals via the Network Terminal Option program product concurrent with the availability of ACF/VTAM R2 for OS/VS2 (MVS).

VSPC R2 supports the IBM 2741 and TWX-33/35 protocols via the Network Terminal Option program product on OS/VS1 and OS/VS2 on the latest release of VSPC available.

**Channel-attached 3270 System and 3790 System Networking:** Permits all the channel-attached 3270 and 3790 systems supported by ACF/VTAM R2 to participate in multiple system networks.

Channel-attached device support enhancements have been made for both single and multiple host environments: Assignment of network addresses for channel-attached devices now comes from the host system's subarea. This removes the requirement that channel-attached devices be represented by their own unique subarea number. Channel-attached non-SNA 3270 devices may now make use of the USS facilities available to SNA devices. This will allow for common syntax of USS commands for SNA and non-SNA channel-attached devices.

**Unformatted System Services (USS) Enhancements:** It is now possible to supply to ACF/VTAM R2 a user defined USS message in excess of two hundred and fifty five (255) characters. This facility could be useful to an installation wishing to display a full screen (e.g., a company logo) on a 3270 display system prior to USS logon.

The syntax for some of the new ACF/VTAM R2 commands is provided within USS tables. This provides the capability to alter certain parameters and defaults by modifying the supplied USS tables. The new commands are: VARY terminate, the enhanced SDLC data link test, the terminal connectivity test, the intensive mode recording of SDLC data link errors and the dynamic display of ACF/NCP/VS storage. This allows an installation to customize these parameters and defaults to reflect the installation's requirements.

**3790 Inbound Pacing Support:** This facility is supported as a user-selectable session establishment function under ACF/VTAM R1 and R2. Pacing of inbound message traffic for a user application program can help avoid buffer overrun. (Also supports 8100 and 3730.)

### CUSTOMER RESPONSIBILITIES

To install and use ACF/VTAM R2, the customer must:

- Design the single system network.
- Order and install all required communications equipment.
- Have prerequisite VTAM SCP for ACF/VTAM R2 installed.
- Install ACF/VTAM R2, or ACF/VTAM Version 2.
- Define the network to ACF/VTAM R2, or ACF/VTAM Version 2.
- Install ACF/NCP/VS R1 and/or ACF/NCP/VS R2. \*
- Define the network to ACF/NCP/VS R1 and/or ACF/NCP/VS R2. \*

To install and use the ACF/VTAM V1 R2 Multisystem Networking Facility feature, the customer must:

- Design the multisystem network.
- Order and install any additional communications equipment, for example, intersystem links between interconnected 3705s.
- Have prerequisite VTAM SCP for ACF/VTAM V1 R2 installed.
- Install ACF/VTAM R2 or ACF/VTAM Version 2.
- Install ACF/NCP/VS R1 and/or ACF/NCP/VS R2.
- Install the ACF/VTAM R2 Multisystem Networking Facility feature or ACF/VTAM Version 2.
- Define the multisystem network to ACF/VTAM R2 or ACF/VTAM Version 2 and to ACF/NCP/VS R1 and/or ACF/NCP/VS R2 in each host system.

\* Unless all terminals defined to ACF/VTAM R2 are channel-attached to the host processor.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

ACF/VTAM V1 R2 runs in a virtual storage environment on one of the following CPUs with the relocation feature:

Under DOS/VSE: S/370 mdls 115, 125, 135, 135-3, 138 145, 145-3, 148, 155II, 158, and 3031.

Under OS/VS1: S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155II, 158, 158MP, 165II, 168, 168MP, 3031, 3032 and 3033.

#### SOFTWARE REQUIREMENTS

ACF/VTAM V1 R2 needs one of the following operating systems: DOS/VSE, OS/VS1, or OS/VS2 (MVS) and all subsequent releases and modifications unless otherwise stated. The licensed program ACF/VTAM R2 needs the concurrent installation of prerequisite VTAM SCP for ACF/VTAM R2 system control programming modules. These system control programming modules should be installed only by ACF/VTAM R2 users.

ACF/VTAM R2 requires a current level of the Virtual Storage Access Method (VSAM) if delayed configuration restart will be used.

The ACF/VTAM R2 Multisystem Networking Facility requires the installation of prerequisite ACF/VTAM R2 system control programming modules and the licensed program ACF/VTAM R2. The ACF/VTAM R2 Multisystem Networking Facility also requires the use of a 3705-I or 3705-II Communications Controller with the ACF/NCP/VS program product for cross-domain sessions.

In a mixed ACF/VTAM R2 - ACF/TCAM multisystem environment, ACF/VTAM R2 cannot get from ACF/TCAM the physical device address (used in the copy function) of an SDLC 3270 device controlled by ACF/VTAM. ACF/VTAM R2, therefore, cannot provide that physical device address to application programs.

## ACF/VTAM R2 (cont'd)

The Time Sharing Option (TSO) of ACF/VTAM R2 only operates under OS/VS2 MVS.

### COMPATIBILITY

ACF/VTAM R2 retains compatibility with ACF/VTAM Version 2 or ACF/VTAM R1, except as previously stated under "Migration and Planning Considerations". ACF/VTAM R2 offers compatibility with ACF/NCP/VS R1 and R2.

Where related IBM programs (for example, CICS/VS, IMS/VS, POWER/VS, JES1/RES, JES2/RJE, JES2/NJE, JES/RJP, TSO, IIS, VSPC, BTP, SSS and NOSP) operate with ACF/VTAM R1 Record Mode, compatibility is retained for the level(s) of those programs that are current at the availability of ACF/VTAM R2 on the appropriate operating system release. Recompilation of the related IBM programs is not required.

Compatibility of the ACF/VTAM R1 or ACF/VTAM Version 2 Record Mode Application Program Interface (Record API) is retained for existing user programs that utilize ACF/VTAM R2, except that the SIMLOGON CONALL function has been changed to operate compatibly with the OPNDST CONALL function. However, such user programs may require changes to take advantage of the single and multisystem capabilities offered by ACF/VTAM R2. TSO/VTAM data editing installation exits may require changes due to new exit interface parameters.

The ACF/VTAM R2 Multisystem Networking Facility in one domain of a multiple domain network will operate with another ACF/VTAM Multisystem Networking Facility or ACF/VTAM Version 2 or an ACF/TCAM Multisystem Networking Facility in another domain.

The capabilities provided by ACF/VTAM R2 operating in one domain are limited to the capabilities provided by ACF/VTAM R1, ACF/TCAM R1, and ACF/TCAM V2 R1 when operating in another domain(s). These capabilities are also limited to the capabilities of ACF/NCP/VS R1 when used in the same domain or a different domain.

### MIGRATION and PLANNING CONSIDERATIONS

**ACF/VTAM R2 with ACF/NCP/VS Considerations:** When used only for local user applications (that is, data communication between two application programs in the same host system or between a channel-attached terminal and an application program on the same host system), ACF/VTAM R2 supports the following items without the need for ACF/NCP/VS or the ACF/VTAM R2 Multisystem Networking Facility feature:

- Enhanced Network Operator control for session termination.
- The NCCF program product.
- Application-to-application parallel sessions.
- Negotiable session initialization parameters.
- 3790 inbound pacing support.
- Terminal connectivity test.
- VARY command enhancements.
- Allow the LOGMODE, USS and INTERPRET tables to reside outside of the pageable link pack area (PLPA). (OS/VS2 MVS only)
- VTAM Internal Trace Commands.
- DISPLAY command enhancements.
- Usability enhancements associated with channel-attached device support.
- Usability enhancements to Unformatted Systems Services (USS).

When used for remote network user applications, ACF/VTAM R2 supports the following items in conjunction with ACF/NCP/VS R1 or with ACF/NCP/VS R2:

- Enhanced Network Operator control for session termination.
- Application-to-application parallel sessions. \*
- Dynamic display of ACF/NCP/VS storage.
- Terminal connectivity test.
- Dynamic dump of ACF/NCP/VS storage.
- Channel-attached 3270 system and 3790 system networking. \*
- VARY command enhancements.
- Allow the LOGMODE, USS and INTERPRET tables to reside outside of the pageable link pack area (PLPA). (OS/VS2 MVS only)
- VTAM Internal Trace Enhancements.
- DISPLAY command enhancements.
- Usability enhancements associated with channel-attached device support.
- Usability enhancements to Unformatted Systems Services (USS).

- The NCCF program product.
- Negotiable session initialization parameters (Application-to-application). \*
- 3790 inbound pacing support.
- \* Requires ACF/VTAM R2 Multisystem Networking Facility feature unless used for local user applications.

When used for remote network user applications, ACF/VTAM R2 supports the following items only in conjunction with ACF/NCP/VS R2:

- Enhanced SDLC data link test.
- Intensive mode recording of SDLC data link errors.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices.
- The Network Terminal Option program product.

**Communications Controller Support:** ACF/VTAM R2 operates with the following communications controllers as supported by ACF/NCP/VS R1 and R2:

- 3705-I Communications Controller.
- 3705-II Communications Controller.

**Multisystem Considerations:** In a multiple host system environment, the ACF/VTAM V1 R2 enhancements are supported for each respective ACF/VTAM V1 R2 or ACF/VTAM Version 2 host system just as they are within a single host system environment.

ACF/VTAM R2 supports the following items between ACF/VTAM R2 host systems or between ACF/VTAM R2 or ACF/VTAM Version 2 or ACF/TCAM V2 host systems:

- Enhanced network operator control for session termination. \*
- Negotiable session initialization parameters.
- Application-to-application parallel sessions. \*
- The Network Terminal Option program product (except between ACF/VTAM R2 and ACF/TCAM V2).
- Channel-attached 3270 system and 3790 system networking.
- The NCCF program product. \*\*
- 3790 inbound pacing support. \*\*

ACF/VTAM R2 also supports the following items from an ACF/VTAM R2 host system when communicating with an ACF/VTAM R1 or ACF/TCAM V1 R1 host system:

- Enhanced Network operator control for session termination. \*
- Channel-attached 3270 system and 3790 system networking.

In the above configurations, the appropriate access method features for multisystem networking must be installed.

\* Not applicable to ACF/TCAM.

\*\* Also supported between ACF/VTAM R2 and either ACF/VTAM R1 or ACF/TCAM V1 R1 host systems.

**Migrating from VTAM 2.0 or ACF/VTAM V1 R1 to ACF/VTAM V1 R2:** The following migration paths are available for the given levels of VTAM and ACF/VTAM:

VTAM 2.0 will operate with the following levels of NCP/VS and ACF/NCP/VS:

- NCP/VS 5.0.
- ACF/NCP/VS R1 (with appropriate VTAM 2.0 PTFs).
- ACF/NCP/VS R2 (OS/VS1 and OS/VS2 MVS only with appropriate VTAM 2.0 PTFs).

ACF/VTAM R1 and ACF/VTAM R2 will operate with the following levels of NCP/VS and ACF/NCP/VS:

- NCP/VS 5.0 (ACF/VTAM R1 only).
- ACF/NCP/VS R1.
- ACF/NCP/VS R2 (except ACF/VTAM R1 under OS/VS2 SVS and with appropriate ACF/VTAM R1 PTFs).

Functions supported by VTAM 2.0 or ACF/VTAM R1 with the appropriate level of NCP/VS or ACF/NCP/VS are also supported by ACF/VTAM R2 with the appropriate level of ACF/NCP/VS with the following exceptions:

- OS/VS2 (SVS) is not supported by ACF/VTAM R2 and consideration must be given to migrating a user's operating system support before or at the same time as migrating to ACF/VTAM R2.
- Alternatives (such as the Network Terminal Option program product) must be considered for users that have applications written for the VTAM 2.0 or ACF/VTAM R1 basic mode operations. ACF/VTAM R2 supports only record mode operations.
- In a multisystem networking environment, message traffic from a terminal to a target host, or from a host to a terminal or from one

PROGRAM PRODUCTS

ACF/VTAM R2 (cont'd)

application program to another application program can only be routed through intermediate ACF/NCP/VS systems, not through intermediate host processors. Alternatives (such as a 3705-to-3705 SDLC data link) should be considered for users who route message traffic through intermediate host processors under ACF/VTAM R1.

**Other Considerations:** ACF/VTAM V1 R2 requires the following features in support of the Compare and Swap instruction: Conditional Swapping (#1051) on the 3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

ACF/VTAM R2 will operate in a VM/370 virtual machine which supports the required release of the operating system (DOS/VSE, OS/VS1, OS/VS2 MVS).

ACF/VTAM R2 operation in a VM/370 environment is intended for use in program development and testing and other uses where performance is not critical. Operation of ACF/VTAM R2 under VM/370 Release 5, even with the virtual machine assist feature, may add significant additional processor overhead. If your customer has specific throughput or terminal response requirements, you should plan to benchmark under VM/370 to ensure that any proposed configuration will meet the customer's performance needs.

Each DOS/VSE, OS/VS1 or OS/VS2 (MVS) virtual machine in which ACF/VTAM R2 resides requires a dedicated sub-channel address to a 3705-I or 3705-II with ACF/NCP/VS R1 or ACF/NCP/VS R2.

In a mixed ACF/VTAM - ACF/TCAM multisystem environment, the ability of ACF/VTAM R2 to access device characteristics of terminals controlled by ACF/TCAM is limited to those indicators defined and maintained by ACF/TCAM. In particular, the ability to determine the following 3271-11, -12 and 3275-11, -12 device characteristic is not supported: The physical device address (used in the copy function).

Machine and storage requirements will be provided in an update to the *Advanced Communications Function for VTAM (ACF/VTAM) General Information: Introduction*, prior to availability of ACF/VTAM R2 on each supported operating system.

IBM will accept APARs describing any situation where the installation of ACF/VTAM R2 causes an exposure to the system integrity of OS/VS2 MVS.

CONVERSION

Initially, host computers that are to participate in a multiple-domain network can be installed separately as single-domain networks, and the networks can be interconnected later with links between local communications controllers. This permits an existing network to continue in operation while the multiple-domain network is being developed. VTAM and ACF/VTAM application programs that were originally designed to operate in a single-domain network will continue to operate within an ACF/VTAM R2 domain of a multiple-domain network, but may need modification if they are to have sessions with logical units in other domains.

ACF/VTAM R2 will support ACF/NCP/VS R1 in a 3705-I or 3705-II Communications Controller. This permits the concurrent or subsequent installation of ACF/NCP/VS R2 in a 3705-I or 3705-II Communications Controller.

PERFORMANCE and STORAGE CONSIDERATIONS

The design objective for ACF/VTAM R2 record mode path lengths for a single system environment is approximately equal to an ACF/VTAM R1 environment for the equivalent function. Response time in a multisystem environment will depend on the number of 3705s with ACF/NCP/VS traversed and other network load factors. The design objective for ACF/VTAM R2 record mode for OS/VS and DOS/VSE is to have the overall real storage requirement approximately equal to or less than that of ACF/VTAM R1 record mode. Specific user storage requirements will be dependent on the specific configuration.

In DOS/VSE, OS/VS1 and OS/VS2 (MVS), the design objective, compared to ACF/VTAM R1, is to reduce the:

- Overall ACF/VTAM R2 control block storage requirement due to elimination of the fixed storage requirement (currently 8 bytes) for control blocks per logical unit.
- Overall ACF/VTAM R2 storage requirement due to elimination of Basic mode support.

In OS/VS2 (MVS), the design objective, compared to ACF/VTAM R1, is to achieve reductions in ACF/VTAM R2 usage of OS/VS2 (MVS) common storage as follows:

- Reduce use of the Pageable Link Pack Area (PLPA) due to elimination of Basic mode support.
- Significantly reduce use of the Common Service Area (CSA) due to elimination of certain control blocks and/or movement of other control blocks from CSA to ACF/VTAM R2 private storage. (The movement from CSA to private storage may cause re-definition of the region size for ACF/VTAM R2). Due to Basic mode removal

and/or re-design of the ACF/VTAM R2 OPEN/CLOSE and VARY components, this design objective includes:

- 1) Movement of the symbol and resource definition tables to ACF/VTAM R2 private storage areas.
- 2) Elimination of the control blocks that represented active and inactive connections between application programs and between application programs and network devices.
- 3) Reduced usage of the large pageable pool during network activation.
- 4) Elimination of terminal related fixed storage control blocks that were used to route Basic mode input data.

Related IBM Programs

The following summarizes relationships in a networking environment:

DOS/VSE			
OS/VS1			
OS/VS2 (MVS)			
↓	↓	↓	↓
* * *	DB/DC	CICS/VS	ACF VTAM R2
* * *		IMS/VS	
* * *	RJE	POWER/VS	
* * *		JES1/RES	
* * *		JES2/RJE	
* * *		JES2/NJE	
* * *	Interactive	TSO	
* * *		VSPC	
* * *		IIS	
* * *	Device Support	BTP	
* * *		SSS	
* * *		Network Terminal	
* * *		Option	
* * *		DSX	
* * *		PSS/HS	
* * *	Communi- cation Systems Mgt.	NOSP	
* * *		NCCF-NPDA	
* * *	User Application Programs		

To ACF/VTAM in different host system or ACF/TCAM in same or different host system (See Note)

DOCUMENTATION

(available from Mechanicsburg)

Introduction to Advanced Communications Function	GC30-3033
Advanced Communications Function for VTAM (ACF/VTAM) General Information: Introduction	GC27-0462
Advanced Communications Function for VTAM (ACF/VTAM) General Information: Concepts	GC27-0463
Advanced Communications Function for VTAM Release 2: Program Summary	GC27-0457

ACF/VTAM V1 R2 TERMINAL SUPPORT CHART †

Start/Stop Terminals (Note 1)

- 2740-1
- \* 2741
- 3101 (mdls 10, 12, 13, 20, 22, 23)
- 6733 as CPT-TWX (M33/35)
- \* CPT-TWX (M33/35)
- 3232-51 (mdl 51)
- \* WT Telegraph [ Note 2 ]

BSC Terminals

- \* 3271-1,-2 [ Note 2 ]
- \* 3274-1C,-21C,-31C,-51C (3271-1,-2) [ Note 2,4 ]
- \* 3275-1,-2 [ Note 2 ]
- \* 3276-1,-2,-3,-4 (3271-1,-2) [ Note 2,4 ]
- \* 5285/5288 (3271-2) [ Note 2 ]
- \* 5275 (3275-1, -2) [ Note 2 ]
- \* 5937 (3271-1, -2) [ Note 2 ]
- \* 8100/DPPX (3276-1,-2,-3,-4) [ Note 2 ]
- \* 8100/DPPX/SF (3276-1,-2,-3,-4) [ Note 2 ]
- \* System/34 (3271) [ Note 2 ]
- \* System/36 (3271) [ Note 2 ]
- \* System/38 (3271) [ Note 2 ]

## PROGRAM PRODUCTS

**ACF/VTAM R2 (cont'd)****SDLC Terminals**

- \* 3232-1
- \* 3271-11,-12 [ Note 2 ]
- \* 3274-1C,-21C,-31C,-51C (3791) [ Note 2,4 ]
- \* 3275-11,-12 [ Note 2 ]
- \* 3276-1,-2,-3,-4 (3791) [ Note 5 ]
- \* 3276-11,-12,-13,-14 (3791) [ Note 4 ]
- 3601, 3602
- 3614, 3624 [ Note 2 ]
- 3631, 3632 (3601, 3602)
- 3661 [ Note 3 ]
- 3684-1,-2
- 3694
- \* 3767-1,-2,-3
- \* 3771-i,-2,-3
- \* 3773-1,-2,-3
- 3773-P1,-P2,-P3
- \* 3774-1,-2
- 3774-P1,-P2
- \* 3775-1
- 3775-P1
- 3776-1,-2,-3,-4
- 3777-1,-3,-4
- \* 3791 [ Note 6 ]
- \* 3791/3730 [ Note 6 ]
- 3791/3760
- 4701-1,-2
- \* 5285/5288 (3274-1C)
- 5285/5288 (3770)
- 5520 (3791/3730)
- 5937 (3271) [ Note 2 ]
- 6670
- \* 8100/DPPX (3791) [ Note 6 ]
- \* 8100/DPPX/SP (3791) [ Note 6 ]
- \* 8100/DPCX (3791) [ Note 6 ]
- 8775-11,-12 (3274) [ Note 8 ]
- S/32 (3770)
- S/34 (3770) (3791)
- S/34 (3274) [ Note 2 ]
- S/36 (3770)
- S/36 (3791)
- \* S/36 (3274)
- S/38 (3770)
- Series/1

**Local Terminals**

- \* 3272-1,-2
- \* 3274-1A,-21A,-31A (3791),-1B,-21B (3272-1,-2),  
-1D,-21D,-31D (3272-1,-2)
- \* 3791 [ Note 6 ]
- \* 3791/3730 [ Note 6 ]
- 3791/3760
- 4331 Display/Printer Adapter (3272-2)
- 4331 Loop Adapter (3274-1A) [ Note 7 ]

† All of the above terminals have both single and multisystem support. The terminal type in parentheses designates the programming support provided by ACF/VTAM R2, e.g., S/32 (3770) means the S/32 is supported as a 3770.

\* Also supported by TSO/VTAM.

Note 1: The Start/Stop Terminals shown are supported only via the Network Terminal Option program product.

Note 2: Nonswitched connection only.

Note 3: Switched connection only.

Note 4: Buffer sizes of 960, 1920, 2560, and 3440 are supported.

Note 5: With the SDLC/BSC switch feature set to SDLC.

Note 6: TSO support applies only with 3270 Data Stream Compatibility.

Note 7: ACF/VTAM does not support the attachment of the 3644 or 8775 with Downstream Loadable Functions to the 4331 Loop Adapter Feature.

Note 8: 8775 base function only. ACF/VTAM does not support the 8775 with Downstream Loadable Functions.

RPQs ACCEPTED: No

**5735-RC2 - ACF/VTAM R3 (OS/VS)  
5746-RC3 - ACF/VTAM R3 (DOS/VS)  
ADVANCED COMMUNICATIONS FUNCTION  
FOR VTAM RELEASE 3 (ACF/VTAM)**

**PURPOSE**

Advanced Communications Function for VTAM Version 1 Release 3 (ACF/VTAM R3) is for users of DOS/VSE, OS/VS1, and OS/VS2 (MVS) that offers expanded network configurability, network management capability and enhanced network recoverability. Multiple system networks require installation of the ACF/VTAM V1 R3 Multisystem Networking Facility (MSNF) feature.

**HIGHLIGHTS OF ACF/VTAM R3**

- **Parallel Links:** Multiple active SDLC data links between adjacent 3705s.
- **Transmission Groups:** Logical groupings of transmission links between adjacent network nodes.
- **Multiple Routes:** Multiple routes for SNA and non-SNA message transmission between nodes in a network.
- **Multiple Priority Levels:** Three levels of transmission priority selectable by session.
- **Extended NCP Interconnection:** New capabilities for interconnecting 3705s in single and multiple system networks.
- **Extended NCP Ownership.**
- **Flow Control:** Enhanced management of network traffic demands.
- **Reduced Cross-Domain Resource Definition Requirements. \***
- **Session Outage Notification:** Enhanced awareness of session outages.
- **Enhanced Recovery Capabilities. \***
- **Route Verification and Error Notification Facilities.**
- **Transmission Group Option for Line Trace.**
- **Support of Release 2 of the Network Terminal Option program product.**
- **Network Logical Data Manager (NLDLM):** For OS/VS2 MVS, support of the NLDLM program product.
- **Supports the CCITT X.21 switched interface when the 3705-II is attached to an X.21 Interface via the 3705-II**
- **Additional Problem Determination and Serviceability Enhancements.**
- **Additional Device Support Extensions and Network Operation Enhancements.**
- **Additional Reliability and Availability Enhancements for OS/VS2 (MVS).**
- \* See the "Summary and Advantages" section for those capabilities requiring the Multisystem Network Facility (MSNF) feature.

ACF/VTAM R3 is designed to operate with ACF/NCP/VS Release 2, 2.1 or 3. Some of the capabilities provided by ACF/VTAM R3 are supported only in conjunction with ACF/NCP/VS R3. A summary of this support appears later in these pages.

**SUMMARY AND ADVANTAGES OF ACF/VTAM R3**

**Parallel Links:** Multiple active SDLC links between adjacent 3705s ... Parallel Links allow data traffic to flow simultaneously over two or more SDLC links between adjacent 3705s. All such links can be operational and in use at the same time, and each can be activated or deactivated independently of the others. This capability can provide increased message flow and improve the availability and reliability of transmissions between 3705s.

**Transmission Groups:** Logical groupings of transmission links between adjacent network nodes ... A user may define up to eight Transmission Groups, each with one or more SDLC links between adjacent 3705s. A Transmission Group permits multiple SDLC links to be defined as a single logical link. A single channel between a host and its channel-attached 3705 is also defined as a Transmission Group. If a link or links in a Transmission Group fails, session traffic will automatically be placed on remaining active links without loss of data. This enhances the reliability and availability of service between 3705s. Multiple Transmission Groups and appropriate route selection permit a user to specify message traffic for different applications to flow through a network via pre-assigned Transmission Groups. For example, interactive processing may be assigned one group and batch processing may be assigned a different group, each with its own physical link support.

**Multiple Routes:** Multiple routes for SNA and non-SNA message transmission between nodes in a network ... A user may define up to eight routes for message transmission between two host systems or between a host system and a 3705. When a session is initiated between two application programs or between a terminal and an

application program, one of the routes is automatically selected to transmit the session traffic. The user may limit the selection to a particular route or to one of an ordered sequence of routes. Thus, it is possible to distribute the traffic for different sessions to different routes, dividing the load among several routes. Parallel sessions between two applications can take advantage of multiple routes so that failure of one route does not disrupt all sessions.

The ordered sequence of routes, determined by the installation, defines the set of alternate routes available for session traffic. In the event a route becomes inoperative during a session, the application program or terminal may request that the session be re-initiated. This causes automatic selection of one of the alternate routes. The user can then resynchronize the session data traffic and continue data communications and application processing via network routes that remain in operation.

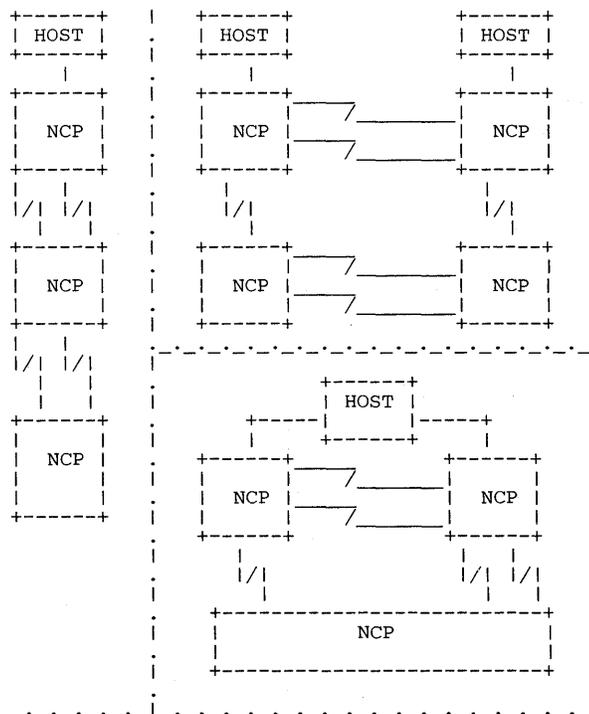
**Multiple Priority Levels:** Three levels of transmission priority selectable by session ... A user can specify one of three message traffic priorities for a session between two application programs or between a terminal and an application program. For example, this permits message traffic for a time dependent session to be transmitted through a network ahead of other message traffic. That is, interactive processing may be given top priority by a user while other network traffic, such as batch processing, is assigned to a lower priority by the user.

**Extended NCP Interconnection:** New capabilities for interconnecting 3705s in single and multiple system networks ... In ACF/VTAM V1 R2, a remote NCP could only be link-attached via a single link to a single channel-attached 3705. In ACF/VTAM V1 R3, a 3705 may now be link-attached via Transmission Groups to one or more channel-attached and/or link-attached 3705s.

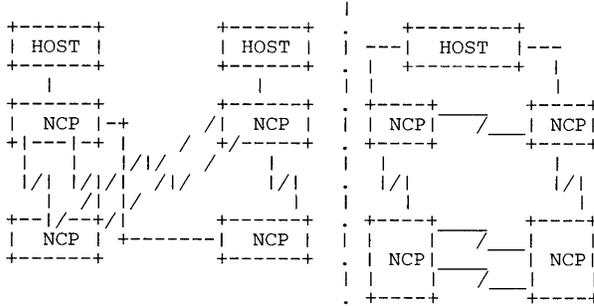
These capabilities can significantly expand the installation's configurability options. Also, they can improve the overall efficiency of the network and improve the ability of a host processor to take over a 3705 whose current owner (or a link to that owner) has failed or has been deactivated.

See Figure 1 for some examples of interconnection flexibility.

**FIGURE 1**



ACF/VTAM R3 (cont'd)



**Extended NCP Ownership:** As many as eight host systems can share the ownership of an NCP in a 3705 that is channel-attached \* and/or link-attached to another 3705(s). This extends the capability previously provided for sharing channel-attached 3705s. If one of the host systems fails or gives up control of the 3705, each of the remaining host systems is notified. This notification serves as a signal for using the enhanced take-over capability described below. All host systems that share ownership of an NCP in a 3705 can also share ownership of SDLC links that connect the 3705 to other 3705s. A shared SDLC link is not deactivated until all owning host systems give up control of the link. Each of the host systems is notified if a link that it owns fails, or if the adjacent 3705 becomes inoperative.

\* The channel and SDLC link attachments cannot exceed the number of channels and SDLC links supported by the 3705-1 or the 3705-11 communications controllers.

**Flow Control:** Enhanced management of network traffic demands ... Via SNA protocols, the flow of message traffic is dynamically regulated between a host system and a 3705 and between two host systems. Continuous feedback is exchanged between network resources in order to regulate network traffic and reduce the possibility of network congestion. When necessary, the feedback triggers local flow control mechanisms in ACF/VTAM R3. Applications and local terminals may be temporarily prevented from introducing more data into a congested network.

**Reduced Cross-domain Resource Definition Requirements ...** Requires the MSNF feature. This enhancement is available for both terminal or application definitions and is requested when the user defines the host-to-host control session. A terminal in one domain can request a session with an application program in a different domain without prior definition of the terminal within the application program's host. Also, an application in one domain can request a session with an application program or terminal in a different domain without prior definition of the requesting application within the cross-domain application program's or cross-domain terminal's host.

This enhancement is designed to reduce the need for user-specified cross-domain resource definitions in a multisystem environment and also to reduce the storage required to support such definitions. It permits the addition of an application program or terminal to one host system without the need to redefine other host systems which the resource may want to enter an SNA session.

**Session Outage Notification** Enhanced awareness of session outages ... If the route supporting a session becomes inoperative, then, via SNA protocols, the session ends are made aware of the outage. Session re-initiation may be requested as described under "Multiple Routes".

**Enhanced Recovery Capabilities**

- **Enhanced restart of host-to-terminal control sessions ...** In recovering from a host failure or a route failure on the host-to-terminal control session, a host system can recover its control session for a 3770 MLU, 3271-11\*\*, 3271-12\*\*, 3275-11\*\*, 3275-12\*\*, 3274-1C/SNA\*, 3684, 5285, 5288, S/32, S/34 or S/38 without disruption of existing sessions between the device and application programs. This permits user applications that are not affected by such a failure to continue processing during and after recovery of the control session. For other terminals, restart of the control session results in Session Outage Notification.

\* This product must be at the appropriate EC level to provide this function.

\*\* Support of these devices is provided by ACF/NCP/VS R3.

- **Enhanced takeover of a 3705 ...** In the event a host system fails or otherwise gives up control of a 3705, any host system that is sharing ownership of the same 3705 will have its network operator notified about the lost host. Any of the notified host systems can take over control of the devices mentioned above without disrupting their existing cross-domain sessions with application programs. It is no longer necessary to deactivate corresponding cross-domain resource definitions before acquiring resources attached to the 3705 that were controlled by the lost host system.

- **Enhanced multiple host system restart ...** Requires the MSNF feature. In recovering from a failure situation, two host systems can restart their control session without disruption of existing cross-domain sessions between two application programs or between a terminal and an application program. This permits user applications that are not affected by such a failure event to continue operations during and after recovery of the host systems' cross-domain control session.

**Route verification and error notification facilities ...** Via the DISPLAY command, a network operator can determine if a message route originating in his host is operative or inoperative. This permits a network operator to verify the availability of network routes and to take corrective action for routes that may have become inoperative. It also permits a network operator to verify that a route has been returned to service following a failure or deactivation. During the verification, appropriate resource owners are notified when an inactive or failed resource is encountered on a route.

In addition, if during network operation a route fails, an awareness message is issued at the host system end point(s), identifying the inoperative route to the network operator. This permits a network operator to take appropriate action to minimize the affects of an unusable message route on network applications.

**Problem Determination and Serviceability Enhancements:**

**Trace Support Extensions:**

- Prior to ACF/VTAM Release 3, the ACF/VTAM operator had to issue a separate command for each node for which a trace was to be initiated or terminated. With ACF/VTAM Release 3, the ACF/VTAM operator can initiate and terminate buffer and I/O traces for a node and all its subnodes with a single ACF/VTAM operator command. This capability could reduce the ACF/VTAM operator actions required to gather problem determination information.

- Provides VTAM Internal Trace (VIT) enhancements. The Path Information Unit (PIU) VIT entry has been enhanced to include traces of System Services Control Point (SSCP) SNA sessions. The sessions being traced are those between the SSCP and application programs, the ACF/VTAM operator services component, and the ACF/VTAM host physical unit services component. This additional problem determination information should be useful in diagnosing problems where the SSCP is believed to be in error.

All VIT entries containing the same problem determination data have been reformatted to have this data at a consistent location in each of the different entry types. These reformatted entries should improve the usability and readability of the entries and thus reduce the time necessary to analyze them.

The VIT SNAP entry type has been enhanced to allow for 64 bytes of problem determination data to be contained in the entry, thus allowing additional information to be collected. The current length of 32 bytes continues to be supported.

A new VIT option, CIO, has been added which provides trace entries of ACF/VTAM channel I/O operations. The entries contain information about start I/O conditions, channel interrupts and error recovery procedure events. These additional entries should be useful in isolating a problem to either an ACF/VTAM error or an error with a host processor's channel equipment.

- Provides the capability to initiate and terminate a Generalized Trace Facility (GTF) trace for individual ACF/VTAM user sessions (OS/VS2 (MVS) only).

- Transmission Group Trace extends the existing SDLC line trace capabilities to Transmission Groups. Via the ACF/VTAM operator MODIFY command, the SNA headers of message traffic over a Transmission Group between two IBM 3705 communications controllers can be traced as if it were a single SDLC line.

**Message Support Extensions:**

To aid in diagnosing network problems, ACF/VTAM Release 3 provides:

- The capability for the ACF/VTAM operator to specify a time interval after which notification will be given of ACF/VTAM operations that have been pending completion for longer than the specified time interval. The notification will identify the particular operation by its name and by the origin and destination network names or addresses. The internal ACF/VTAM event identifier will also be displayed. The ACF/VTAM operator also has the capability to modify the time interval.

- The capability to have the last five characters of the issuing ACF/VTAM module name appear in an ACF/VTAM operator message. If this option is specified, the module name information will be inserted between the message identification number and the first character of text of each ACF/VTAM operator message. Requesting this additional information may cause the ending text of some ACF/VTAM messages to be truncated and not displayed.

**ACF/VTAM R3 (cont'd)**

- Operator notification when, in a multisystem networking environment, a request for a cross-domain session fails because of one of the following:
  - The destination cross-domain resource manager (CDRM) is not defined.
  - A necessary CDRM-CDRM session is not active.
  - A required cross-domain resource (CDRSC) is not defined.
  - A required cross-domain resource is not active.

For each of these, the ACF/VTAM operator in the domain that detected the error receives a message containing the name of the resource (CDRM or CDRSC) that prevented successful session initiation and the names of the primary and secondary LUs for which the session setup failed.

- Notification to the system operator when an insufficient storage condition exists. The message will contain the buffer pool experiencing the problem or, as appropriate to the operating system, the operating system subpool from which the storage was requested.

**TSO/VTAM Support Extension:**

- TSO/VTAM is enhanced to allow installations to specify whether data is to be treated as 'confidential text' or not. Data not to be treated as confidential text remains unaltered in the ACF/VTAM buffers and may aid in problem determination.

**Device Support Extensions and Network Operation Enhancements:** In OS/VS1, ACF/VTAM Release 3 extends device support for the Downstream Load Utility program product for IBM 3644 Automatic Data Units (ADU) and IBM 8775 Display Terminals.

- For OS/VS1, ACF/VTAM Release 3 provides support of the Downstream Load Utility program product to permit the operation of IBM 8775s with Advanced Functions when attached via an SDLC line to an IBM 3705 Communications Controller operating with ACF/NCP/VS. This support is available now.

**ACF/VTAM has been enhanced to support SNA Notify:**

- ACF/VTAM application programs that use the queuing facility of the ACF/VTAM SIMLOGON macro instruction may take advantage of SNA Notify to acquire terminals as they are powered on without operator intervention at the application program. This improved operational efficiency is supported by 3270 display stations and printers attached to the 3274 mdl 1A and mdls 1C and 51C when communicating with hosts via SDLC links. The 3274 support is contained in Configuration Support B (#9111) and Configuration Support C (#9112).

**Device support extensions to permit dynamic exit and re-entry to the network:**

- When devices are engaged primarily in tasks unrelated to communications, network communication is a small percentage of the device's use. ACF/VTAM Release 3 permits this type of device (e.g., the IBM System/34), operating on nonswitched SDLC lines, to disconnect and reconnect to the network without requiring ACF/VTAM operator intervention.

**Ability to display a TSO/VTAM userid (OS/VS2 (MVS) only):**

- Prior to ACF/VTAM Release 3, the ACF/VTAM operator had to enter multiple Display commands to associate a TSO user with a specific terminal. ACF/VTAM Release 3 provides the ACF/VTAM operator with a new Display command option which provides for the specification of a TSO user identification. The output of the display will contain:
  - An indication that this is a TSO userid display.
  - The application name (for example, TSO0005).
  - The terminal name (for example, SNA3270B) associated with the specified userid.
  - The status as known by ACF/VTAM of both the application and the terminal.
  - An indication as to whether the TSO/VTAM GTF trace is in effect for this TSO userid.

**Ability to specify an Unformatted System Services (USS) table containing installation-customized ACF/VTAM commands:**

- ACF/VTAM Release 2 and ACF/VTAM Release 3 contain newly implemented ACF/VTAM operator commands which can be customized via USS. Prior to ACF/VTAM Release 3, these customized commands had to be placed in the ACF/VTAM-defined default USS table. To improve the usability of this facility and allow migration of existing customized commands, ACF/VTAM Release 3 permits specification of an installation-defined USS table via the START command. ACF/VTAM searches this installation-defined table prior to searching the IBM-defined default table for ACF/VTAM operator commands. Thus, if during testing of

customized commands an error is detected, an installation need only restart ACF/VTAM and eliminate the specification of the USS table in error.

In OS/VS systems, the amount of private area storage ACF/VTAM may allocate from an application program can be limited:

- Prior to ACF/VTAM Release 3, if an application program had not requested to receive data from ACF/VTAM but data arrived for the application program, ACF/VTAM would allocate as much storage as needed from the application's private area to queue the data. This ACF/VTAM Release 3 facility allows an installation, when defining an application program, to limit the amount of private area storage ACF/VTAM may request to queue this data.

**Reliability and Availability Enhancements for OS/VS2 (MVS)**

Capability to have an application program span multiple address spaces:

- ACF/VTAM has been enhanced to permit application program interface (API) requests from a single application program to originate from different address spaces and to reference a single application program access method control block (ACB). This multiple address space facility can provide application programs with enhanced capabilities for error isolation and session protection. This capability will also allow application program design flexibility by permitting individual sessions to be assigned to their own address space while being allowed to reference a single ACB. Improved operation may also be achieved by grouping sessions with similar characteristics or functions to be performed in one address space.

**New levels of error isolation:**

- To minimize the disruption caused by an error detected while ACF/VTAM is processing, ACF/VTAM attempts to isolate the error to:
  - The failing API request.
  - The session issuing the API request.
  - The task containing the session.
  - The application program.

Also, if a task or address space is terminated while processing for other than ACF/VTAM, ACF/VTAM attempts to isolate the disruption to the task structure or address space involved.

Extensions to the OS/VS2 (MVS) authorized path mode of operation for additional ACF/VTAM application program interface (API) macro instructions and exit routines:

- Prior to ACF/VTAM Release 3, an authorized application program could use only a small subset of the ACF/VTAM API macro instructions and exit routines in the OS/VS2 (MVS) authorized path mode of operation (via the system request block (SRB) mode of operation). With ACF/VTAM Release 3, all API macro instructions (except for the OPEN, CLOSE, MODCB, TESTCB, GENCB and SHOWCB macro instructions) can be used in this mode of operation. Selection of authorized path mode is under control of the application program via API macro instruction operands.

All exit routines associated with an ACF/VTAM application program can make use of this authorized path mode of operation. The selection of authorized path mode is specified when the application program is defined.

Application programs selecting the authorized path mode of operation may realize improved ACF/VTAM performance.

**Support of Release 2 of the Network Terminal Option (NTO) program product ...** ACF/VTAM R3 will support the devices and capabilities of Release 2 of NTO.

**NLDM Program Product ...** The NLDM program product, which runs as an application on NCCF, is supported in OS/VS2 MVS environments. ACF/VTAM will accept requests from NLDM to capture session initiation/termination data from all resources it controls and to continuously trace data passing between selected network resources. The session data and trace data are sent to the NLDM application, where they are correlated to assist in performing session-level problem determination.

**3274-1A and 3274-1C/SNA Inbound Pacing ...** Inbound pacing is supported under ACF/VTAM R2 and R3 for the 3274-1A and 3274-1C/SNA. These products must be at the appropriate EC level to provide this function.

**Serviceability Enhancements ...** The following ACF/VTAM R2 serviceability enhancements continue to be supported by ACF/VTAM R3:

- The ability to terminate or initiate the VTAM Internal Trace facility at VTAM initialization time.
- The ability to have the VTAM Internal Trace records recorded on an external file in a DOS/VSE environment. This capability continues to be available in OS/VS1 and OS/VS2 MVS environments.

## ACF/VTAM R3 (cont'd)

-The data format and contents of certain VTAM Internal Trace records have been enhanced. For example, the user exit records now contain the resource name instead of the address of the resource name.

ACF/VTAM R3 supports the following CCITT X.21 switched functions when attached to an X.21 Interface via the 3705-II:

- Address calling.
- Auto Answer.
- Call progress signal.
- Direct call.
- Closed User Groups.
- Abbreviated Address Calling.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

Communications Controller support ... ACF/VTAM R3 operates with the following communications controllers as supported by the level or levels of ACF/NCP/VS that are current when ACF/VTAM R3 becomes available:

- 3705-I Communications Controller.
- 3705-II Communications Controller.

ACF/VTAM R3 requires the following features in support of the Compare and Swap instruction: Conditional Swapping (#1051) on the 3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

**System Configuration:** ACF/VTAM R3 runs in a virtual storage environment in any system configuration that supports a DOS/VSE, OS/VS1 or OS/VS2 (MVS) operating system as specified in the "Programming Systems" section.

#### SOFTWARE REQUIREMENTS

ACF/VTAM R3 needs one of the following operating systems: DOS/VSE with the VSE/AF licensed program, OS/VS1, OS/VS2 (MVS) and all subsequent releases and modifications unless otherwise stated. The licensed program ACF/VTAM R3 needs the concurrent installation of prerequisite VTAM SCP for ACF/VTAM R3 system control programming modules. These system control programming modules should be installed only by ACF/VTAM R3 users.

**Software Configuration:** ACF/VTAM R3 requires one of the following operating systems at the specified level or subsequent levels unless otherwise specified:

- DOS/VSE with the VSE/Advanced Function (VSE/AF) licensed product.
- OS/VS1 Release 7.0.
- OS/VS2 (MVS) Release 3.8.

If delayed configuration restart will be used, ACF/VTAM R3 requires a current level of Virtual Storage Access Method (VSAM).

ACF/VTAM R3 will operate in a VM/370 virtual machine which supports the required release of the operating system (DOS/VSE, OS/VS1, OS/VS2 (MVS)). VM/370 provides a means of supporting VTAM and TCAM systems in the same processor, each running in its own virtual machine. This facility can be helpful when changing VTAM releases and when testing the ACF/VTAM Multisystem Networking Facility feature.

Operation of ACF/VTAM R3 under VM/370, even with the virtual machine assist feature, may add additional processor overhead which should be considered in your review of the customer's performance needs.

Each DOS/VSE, OS/VS1 or OS/VS2 (MVS) virtual machine in which ACF/VTAM R3 resides requires a dedicated sub-channel address to a 3705-I or 3705-II with ACF/NCP/VS R1, ACF/NCP/VS R2 or ACF/NCP/VS R3.

**Co-requisite:** Use of ACF/VTAM R3 requires the concurrent installation of co-requisite VTAM system control programming (SCP) modules.

**Other Considerations:** In a mixed ACF/VTAM - ACF/TCAM multisystem environment, the ability of ACF/VTAM R3 to access device characteristics of terminals controlled by ACF/TCAM is limited to those indicators defined and maintained by ACF/TCAM. In particular, the ability to determine the physical device address of a 3271-11, -12 used in the copy function is not supported.

**CICS/VS Intersystem Communication - Message Performance Option:** The ISC Message Performance Option is designed for transaction switching between CICS/VS systems and is invoked by specifying a new parameter on the START command and by appropriately defining the terminal control table. Increased performance is achieved by eliminating certain CICS/VS generated control sequences that are normally exchanged between two CICS/VS systems. The application designer is given the option of increased performance as a trade-off against certain aspects of data integrity.

As is the case today, the START command is used to generate an asynchronous transaction. Recoverable resources are still protected

within each transaction, however, there is no communication at SYNCHPOINT time with the transaction.

ISC Message Performance option will be of particular value in those cases where the terminal operators are interested in making an inquiry-only (i.e., no resources are updated) and in getting an answer in the quickest possible time. If no answer is received after a certain time, the inquiry is considered lost and is retried. Thus, CICS/VS is not required to provide any recovery capability in the event of a failure, either of the line or the system; the operator provides all the recovery necessary, namely reissuing the original request.

**Availability:** CICS/DOS/VS and CICS/OS/VS support is available now.

**CICS/VS VTAM Dynamic Close Support:** The VTAM Dynamic Close Support being provided by CICS/VS is in response to the user requirements to have the ability to continue execution of CICS/VS even though the VTAM network is being shut down. This support is complementary to the CICS/VS V1 R4.0 support of Dynamic Open. Together, they allow CICS/VS and VTAM to be initialized, run and terminated independently of each other.

Dynamic close may be invoked either by issuing a CICS/VS Master Terminal command or a VTAM Halt command (normal, quick or cancel).

Dynamic close results in the termination of all CICS/VS sessions with VTAM. This may be achieved in two ways:

- Through an orderly Dynamic Close.
- Through a quick Dynamic Close.

An orderly close will wait for transaction termination on all CICS/VS sessions and then issue a CLSDST against each active session before issuing a VTAM CLOSE ACB macro. A quick close will abnormally terminate all transactions currently in session with VTAM before issuing a CLOSE ACB macro.

**Parallel Sessions:** CICS/VS will support the Parallel Session capability for communication between inter-connected CICS/VS systems. This can offer system throughput enhancements by permitting more than one transaction to concurrently access resources on a remote CICS/VS system. The maximum number of concurrent transactions is governed by the number of available parallel sessions.

This support will be available in the latest current release in 2Q80 for CICS/DOS/VS and 3Q80 for CICS/OS/VS.

#### COMPATIBILITY

Where related IBM programs (for example, CICS/VS, IMS/VS, POWER/VS, JES1/RES, JES2/RJE, JES2/NJE, JES3/RJP, TSO, IIS, VSPC, BTP, SSS, and NCCF) operate with the ACF/VTAM R2 Record Mode Interface, compatibility is retained for the level(s) of those programs that are current at the availability of ACF/VTAM R3 or ACF/VTAM Version 2 on the appropriate operating system release. Recompilation of the related IBM programs is not required.

Compatibility with the ACF/VTAM R2 Record Mode Application Program Interface (Record API) is retained for existing user programs that utilize ACF/VTAM R3. However, such user programs may require changes to take advantage of the single and multisystem capabilities offered by ACF/VTAM R3 or ACF/VTAM Version 2.

By the enhancements made in ACF/VTAM R3 in support of Parallel Links, Multiple Routes and Extended NCP Interconnection, minor operational differences do, however, exist with VTAM Level 2, ACF/VTAM R1 and ACF/VTAM R2.

#### MIGRATION and PLANNING CONSIDERATIONS

##### ACF/VTAM V1 R3 with ACF/NCP/VS Considerations

The following ACF/VTAM V1 R3 enhancements are supported only in conjunction with ACF/NCP/VS R3:

- Parallel Links.
- Transmission Groups.
- Multiple Routes.
- Multiple Priority Levels.
- Extended NCP Interconnection.
- Extended NCP Ownership.
- Flow Control.
- Session Outage Notification.
- Enhanced Recovery Capabilities. \*
- Route Verification and Error Notification Facilities.
- Transmission Group Trace.
- Support of Release 2 of the Network Terminal Option program product.
- Support of the CCITT X.21 Switched Interface.

ACF/VTAM V1 R3 with ACF/NCP/VS Release 2 or 2.1 continues support of NTO Release 1.

In addition to being supported with ACF/NCP/VS Release 3, the following ACF/VTAM Version 1 Release 3 enhancements are supported with ACF/NCP/VS Release 2 or 2.1:

PROGRAM PRODUCTS

**ACF/VTAM R3 (cont'd)**

- Reduced cross-domain resource definition requirements. \*
  - Problem determination and serviceability enhancements.
  - Device support extensions and network operation enhancements.
  - Reliability and availability enhancements.
- \* See the "Summary and Advantages" section of the 1979 Program Product Announcement for those capabilities requiring the Multisystem Networking Facility (MSNF) facility

NCP/VS Version 5 and ACF/NCP/VS Release 1 are not supported with ACF/VTAM Release 3. All facilities provided by NOSP are now available with the Network Communications Control Facility (NCCF) program product, which operates on ACF/VTAM Release 3.

The VTAM-NCP support table that follows lists the releases of each product through which SSCP-PU, SSCP-LU, and LU-LU sessions are supported. It can be used to plan migration from previous releases of VTAM to ACF/VTAM V1R3.

NCPs	NCP5	V1	V1	V1	V1R3	V2	V2	V3	V3
		R1	R2	R2.1	(7)	(7)			
VTAMS						3705	3725	3705	3725
VTAM2	yes	yes	yes	yes	no	no	no	no	no
V1R1	yes	yes	yes	yes	yes	no	no	no	no
V1R2	no	yes	yes	yes	yes	no	no	no	no
V1R3	no	no	yes	yes	yes	yes	yes	yes	yes
		(1)	(2)	(2)	(7)	(7)	(8)	(9)	(8,9)

**Notes:**

- (1) With applicable VTAM Level 2 PTFs.
- (2) OS/VS only, with applicable VTAM Level 2 PTFs:
  - OS/VS1: UX14242.
  - OS/VS2 (MVS): UZ28810.
- (3) Not supported on VSE.
- (4) With applicable ACF/VTAM V1R1 PTFs:
  - DOS/VS Release 34: UD17664.
  - OS/VS1: UX14243.
  - OS/VS2 (MVS): UZ28811.
- (5) With applicable ACF/NCP/VS V1R2 or V1R2.1 PTFs when connected to ACF/NCP/VS V1R3 or later.
- (6) OS/VS only, with applicable ACF/VTAM V1R1 PTFs:
  - OS/VS1: UX14243.
  - OS/VS2 (MVS): UZ28811.
- (7) With EREP PTFs for Link Problem Determination Aid (LPDA) level maintenance data records.
- (8) OS/VS2 (MVS) only, with ACF/VTAM V1R3 PTFs UZ90205, UZ90206, UZ90207 and UZ90208. (ACF/VTAM V1R3 for OS/VS1 and DOS/VS does not support sessions with ACF/NCP for the 3725.)
- (9) With applicable ACF/VTAM V1R3 PTFs:
  - OS/VS2 (MVS): UZ62633.
  - OS/VS1: UX18990.
  - DOS/VS: UD26545.
- (10) With ACF/VTAM V1R3 PTF when the network contains any ACF/VTAM V2R2 or ACF/NCP/VS node(s):
  - OS/VS2 (MVS): UZ56422.
  - OS/VS1: UX17328.
  - DOS/VS: UD23966.

**Note:** The above matrix assumes that customers will be at current access method maintenance levels when migrating from one NCP release to another.

Refer to the "Compatibility" section which follows for the operational characteristic differences between ACF/VTAM R3 and VTAM Level 2, ACF/VTAM R1 and ACF/VTAM R2.

**Multisystem Considerations:** In a multiple host system environment:

- The ACF/VTAM R3 enhancements are supported for each respective ACF/VTAM Version 2 or ACF/VTAM R3 host system.
- An ACF/VTAM R3 host system can coexist with ACF/VTAM Version 2 or ACF/VTAM R1, ACF/VTAM R2, ACF/VTAME, ACF/TCAM V1 R1, ACF/TCAM V2 R1, ACF/TCAM V2 R2 and/or ACF/TCAM V2 R3 host systems at the level of function supported by these host systems and the intermediate NCPs.

**DATA SECURITY, AUDITABILITY and CONTROL**

Security features available with previous releases, such as Encrypt/Decrypt, continue to be supported by ACF/VTAM R3. User management is responsible for the selection, adequacy and implementation of these features and the appropriate application and administration control.

**PERFORMANCE AND STORAGE CONSIDERATIONS**

Machine and storage requirements will be provided in the *Advanced Communications Function for VTAM (ACF/VTAM) Installation* manual at the availability of ACF/VTAM R3 on each supported operating system. Optionally, additional storage must be allocated in OS/VS2 MVS environments when the NLDM program product is installed. This storage requirement is dependent on the number of size of NLDM trace buffers selected.

The planned design of ACF/VTAM Release 3 indicates that, due to the ACF/VTAM R3 enhancements, the ACF/VTAM R3 path lengths, real storage requirements, control block storage requirements, overall storage requirements and the OS/VS2 (MVS) Common Area storage requirements may increase compared to ACF/VTAM Release 2. The actual performance impact (if any) to a customer will vary depending upon his particular hardware and network configuration.

**RELATED IBM PROGRAMS**

The following summarizes relationships:

DOS/VSE with VSE/AF OS/VS1 OS/VS2 (MVS)	DB/DC	CICS/VS IMS/VS	ACF VTAM R3
** *	Job Entry	POWER/VS JES1/RES JES2/RJE JES2/NJE JES3/RJP	
** *	Interactive	TSO VSPC IIS	
** *	Device Support	BTP SSS NTO DSX Host Command Facility Programmable Store System Host Support	
** *	Communication Network Mgmt.	NCCF NPDA Information/ System NLDM **	
** *	User Application Programs		

To ACF/VTAM in different host system or ACF/TCAM in same or different host system (See Note)

\*\* VTAM PTF required.

**Note:** Refer to sales pages for information on programming support for specific SNA (and non-SNA 3270) devices and other related IBM program capabilities. Non-SNA device support (other than 3270) is provided only through the Network Terminal Option program product, or through user-written code which uses the ACF/NCP/VS attachment facility.

**PROGRAM CURRENCY**

The levels of VTAM and ACF/VTAM currently supported on the various levels of the operating systems are listed below:

Programming support for OS/VS1 Release 6.7 and OS/VS2 (MVS) Release 3.7 operating system releases is being withdrawn effective December 31, 1980. The programming support for DOS/VS Release 34 is being withdrawn March 31, 1981.

Programming support for the current levels of VTAM and ACF/VTAM is being withdrawn on the following schedule:

**VTAM 1.1**

OS/VS2 (MVS) Release 3.7      December 31, 1980

PROGRAM PRODUCTS

ACF/VTAM R3 (cont'd)

VTAM Level 2

DOS/VS Release 34 (1)	March 31, 1981
OS/VS1 Release 6.7	December 31, 1980
OS/VS1 Release 7	March 31, 1982
OS/VS2 (MVS) Release 3.7	December 31, 1980
OS/VS2 (MVS) Release 3.8	not established

(1) End of currency for DOS/VS Release 34 is being extended from December 31, 1980 to March 31, 1981.

ACF/VTAM Release 1

DOS/VS Release 34 (1)	
SCP	March 31, 1981
BASE and MSNF Feature	March 31, 1981
OS/VS1 Release 6.7	
SCP	December 31, 1980
BASE, MSNF and Encrypt/ Decrypt Features	September 30, 1981
OS/VS1 Release 7	
SCP	September 30, 1981
BASE, MSNF and Encrypt/ Decrypt Features	September 30, 1981
OS/VS2 (MVS) Release 3.7	
SCP	December 31, 1980
BASE, MSNF and Encrypt/ Decrypt Features	September 30, 1981
OS/VS2 (MVS) Release 3.8	
SCP	September 30, 1981
BASE, MSNF and Encrypt/ Decrypt Features	September 30, 1981

(1) End of currency for ACF/VTAM Release 1 on DOS/VS Release 34 is being extended from December 31, 1980 to March 31, 1981.

ACF/VTAM Release 2

The VSE System	
SCP	December 31, 1982
BASE and MSNF Feature	December 31, 1982
OS/VS1 Release 6.7	
SCP	December 31, 1980
BASE, MSNF and Encrypt/ Decrypt Features	December 31, 1982
OS/VS1 Release 7	
SCP	December 31, 1982
BASE, MSNF and Encrypt/ Decrypt Features	December 31, 1982
OS/VS2 (MVS) Release 3.8	
SCP	December 31, 1982
BASE, MSNF and Encrypt/ Decrypt Features	December 31, 1982

DOCUMENTATION

(available from Mechanicsburg)

*Introduction to Advanced Communications Function (GC30-3033) ...  
Advanced Communications Function for VTAM (ACF/VTAM) General  
Information: Introduction (GC27-0462) ... ACF/VTAM Program  
Summary (GC27-0457).*

ACF/VTAM Licensed Program Specification will be available at program product availability.

ACF/VTAM R3 TERMINAL SUPPORT CHART†

Start/Stop Terminals [Note 1]

- 2740-1
- \* 2741
- 3101, as CPT-TWX (M33/35)
- 3232-51 as CPT-TWX (Mdl 33/35)
- 6733 as CPT-TWX (M33/35)
- \* CPT-TWX (M33/35)

\* WT Telegraph

BSC Terminals

- \* 3271-1, -2 [Note 2]
- \* 3274-1C, -21C, -31C, -51C, (3271-1, -2) [Notes 2 and 4]
- \* 3275-1, -2 [Note 2]
- \* 3276-1, -2, -3, -4 (3271-1, -2) [Notes 2 and 4]
- \* 3780 [Notes 2 and 8]
- \* 5275 (3275-1, -2) [Note 2]
- \* 5937 (3271-1, -2) [Note 2]
- \* 8100/DPPX (3276-1, -2, -3, -4) [Note 2]
- \* 8100/DPPX (3276-1, -2, -3, -4) [Note 2]
- \* System/36 (3271) [Note 2]

SDLC Terminals

- \* 3232-1
- \* 3271-11, -12 [Note 2]
- \* 3274-1C, -21C, -31C, -51C (3791) [Notes 2 and 4]
- \* 3275-11, -12 [Note 2]
- \* 3276-1, -2, -3, -4 (3791) [Note 5]
- \* 3276-11, -12, -13, -14 (3791) [Note 4]
- 3601, 3602
- 3614, 3624 [Note 2]
- 3631, 3632 (3601, 3602)
- 3661 [Note 3]
- 3684
- 3694
- \* 3767-1, -2, -3
- \* 3771-1, -2, -3
- \* 3773-1, -2, -3
- 3773-P1, -P2 -P3
- \* 3774-1, -2
- 3774-P1, -P2
- \* 3775-1
- 3775-P1
- 3776-1, -2, -3, -4
- 3777-1, -3, -4
- 3791 [Note 6]
- \* 3791/3730 [Note 6]
- 3791/3760
- 4701-1, -2
- 5285/5288 (3770)
- 5520 (3791/3730)
- 5937 (3271) [Note 2]
- 6670
- \* 8100/DPPX (3791) [Note 6]
- \* 8100/DPPX/SP (3791) [Note 6]
- \* 8100/DPCX (3791) [Note 6]
- 8775-11, -12 (3274) (Note 7)
- System/32 (3770)
- System/34 (3770) (3791)
- System/36 (3770)
- System/36 (3791)
- \* System/36 (3274)
- System/38 (3770)
- System/38 (3274)
- Series/1

Local Terminals

- \* 3272-1, -2
- \* 3274-1A, -21A, -31A (3791), -1B, -21B (3272-1, -2), -1D, -21D, -31D (3272-1, -2)
- \* 3791 [Note 6]
- \* 3791/3730 [Note 6]
- 3791/3760
- 4331 Display/Printer Adapter (3272-2)
- 4331 Loop Adapter (3274-1A)

† All of the above terminals have both single and multisystem support. The terminal type in parentheses designates the programming support provided by ACF/VTAM R3, e.g., S/32 (3770) means the S/32 is supported as a 3770.

\* Also supported by TSO/VTAM

Note 1: The Start/Stop Terminals shown are supported only via the Network Terminal Option (NTO) program product.

Note 2: Nonswitched connection only.

Note 3: Switched connection only.

Note 4: Buffer sizes of 960, 1920, 2560 and 3440 are supported.

Note 5: With the SDLC/BSC switch feature set to SDLC.

**ACF/VTAM R3 (cont'd)**

Note 6: TSO support applies only with 3270 Data Stream compatibility.

Note 7: For OS/VS1, ACF/VTAM Release 3 supports the IBM 8775 with Downstream Loadable Functions. ACF/VTAM Release 3 on VSE and OS/VS2 (MVS) for the IBM 8775 is for base function only.

Note 8: Supported only via the Network Terminal Option Release 2 (NTO) program product.

**MVS INTEGRITY**

IBM will accept APARs describing any situation where the installation of ACF/VTAM R3 causes an exposure to the system integrity of OS/VS2 (MVS).

**RPQs ACCEPTED: No**

**5735-RC3 - ACF/TCAM V2 R1  
ADVANCED COMMUNICATIONS FUNCTION for TCAM  
VERSION 2 RELEASE 1**

**PURPOSE**

Advanced Communications Function for TCAM Version 2 Release 1 is for users of OS/VS1 and OS/VS2 (MVS) that can provide additional capabilities for improved installability and usability, problem determination, network operation and data communications in a network with a single S/370 or with multiple S/370s. To support multiple S/370 networks, a user must install the ACF/TCAM V2 Multisystem Networking Facility feature.

**HIGHLIGHTS OF ACF/TCAM V2 R1**

Problem determination and network operation ... Includes additional functions that can assist in optimizing management and control of a user's data communication installation.

- Enhanced SDLC data link test.
- SNA terminal connectivity test.
- Intensive mode recording of SDLC data link errors.
- Dynamic display of ACF/NCP/VS storage.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices under ACF/NCP/VS Release 2.
- Support for the Network Communications Control Facility (NCCF) program product and its related Network Problem Determination Application program product.

Enhanced data communications capabilities ... Includes improved flexibility for session operation, data security and enhanced device support.

- Negotiable session initialization parameters.
- Support of the Programmed Cryptographic Facility program product (5740-XY5).
- Support of channel-attached 3790 and 3270 systems.
- Support of the channel-attached 3270 systems (SNA only) and 3790 systems (configuration support #9165 and #9169 only) in a multiple processor network, using the Multisystems Networking Facility feature.
- Support of the 3790 Communication System inbound message traffic pacing function. (Also supports 8100 and 3730 systems).

ACF/TCAM V2 R1 provides service programs and customer tailorable facilities that enhance the installability and usability of ACF/TCAM in the following areas:

- System startup and restart.
- Session establishment and routing control.
- Statistics gathering.
- Exception and error control.
- Operator control.
- Message retrieval.
- Message routing.

In addition, the Multisystem Networking Facility feature has been enhanced by providing customer aids for implementing the following:

- Installation and management of ACF/TCAM host to host data flows in large networks with multiple application types, such as:
  - Interactive applications.
  - Message routing.
  - Data collection.
  - Data distribution.
- Extended device support for ACF/TCAM host to host networking.
- Automatic recovery of ACF/TCAM host to host message traffic.
- Other usability enhancements.

**SUMMARY AND ADVANTAGES OF ACF/TCAM V2 R1**

**Problem Determination and Network Operation Functions**

- Enhanced data link test offers the capability to dedicate one station on an SDLC to testing while allowing the remaining stations on that link to remain active. When a station comprises a cluster control unit and its attached devices, the control unit is dedicated to the test; its attached devices are deactivated.
- SNA terminal connectivity test provides the capability of initiating an echo test from the terminal end of a session to determine that an SNA terminal and its connection to ACF/TCAM V2 are functioning correctly. The test does not interfere with other stations on the link, or with other devices on the same control unit.
- Intensive mode error recording of SDLC data link errors allows a network operator to dynamically invoke and terminate recording of information about temporary errors that may be occurring on an SDLC data link. This capability supplements existing support that records permanent error information and permits a user to collect

additional information on SDLC data link errors. This detailed information could preclude the need for specific testing in order to recreate an error situation.

- Dynamic display of ACF/NCP/VS storage allows the network operator to display any contiguous 256 bytes without disrupting normal ACF/NCP/VS operation. This display capability, provided in hexadecimal representation, can be useful in dynamically evaluating network problem situations.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices under ACF/NCP/VS R2 allows the user to selectively add or delete supported nonswitched SNA-SDLC devices, without disrupting other network functions. This capability supplements the ACF/NCP/VS R2 generation process, and supports temporary configuration in a non-disruptive fashion, until a permanent network control generation can be done.
- In support of the Network Communications Control Facility program, ACF/TCAM V2 R1 provides an interface to support the problem determination and operation facilities offered by this program product.

**Additional Data Communications Capabilities**

- Negotiable session initialization parameters allow a more flexible session initialization process. During session initialization, two user-written application programs or message handlers can dynamically exchange certain session parameters to establish and/or modify transmission control and integrity of session data. With this capability, it may be possible for a user to simplify the predefined installation of intercommunicating application programs.
- ACF/TCAM support of the Programmed Cryptographic Facility offers the user transmission security of data.
- Support of enhanced 3705-II (mdls J, K, & L) permits channel attachment and/or SDLC data link attachment of the enhanced 3705-II in an ACF/TCAM V2 R1 network with ACF/NCP/VS Release 2.
- Support of channel-attached 3270 and 3790 systems permits these systems to be included in the single system SNA environment supported by ACF/TCAM V2 R1.
- Channel-attached SNA 3270 system and 3790 system networking permits the channel-attached 3270 systems (SNA only) and 3790 systems (configuration support #9165 and #9169 only) supported by ACF/TCAM V2 R1 to participate in multiple system networking.
- 3790 inbound pacing is supported as a user-selectable session establishment function under ACF/TCAM V1 and V2 R1 with 3790 support. ACF/TCAM V2 R1 also supports 8100 and 3730 systems.

**Enhanced Installability and Usability Capabilities:** The following enhancements to ACF/TCAM V2 R1 consist of macros, system service programs, and message handler facilities that a customer can tailor to meet unique system configurations. Model message control programs are provided to aid the customer in implementing these new capabilities and minimize his coding requirements.

**Enhancements to the Base ACF/TCAM V2 R1 Program Product**

- An initiator program ... Functions as a master task for a customer's message control program. The initiator provides for automatic activation, monitoring and selective restart of the message control program and associated IBM or user supplied service programs. The initiator allows non-failed tasks in the MCP region to continue running when another task in the region fails. The initiator will optionally restart the failed task.
- A message generation facility for building variable content start-up and restart messages.
- Enhanced message handler facilities to provide ease of use and flexibility in:
  - ACF/TCAM session establishment.
  - Routing control.
  - Security checking.
  - Logon/logoff message handling.
  - Error handling.
- A system accounting facility that enables an installation to gather system utilization data for financial accounting and system control. Data such as line utilization, application program logons, number of messages processed by each terminal, etc., can be captured for either on-line or deferred processing.
- Enhanced exception and error control facilities are provided in the form of macro instructions that the installation can use to achieve a high degree of automation in exception handling procedures. To end users and operations people, these facilities can provide awareness of exception conditions, advise the operator of automatic actions taken and/or generate messages indicating

## ACF/TCAM V2 R1 (cont'd)

required action and deliver the messages to the point where the action needs to be taken.

- Enhancements to operator control ....
  - A command for transferring, copying and purging unsent queued messages.
  - A facility for adding user written commands.
  - An on-line operator's guide that displays available commands and command format details.
  - Additional commands to facilitate large system management.
- A message retrieval system service program allows disk queued messages to be retrieved by command from specially designated stations. Retrieved messages may be sent to any station(s) and/or tape. This facility may be used in support of a message routing application, or to aid in investigation and analysis of user difficulties. The program can locate sent and unsent messages by specification of sending or receiving station, time of entry, sequence numbers or range of sequence numbers.
- A message queue system service program that at the time of system shutdown can search all, or selected, queues for unprocessed or unsent messages and place those messages on tape for introduction into a changed or altered system after a cold start. This facility allows the installation to redefine the network configuration and perform a cold restart without message loss and without having to wait for the system to drain. The latter could be difficult if traffic has been queued after hours to terminals that have been turned off for the night.

**Enhancements to the ACF/TCAM V2 R1 Multisystem Networking Facility Feature:** The enhancements to the networking feature of ACF/TCAM V2 R1 are oriented toward support of large networks with multiple application types. Two important elements of the enhanced support are:

**Host to host data flows ...** In which message traffic flowing on the network is always handled by both the originating host and the destination host. Depending upon the particular application, and user specified routing instructions, message traffic may also be handled by intermediate host nodes, in addition to the originating and destination hosts.

Host to host data flows can contribute to increased network usability by providing capabilities such as:

- An efficient mechanism for session establishment and message routing for interactive applications.
- A technique for re-routing of interactive data around failed network elements that is transparent to the terminal operator.
- A facility for staging the movement of non-interactive data across a network during periods of low interactive message traffic.
- Added capabilities for system accounting and control in large networks.

**Transmission categories ...** A customer may establish up to 16 transmission categories in his network. All messages in the same category are treated similarly with respect to queuing medium, message priority, sequence checking, error handling, data staging, routing alternatives, etc.

Use of host-to-host data flows and transmission categories is facilitated by enhanced message handler facilities and user specified networking tables. Within the structure provided by these enhancements, the ACF/TCAM V2 R1 user has the following capabilities:

**Interactive Applications:** Enhanced session establishment and message routing capabilities for interactive applications:

- Transaction routing on a message by message basis.
- Extended interchanges between a terminal and a single application.

Transaction input to different application programs residing in different hosts may be routed without requiring the terminal operator to establish separate SNA sessions for each transaction.

A terminal may access an application in another host, even if the terminal is not defined in the application's host.

Input for a conversational application that is not currently active can be rejected, with an appropriate message sent to the terminal sending the input.

### Non-Interactive Applications

#### Message Routing

- Terminals need be defined to only their owning host nodes in order to gain access to the network via host-to-host message routing flows. New destinations may be added to the network, affecting only the owning host's ACF/TCAM terminal table.

- A single set of input and output sequence numbers can be defined and assigned to messages received from and sent to each terminal. Messages may be retrieved by input and output sequence numbers, thereby facilitating error recovery and problem determination.

#### Data Collection

- Input from a terminal to an application in a cross-domain host can be edited and accepted for processing by the terminal's host, even if the application host has not been brought up.
- Using host to host data flows, messages enter the terminal's host immediately, and are delivered to the application host at the system's convenience -- as determined by the priority and routing parameters specified by the customer.

#### Data Distribution

- Output for a terminal can be accepted for delivery by the terminal's host node even if the terminal is not up.
- Data may be moved in stages to other host(s) closer to the destination terminal, or directly from the source host to the destination host. The staging of data can be controlled by the system operator, contributing to a more manageable and efficient flow of data through the network.

In addition, the macros, system service programs and message handler facilities of the Multisystem Networking Facility feature provide the customer with the following capabilities:

- Host-to-Host networking support for:
  - Non-SNA Channel attached devices.
  - EP attached devices.
  - NCP attached start/stop, BSC and SNA-SDLC devices (in addition to the networking support already provided to these devices).
- In the event that the primary route to a destination host node is unavailable, messages in a particular transmission category can be re-routed through an intermediate host node(s) enroute to the destination host.
- The balancing of message traffic between two host nodes by the use of transmission categories.
- Automatic recovery of host-to-host message traffic.
- Automatic monitoring of the availability of cross-domain host nodes, terminals, and applications.
- Through the use of an expanded ACF/TCAM addressing structure, networking support can be extended to:
  - Non-SNA hosts.
  - SNA clusters as "hosts".
  - Non-SNA links.
  - Multiple SNA networks.

**Model Message Control Programs:** The base and networking capabilities previously described are utilized in *Model Message Control Programs*, which are shipped to the customer in machine readable form. The programs are Class A supported, and may be used exactly as is, or tailored to the user's installation requirements. The models include message handlers for 2740 EP start/stop, 3270 EP BSC, 3270 local, and 3767 SDLC devices, including TSO support.

The models will be documented in the publication, *ACF/TCAM Installation Sample Programs*.

#### MIGRATION and PLANNING CONSIDERATIONS

**ACF/TCAM V2 R1 with ACF/NCP/VS:** When used only for local user applications (that is, data communications between two application programs or message handlers in the same S/370 or between a channel-attached terminal and an application program or message handler on the same S/370) ACF/TCAM V2 R1 supports the following items without the need for ACF/NCP/VS:

- Support of channel-attached 3790 and 3270 systems.
- Support of IBM 3790 inbound pacing.
- Negotiable session initialization parameters.
- Support for the Network Communications Control Facility program product.

When used for remote network user applications, ACF/TCAM V2 R1 supports the following items in conjunction with NCP/VS 5.0, ACF/NCP/VS R1, or with ACF/NCP/VS R2:

- Dynamic display of ACF/NCP/VS storage.
- SNA terminal connectivity test.
- Multisystem networking feature support of channel-attached 3790 and 3270 systems.

## PROGRAM PRODUCTS

**ACF/TCAM V2 R1 (cont'd)**

- Support for the Programmed Cryptographic Facility program product. **Notes:** (1) Single system support is provided through ACF/NCP/VS or NCP/VS. Multiple Systems Support is provided through ACF/NCP/VS.
  - Support for the NCCF program product. (2) Nonswitched support only.
  - Support for 3790 inbound pacing. (3) S/360 mdls 25, 30, 40, 50, 65, 65MP, 67 (65 Mode) 75, 85, 91, 195 with either BOS, BPS, DOS, OS; S/370 mdls 115-168MP with either BOS, BPS, DOS, OS, DOS/VS, OS/VS1 or OS/VS2.
  - Negotiable session initialization parameters (application-to-application). \* (4) 3771-1,-2,-3; 3773-1,-2,-3; 3773-P1,-P2,-P3; 3774-1,-2; 3774-P1,-P2; 3775-P1; 3776-1,-2,-3,-4; 3771-1,-3,-4.
  - Enhanced installability and usability capabilities. (5) In 3767 compatibility mode.
- When used for remote network user applications, ACF/TCAM V2 R1 supports the following items only in conjunction with ACF/NCP/VS Release 2:
- Enhanced SDLC data link test. (6) TSO support applies only to 3790 with 3270 data stream compatibility.
  - Intensive mode recording of SDLC data link errors. (7) Configuration support #9165 and #9169 only.
- \* Applicable only to ACP/NCP/VS R1 and R2

PROGRAM PRODUCTS

ACF/TCAM V2 R1 (cont'd)

ACF/TCAM V2 R1 TERMINAL SUPPORT CHART  
FOR GET/PUT INTERFACE

	Single System Support ACF/TCAM via EP/VS	Single System Multi-system Support(1) ACF/TCAM via NCP/VS or ACF/NCP/VS	Single System Support TSO with ACF/TCAM via EP/VS	Single System Multisystem Support (1) TSO with ACF/TCAM via NCP/VS or ACF/NCP/VS
S/S Terminal				
1030	x	-	-	-
1050	x	x	x	x
1060	x	-	-	-
2260	x	-	x	-
2265	x	-	x	-
2740-1,2	x	x	-	-
2741	x	x	x	x
2760	x	-	-	-
3101	x	x	x	x
3232-51 (as CPT-TWX)	x	x	x	x
6733				
(as CPT-TWX 33/35)	x	x	x	x
AT&T 83B3 WU 115A line control type	x	x	-	-
CPT-TWX (M33/35) line control type	x	x	x	x
WT Telegraph (CCITT 2 & 5)	x	x	-	-
BSC Terminals				
2715-2	x	x	-	-
2772	x	x	-	-
2780	x	x	-	-
2922	x	-	-	-
2972-8,-11	x (2)	x (2)	-	-
3271-1,-2	x (2)	x (2)	x (2)	x (2)
3275-1,-2	x (2)	x (2)	x (2)	x (2)
3670	x	-	-	-
3735	x	x	-	-
3741-2,-4	x	x	-	-
3747	x	x	-	-
5110	X	X	-	-
1131	x	x	-	-
1826	x	x	-	-
System/3	x	x	-	-
S/360-20	x	x	-	-
S/360 (3)	x	x	-	-
S/370 (3)	x	x	-	-
System/38 (3271)		x (2)		
5285/5288				
(as a 3271-2)	-	x (2)	-	-
SDLC Terminals				
3232-1	-	x	-	x
3271-11,-12	-	x (2)	-	x (2)
3275-11,-12	-	x (2)	-	x (2)
3274-1C,-21C,-31C,-51C	-	x (2)	-	x (2)
3276-11,-12,-13,-14	-	x	-	x
3601, 3602	-	x	-	-
3614	-	x (2)	-	-
3624	-	x (2)	-	-
3694	-	x	-	-
3767-1,-2,-3	-	x	-	x
3770 (4)	-	x	-	x (5)
3791/3730	-	x	-	x (6)
3791/3760	-	x	-	x (6)
4701	-	x	-	-
5285/5288(as a 3274-1C)	-	x	-	-
Series/1	-	x	-	-
Communications Controllers				
3705-1 Remote				
3705-II Remote				
* Local Terminals	TCAM	TSO		
2260	x	x		
2715-1	x	-		
3272-1,-2	x	x		
3274-1A,-1B,-1D,-21A, 21B,-21D,-31A,-31D	x	x		
3791	x (7)	x (6)		
3791/3730	x (7)	x (6)		
7770-3	x	-		

PROGRAM PRODUCTS

ACF/TCAM V2 R1 (cont'd)

ACF/TCAM TERMINAL SUPPORT CHART FOR GET/PUT INTERFACE (Cont'd.)

COMPATIBILITY MODE (1)

	Single System Support ACF/TCAM via EP/VS	Single System Support(1) ACF/TCAM via NCP/VS or ACF/NCP/VS	Single System Support TSO with ACF/TCAM via EP/VS	Single System Multisystem Support (1) TSO with ACF/TCAM via NCP/VS or ACF/NCP/VS
<b>S/S Terminals</b>				
3767-1,-2 (2740-1)	x	x	-	-
3767-1,-2(2740-2)	x (3)	x (3)	-	-
3767-1,-2 (2741)	x	x	x	x
CMCST (2741)	x	x (4)	x	x
S/7 (2740-1)	x	x	-	-
5100 (2741)	x	x	x	x
5110 (2741)	x	x	x	x
<b>BSC Terminals</b>				
3274-1C,-21C,-31C,-51C (3271)	x (3)	x (3)	x (3)	x (3)
3276-1,-2,-3,-4 (3271)	x (3)	x (3)	x (3)	x (3)
3771-1,-2,-3 (2772)	x	x	-	-
3773-1,-2,-3,-P1 -P2,-P3 (2772)	x	x	-	-
3774-1,-2,-P1 -P2 (2772)	x	x	-	-
3775-1,-P1 (2772)	x	x	-	-
3776-1,-2 (2772/3780)	x	x	-	-
3777-1 (2772/3780)	x	x	-	-
3780 (2772)	x	x	-	-
5265 (3741-2,-4)	x	x	-	-
5274 (3275-1,-2)	x (3)	x (3)	x (3)	x (3)
5285/5288 (3770)	-	x	-	-
5937 (3271-1,-2)	x (3)	x (3)	-	-
8130 (3271)	x (3)	x (3)	x (3)	x (3)
8130 (3780)	x (3)	x (3)	-	-
8140 (3271)	x (3)	x (3)	x (3)	x (3)
8140 (3780)	x (3)	x (3)	-	-
System/7 (System/3)	x	x	-	-
System/32 (System/3)	x	x	-	-
System/34 (System/3)	x	x	-	-
System/38 (System/3)	x	x	-	-
Series/1 (System/3)	-	x	-	-
<b>SDLC Terminals</b>				
3232-1	-	-	-	-
3274-1C,-21C,-31C,-51C (3791)	-	x (6)	-	x (6)
3276-1,-2,-3,-4 (3791)	-	x (7)	x	x (7)
3276-11,-12,-13,-14 (3791)	-	x (6)	-	x (6)
3770 (3767)	-	x (5)	-	x (5)
5285/5288 (3770)	-	x	-	-
5520 (3791/3730)	-	x	-	-
8130 (3791)	-	x	-	x
8140 (3791)	-	x	-	x
S/32 (3770)	-	x	-	x
S/34 (3770)	-	x	-	x
S/34 (3791)	-	x	-	x
S/38 (3770)	-	x	-	x

\*Local devices, except for SNA 3270 and 3790 systems, are not supported by ACF/TCAM for cross-system communications with the ACF/TCAM Multisystem Networking Facility ... Unless such devices communicate via host-to-host data flows.

(7) Applies to 3276 mdl's 1, 2, 3, 4 with BSC/SDLC switch set to SDLC mode.

ACF/TCAM V2 RECORD MODE TERMINAL SUPPORT CHART

<b>BSC Terminals</b>	
3271-1,-2 (2,4)	
3274-1C,-21C,-31C,-51C (2,4)	
3275-1,-2 (2,4)	
3276-1,-2,-3,-4 (2,4)	
5274 (3275-1,-2) (2,4)	
5937 (3271-1,-2) (2,4)	
8130 (3276) (2,4)	
8140 (3276) (2,4)	

- Notes: (1) The terminal type in parenthesis designates the programming support provided by ACF/TCAM, e.g., System/38 (3770) means the System/38 is supported as a 3770.
- (2) Single System Support is provided through ACF/NCP/VS or NCP/VS. Multiple System Support is provided through ACF/NCP/VS.
- (3) Nonswitched support only.
- (4) Switched support only.
- (5) Supported as an interactive 3767 - applies to 3777-1,-2,-3; 3773-1,-2,-3; 3774-1,-2; and 3775-1,-3 only.
- (6) Buffer size of 960, 2560, and 3440 also supported.

## PROGRAM PRODUCTS

## ACF/TCAM V2 R1 (cont'd)

## SDLC Terminals

3271-11,-12 (2)	3774-1,-2,-P1,-P2
3274-1C,-21C,-31C,-51C (2)	3775-1
3275-11,-12 (2)	3775-P1
3276-11,-12,-13,-14	3776-1,-2,-3,-4
3601, 3602	3777-1,-3,-4
3614 (2)	3791
3624 (2)	3791 / 3730
	5285 / 5288 (3770)
	5520 (3791 / 3730)
3631 (2)	5937 (3271) (3)
3632 (3601,3602) (2)	8130 (3791)
3651 (5)	8140 (3791)
3694	
3767-1,-2,-3	S/32 (3770)
3771-1,-2,-3	S/34 (3770)
3773-1,-2,-3	S/34 (3791)
3773-P1,-P2,-P3	

## Local Terminals

3272-1,-2  
3274-1A,-1B,-1D,-21A,-21B,-21D,-31A,-31D  
3791 (1)  
3791 / 3730 (1)

All the above terminals have both single and multisystem support.

- (1) Configuration Support #9165 and #9169 only.
- (2) Nonswitched connection only.
- (3) Switched connection only.
- (4) Connection only through NCP/VS or ACF/NCP/VS.
- (5) Applies to 3651 mds A25, B25, A75, B75, C75 and D75, with the appropriate SDLC communications features.

PROGRAM PRODUCTS

**5735-RC3 - ACF/TCAM V2 R2  
ADVANCED COMMUNICATIONS FUNCTION for TCAM  
VERSION 2 RELEASE 2**

**PURPOSE**

Advanced Communications Function for TCAM Version 2 Release 2 adds support for record mode operations and associated device products.

**HIGHLIGHTS OF ACF/TCAM V2 R2**

Record API support ... Provides a single telecommunications access method interface to subsystems for ACF/TCAM V2 R2, and VTAM and ACF/VTAM, and support for device products associated with record mode operations.

- Permits use of CICS, DSX, IMS, JES 2/3, and/or VSPC under ACF/TCAM at execution time without change to the existing subsystem/service program.
- Supports single-session inter-host subsystem communication.

**ACF/TCAM V2 R2 WITH ACF/NCP/VS:** The following ACF/TCAM V2 R2 enhancements are supported in conjunction with ACF/NCP/VS Release 1 or with ACF/NCP/VS Release 2:

- Record API support. \*
- Single-session inter-host communication. \*\*
  - \* Supported also by NCP/VS 5.0.
  - \*\* Requires the ACF/TCAM V2 R2 Multisystem Networking Facility feature.

**Communications Controller Support:** ACF/TCAM Version 2 operates with the following communications controllers, as supported by NCP/VS 5.0, ACF/NCP/VS R1, and ACF/NCP/VS R2:

- 3705-I Communications Controller.
- 3705-II Communications Controller.

**CUSTOMER RESPONSIBILITIES**

To install and use ACF/TCAM V2, the customer must:

- Design the single system network.
- Order and install all required communications equipment.
- Have prerequisite TCAM SCP for ACF/TCAM V2 installed.
- Install ACF/TCAM V2.
- Define the network to ACF/TCAM V2.
- Install NCP/VS 5.0, ACF/NCP/VS R1, and/or ACF/NCP/VS R2 (unless all terminals defined to ACF/TCAM V2 are channel-attached to the host processor or are EP/VS-defined).
- Define the network to ACF/NCP/VS R1 and/or ACF/NCP/VS R2.

To install and use the ACF/TCAM V2 Multisystem Networking Facility feature, the customer must:

- Design the multisystem network.
- Order and install any additional communications equipment (for example, intersystem links between interconnected 3705 Communications Controllers).
- Have prerequisite TCAM SCP for ACF/TCAM V2 installed.
- Install ACF/TCAM V2.
- Install ACF/NCP/VS R1 and/or ACF/NCP/VS R2.
- Install the ACF/TCAM V2 Multisystem Networking Facility feature.
- Define the multisystem network to ACF/TCAM V2 and to ACF/NCP/VS R1 and/or ACF/NCP/VS R2 in each host system.

**SOFTWARE REQUIREMENTS**

ACF/TCAM V2 R1 and V2 R2 require one of the following operating systems at the specified level or subsequent levels unless otherwise specified:

- OS/VS1 Release 6.7.
- OS/VS2 (MVS) Release 3.8.

**Multisystem Considerations:** In a multiple host system environment, the ACF/TCAM V2 enhancements are supported for each respective ACF/TCAM V2 host system just as they are within a single host system environment.

ACF/TCAM V2 supports the following items between ACF/TCAM V2 host systems, or between ACF/TCAM V2 and ACF/VTAM R2 host systems:

- Negotiable session initialization parameters.
- Channel-attached SNA 3270 and 3790 systems.
- Single-session inter-host subsystem communication. \*\*
- Support for the NCCF program product. \*
- Support for the Programmed Cryptographic Facility program product.
- Support for 3790 inbound pacing. \*
- \* Also supported between ACF/TCAM V2 and ACF/TCAM V1 or between ACF/TCAM V2 and ACF/VTAM V1 R1 systems.
- \*\* Support provided in ACF/TCAM V2 R2 Record API.

The following ACF/TCAM V2 enhancement is also supported from an ACF/TCAM V2 host system when intercommunicating with an ACF/TCAM V1 or ACF/VTAM R1 host system:

- Channel-attached SNA 3270 system and 3790 system networking.
- In the above configuration, the appropriate access method features for multisystem networking must be installed.

ACF/TCAM V2 can co-exist with non-ACF/TCAM hosts and provide the structure for network-wide services such as message routing, data collection and data distribution. In addition, ACF/TCAM V2 enhanced installability and usability functions can be used to interface two separate networks that wish to communicate with one another.

**MIGRATION**

**Migrating from TCAM 10 or ACF/TCAM V1 to ACF/TCAM V2:** The following migration paths are available for the given levels of TCAM and ACF/TCAM:

TCAM 10 will operate with the following levels of NCP/VS and ACF/VS:

- NCP/VS 5.0.
- ACF/NCP/VS R1.
- ACF/NCP/VS R2 (with appropriate TCAM 10 PTFs).

ACF/TCAM V1 will operate with the following levels of NCP/VS and ACF/NCP/VS:

- NCP/VS 5.0.
- ACF/NCP/VS R1.
- ACF/NCP/VS R2 (with appropriate ACF/TCAM V1 PTFs).

ACF/TCAM V2 R1 and R2 will operate with the following levels of ACF/NCP/VS:

- NCP/VS 5.0.
- ACF/NCP/VS R1.
- ACF/NCP/VS R2.

Functions supported by TCAM 10 or ACF/TCAM V1 are also supported by ACF/TCAM V2 with the appropriate level of NCP/VS or ACF/NCP/VS with the following exceptions:

- OS/VS2 SVS is not supported by ACF/TCAM V2, and consideration must be given to migrating a user's operating system support before or at the same time as migrating to ACF/TCAM V2.
- The enhancements to ACF/TCAM V2 R1 include an initiator task that allows non-failed tasks in the MCP region to continue running when another task in the region fails. The initiator will optionally restart the failed task.

Both the MCP and TCAM operator control run as subtasks of the initiator. These subtasks, along with other initiator subtasks, are defined in a subtask table which contains information on each subtask running under the control of the initiator. A default subtask table, which may be changed by the user, is shipped with ACF/TCAM V2 R1.

The TCAM 10 or ACF/TCAM V1 user will need to do the following in order to execute his MCP as an ACF/TCAM V2 system:

- 1) Modify JCL to start the initiator rather than the MCP.
- 2) Update the subtask table to include his MCP name, or
- 3) Rename his MCP to the default name supplied in the subtask table, or
- 4) Override the default name via JCL.

If the user chooses to code his own subtask table rather than use the one supplied, he must code entries for his MCP and for the TCAM operator control program.

- In an ACF/TCAM V1 R1 multisystem networking environment, when one host had two or more 3705s with ACF/NCP/VS, cross-domain session traffic could be routed either through an ACF/TCAM host transit node or directly through the 3705s without host involvement. In ACF/TCAM V2, the host transit node capability has been removed. Therefore, cross-domain session traffic which does not use host to host data flows must be routed directly through the 3705s. The new 3705-II high speed local attachment feature for communication between 3705-II's offers an attractive means of off-loading this function.

**Migrating from TCS-ACF to ACF/TCAM V2 R1:** All TCS-ACF macros are supported by ACF/TCAM V2 R1. In addition, the functions of the following TCS-ACF macros have been incorporated into ACF/TCAM macros:

TCS-ACF	ACF/TCAM Macro/Operand
TCSRROUTE	FORWARD TTCIN =
HOLDNEXT	HOLDSYNCHLD =

PROGRAM PRODUCTS

ACF/TCAM V2 R2 (cont'd)

NEXTMSG                    IEDRELS SYNCHLD =, BRANCH =,  
TCSINTRO                   INTRO NETMON =, MANUAL =,  
                                 NEWLINE =, NODEID =,  
                                 LOOPCNT =, LOOPQ =

TOPTION                    OPTION USE =  
TCSPRIOR                   PRIORITY PRISAVE =  
SKIPFLD                    SETSCAN SKIPFLD =  
MEROFF                     TERRSET MASK =

To aid in migration, ACF/TCAM V2 R1 will also support the above TCS-ACF macros in their TCS-ACF form. However, it is recommended that customers use the new TCAM operands.

Users of TCS levels prior to TCS-ACF Version 1 Release 2 modification 2 should note that the format and size of two controls fields, the FHP and TCSOPTS option field, have been changed. Any absolute (rather than symbolic) references in user code to their content or size may to be changed.

**Compatibility:** Source code compatibility is retained for existing user programs that utilize current levels of TCS-ACF. However, such programs may require changes to take advantage of the additional capabilities offered through ACF/TCAM V2 R1.

**Other Considerations:** ACF/TCAM V2 requires the following features in support of the Compare and Swap instructions: Conditional Swapping (#1051) on the 3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

ACF/TCAM V2 will operate in a VM/370 virtual machine which supports the required release of the operating system (OS/VS1, OS/VS2 MVS). ACF/TCAM V2 operation in a VM/370 environment is intended for use in program development and testing and other uses where performance is not critical. Operation of ACF/TCAM V2 under VM/370 Release 5, even with the virtual machine assist feature, may add significant additional processor overhead. If your customer has specific throughput or terminal response requirements, you should plan to benchmark under VM/370 to ensure that any proposed configuration will meet the customer's performance needs.

Each OS/VS1 or OS/VS2 (MVS) virtual machine in which ACF/TCAM V2 resides requires a dedicated sub-channel address to a 3705-I or 3705-II with ACF/NCP/VS.

In a mixed ACF/TCAM - ACF/VTAM multisystem environment, the ability of ACF/VTAM to access device characteristics of terminals controlled by ACF/TCAM V1 or ACF/TCAM V2 is limited to those indicators defined and maintained by these versions of ACF/TCAM. In particular, the ability to determine the following SNA 3270 (3271-11,-12; 3275-11,-12) device characteristics is not supported:

- The physical device address (used on the copy function).

Machine and storage requirements will be provided in the *Advanced Communications Function for TCAM (ACF/TCAM) Version 2 Installation: Storage Estimates, Conversion Information, Sample Programs*, at the availability of ACF/TCAM V2 on each supported operating system.

IBM will accept APARs describing any situation where the installation of ACF/TCAM V2 causes an exposure to the system integrity of OS/VS2 MVS.

**Related IBM Programs:** The following table summarizes ACF/TCAM Version 2 relationships in a networking environment:

OS/VS1	OS/VS2 MVS	ACF/TCAM V2 R2			
		ACF/TCAM V2 R1		Record API	GET/PUT Interface*
		DB/DC	CICS/VS 1.4		
*	*	DB/DC	CICS/VS 1.4	*	*
*	*		IMS/VS 1.1.5		*
		Job Entry	JES2/RJE 4.1		*
	*		JES2/NJE 3.0		*
	*		JES3/SNA RJP		*
		Interactive	TSO	*	
*			VSPC		*
*	*		I I S	*	
		Device Suppt.	SSS 5.0	*	
*	*		DSX	*	*
*	*		3650 Host Sup't**		*
		Communication Network Mgt.	NCCF-NPDA	*	
		Programmed Cryptographic Facility		***	***

- \* Includes programs utilizing TGET, TPUT, READ, WRITE, and native TCAM applications not written to Record API.
- \*\* Host support for 3650 Programmable Store System.
- \*\*\* Supported by ACF/VTAM V2 but independent of interface levels shown.

**COMPATIBILITY**

ACF/TCAM V2 R1 and R2 retain compatibility with ACF/TCAM V1, with the following exception:

- ACF/TCAM V2 does not support OS/VS2 SVS.

Consideration for this difference is described above under the section entitled "Migration and Planning Considerations".

ACF/TCAM V2 R1 and R2 offer compatibility with NCP/VS 5.0, ACF/NCP/VS R1, and ACF/NCP/VS R2.

Compatibility of related IBM programs (see previous chart) written to the Record Mode Application Program Interface (Record API) is retained in ACF/TCAM V2 R2, except for programs written to the Programmed Operator interface and user programs written directly to the Record API.

**PROGRAM CURRENCY**

ACF/TCAM V1 is currently supported under OS/VS1 release 6.0 and 6.7, OS/VS2 (SVS) release 1.7, OS/VS2 (MVS) release 3.7 and 3.8.

ACF/TCAM V2 R1 and V2 R2 is supported by OS/VS1 Release 6.7, and OS/VS2 (MVS) Release 3.8, and subsequent releases unless otherwise specified.

**DOCUMENTATION:**  
(available from Mechanicsburg)

Publications currently available which describe ACF/NCP/VS V2 are the following:

*Advanced Communications Function for TCAM (ACF/TCAM) Version 2 General Information: Introduction, ACF/TCAM Version 2 Program Library and Introduction to Advanced Communications Function.*

**5735-RC3 - ACF/TCAM V2 R3  
ADVANCED COMMUNICATIONS FUNCTION for TCAM  
VERSION 2 RELEASE 3**

**PURPOSE**

Advanced Communications function for TCAM Version 2 Release 3 is for users of OS/VS1 and OS/VS2 (MVS) that offers expanded network configurability, network management capability and enhanced network recoverability. To support multiple S/370 networks, a user must install the ACF/TCAM V2 R3 Multisystem Networking Facility feature. To take advantage of some of the functions provided by the Multisystem Networking Facility, a user may install the feature in large, multi-node single system environments.

**HIGHLIGHTS OF ACF/TCAM V2 R3**

- **Parallel Links:** Multiple active SDLC links between adjacent 3705s.
  - **Transmission Groups:** Logical groupings of transmission links between adjacent network nodes. \*
  - **Multiple Routes:** Multiple routes for SNA and non-SNA message transmission between nodes in a network. \*
  - **Automatic Session Re-initiation Option:** Disrupted sessions can be automatically re-initiated to take advantage of multiple route availability. \*
  - **Multiple Priority Levels:** Three levels of transmission priorities, selectable by session. \*
  - **Extended NCP Interconnection:** New capabilities for interconnecting 3705s in single and multiple system networks.
  - **Extended NCP Ownership.**
  - **Flow Control:** Enhanced management of network traffic demands. \*
  - **Reduced Cross-Domain Resource Definition Requirements**
  - **Session Outage Notification:** Enhanced awareness of session outages.
  - **Enhanced Recovery Capabilities. \***
  - **Route Verification and Error Notification Facilities. \***
  - **Route Availability Monitoring Option:** Notification to a session requestor that a previously unavailable route is now available. \*
  - **Transmission Group Option for Line Trace.**
  - **Dynamic NCP Dump Facility.**
  - **Support of the Network Terminal Option (NTO) program product.**
  - **Supports the CCITT X.21 switched interface when the 3705-II is attached to an X.21 Interface via the 3705-II.**
- \* Requires the Multisystem Networking Facility feature.

**Note:** The ACF/TCAM V2 R3 Base System provides the capability to define one Transmission Group between adjacent network nodes. The capability to define more than one Transmission Group requires the networking feature.

**SUMMARY AND ADVANTAGES OF ACF/TCAM V2 R3**

**Parallel Links:** Multiple active SDLC links between adjacent 3705s ... Parallel Links allows data traffic to flow simultaneously over two or more SDLC links between adjacent 3705s. All such links can be operational and in use at the same time, and each can be activated or deactivated independently of the others. This capability can provide increased message flow and improve the availability and reliability of transmissions between 3705s.

**Transmission Groups:** Logical groupings of transmission links between adjacent network nodes ... A user may define up to eight Transmission Groups, each with one or more SDLC links between adjacent 3705s with ACF/NCP/VS R3. A Transmission Group permits multiple SDLC links to be defined as a single logical link. A single channel between a host and its channel attached 3705 is also defined as a Transmission Group. If a link or links in a Transmission Group fails, session traffic will automatically be placed on remaining active links without loss of data. This enhances the reliability and availability of service between 3705s. Multiple Transmission Groups and appropriate route selection permit a user to specify message traffic for different applications to flow through a network via pre-assigned Transmission Groups. For example, interactive processing may be assigned one group and batch processing may be assigned a different group, each with its own physical link support.

**Multiple Routes:** Multiple routes for SNA and non-SNA message transmission between nodes in a network ... A user may define up to eight routes for message transmission between two host systems or between a host system and a 3705. When a session is initiated between two application programs or between a terminal and an application program, one of the routes is automatically selected to transmit the session traffic. The user may limit the selection to a particular route or to one of an ordered sequence of routes. Thus, it is

possible to distribute the traffic for different sessions to different routes, dividing the load among several routes.

The ordered sequence of routes, determined by the installation, defines the set of alternate routes available for session traffic. In the event a route becomes inoperative during a session, the application program or terminal may request that the session be re-initiated. This causes automatic selection of one of the alternate routes. The user can then resynchronize the session data traffic and continue data communications and application processing via network routes that remain in operation.

**Automatic Session Re-Initiation Option:** A user-provided exit routine gains control whenever a session is terminated. The routine may specify that automatic session re-initiation is to be provided for a given session. When this option is requested, TCAM will immediately request a new session with the same characteristics as the terminating session. The exit routine could be designed so that, for example, sessions terminating because of route failure will be automatically re-initiated. When a route fails, sessions using the route are terminated, the exit routine gains control for each session and new sessions are requested. If other routes are operational, a new session can be started immediately on one of the other routes, and data transmission can resume as soon as the new sessions are established.

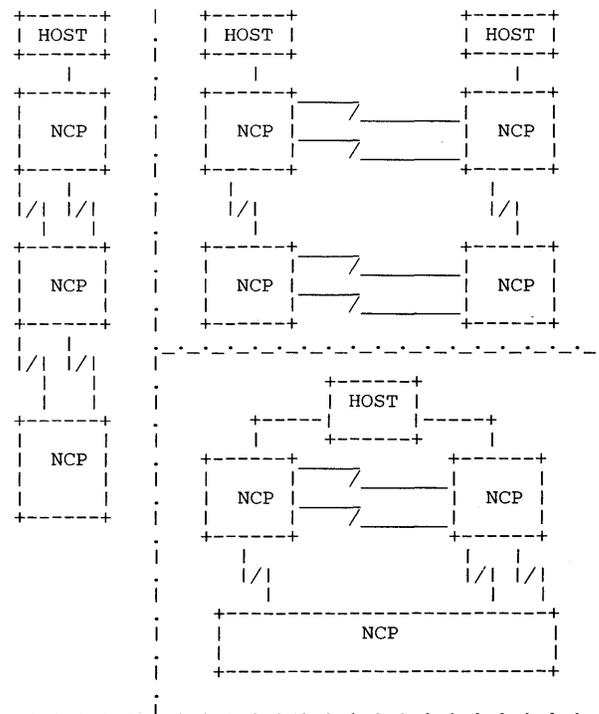
**Multiple Priority Levels:** Three levels of transmission priorities, selectable by session ... A user can specify one of three message traffic priorities for a session between two application programs or between a terminal and an application program. For example, this permits message traffic for a time dependent session to be transmitted through a network ahead of other message traffic. That is, interactive processing may be given top priority by a user while other network traffic, such as batch processing, is assigned to a lower priority by the user.

**Extended NCP Interconnection:** New capabilities for interconnecting 3705s in single and multiple system networks ... in ACF/TCAM V2 R2 a remote NCP could only be link-attached via a single link to a single channel-attached 3705. In ACF/TCAM V2 R3 a 3705 may now be link-attached via Transmission Groups to one or more channel-attached and/or link attached 3705s.

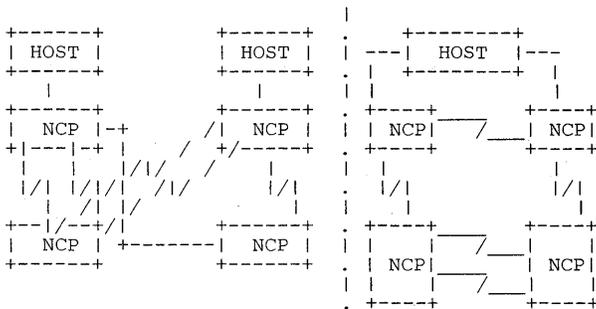
These capabilities can significantly expand the installation's configurability options. Also, they can improve the overall efficiency of the network and improve the ability of a host processor to take over a 3705 whose current owner (or a link to that owner) has failed or has been deactivated.

See Figure 1 for interconnection flexibility.

FIGURE 1



ACF/TCAM V2 R3 (cont'd)



**Extended NCP Ownership:** As many as eight host systems can share the ownership of a 3705 that is channel-attached \* and/or link-attached to another 3705(s). Each of the owning host systems is notified in the event the 3705 becomes inoperative. This permits re-instatement of a failed or deactivated 3705 via any one of the host systems that shares in its ownership.

\* The channel attachments cannot exceed the number of channels supported by the 3705-I or the 3705-II communications controllers.

**Flow Control:** Enhanced management of the network traffic demands ... Via SNA protocols, the flow of message traffic is dynamically regulated between a host system and a 3705 and between two host systems. Continuous feedback is exchanged between network resources in order to regulate network traffic and reduce the possibility of network congestion.

**Reduced Cross-domain Resource Definition Requirements:** An enhancement that is available for both SNA terminal or application definitions ... A SNA terminal in one domain can request a session with an application program in a different domain without prior definition of the terminal within the application program's host. Also, an application in one domain can request a session with an application program or SNA terminal in a different domain without prior definition of the requesting application within the cross-domain application program's or cross-domain terminal's host.

This enhancement is designed to reduce the need for user-specified cross-domain resource definitions in a multisystem environment and also to reduce the storage required to support such definitions. It permits the addition of an application program or SNA terminal to one host system without the need to re-define other host systems with which the resource may want to enter into a SNA session.

**Session Outage Notification:** If the route supporting a session becomes inoperative, the session ends and is made aware of the outage. Session reinitiation may be requested as described under "Multiple Routes".

**Enhanced Recovery Capabilities:**

• Enhanced restart or host-to-terminal control sessions: In recovering from a host failure situation, a host system can recover its control session for a 3271-11\*\*, 3271-12\*\*, 3274-10\*, 3275-11\*\*, 3275-12\*\*, 3684, 3770 MLU, S/32, S/34 or S/38 without disruption of existing sessions between the device and application programs on other host systems. This permits user applications that are not affected by such a failure to continue processing during recovery of the control session. This capability is included in the base ACF/TCAM V2 R3 system.

\* This product must be at an appropriate EC level for this function.

\*\* Support for these devices is provided by ACF/NCP/VS R3.

• Enhanced takeover of a 3705: In the event a host system fails or otherwise gives up control of a 3705, any host system that is sharing ownership of the same 3705 will have its network operator notified about the lost host. Any of the notified host systems can take over control of the devices mentioned above without disrupting their existing cross-domain sessions with application programs. It is no longer necessary to deactivate corresponding cross-domain resource definitions before acquiring resources attached to the 3705 that were controlled by the lost host system.

• Enhanced multiple host system re-synchronization: In recovering from a failure situation, two host systems can re-synchronize their control session without disruption of existing cross-domain sessions between two application programs or between a terminal and an application program. This permits user applications that are not affected by such a failure event to continue operations during re-instatement of the host system's cross-domain control session.

**Route Verification and Error Notification Facilities:** Via the DISPLAY command, a network operator can determine if a message route originating in his host is operative or inoperative. This permits a network operator to verify the availability of network routes and to take corrective action for routes that may have become inoperative. It also

permits a network operator to verify that a route has been returned to service following a failure or deactivation. During the verification, appropriate resource owners are notified when an inactive or failed resource is encountered on a route.

In addition, if during network operation a route fails, an awareness message is issued at the host end point(s) identifying the inoperative route to the network operator. New display commands have been added which permit a network operator to take appropriate action to minimize the affects of an unusable message route on network applications.

**Route Availability Monitoring Option:** A user-provided exit routine gains control whenever a session initiation is attempted. The routine may specify that route availability monitoring is to be provided for a given session.

When a session initiation is attempted but there is no route available, the session attempt is rejected and the requestor is notified of the failure. It is the responsibility of the requestor to retry the session request later, requesting the same or a different route. When route availability monitoring is in effect for a session, however, the failure of the initiation attempt is remembered by TCAM and the requestor is notified of the availability of the route when it becomes available.

**Transmission Group Option for Line Trace:** Extends the existing SDLC line trace capabilities to Transmission Groups. Via the network operator MODIFY command, the message traffic over a Transmission Group between two 3705s can be traced as if it were a single SDLC link.

**Dynamic NCP Dump Facility:** A network operator can invoke a dump of NCP storage from a channel-attached or SDLC-attached 3705. Since NCP continues to operate during the dump process, the dump will represent NCP status over a period of time. The dump contents are recorded and printed via the facilities of the appropriate System Support Programs (SSP) for NCP, and can be useful in dynamically evaluating network problem situations.

**Note:** ACF/TCAM V2 R3 provides Multiple Active Routes and Session Outage Notification support to non-SNA, non-EP devices. EP device networking support continues as in ACF/TCAM V2 R2.

In addition to the existing TCAM support for non-SNA devices, ACF/TCAM V2 R3 supports the following devices as virtual SNA devices through its support of the Network Terminal Option (NTO) program product.

- 2740 mdl 1 Communications Terminal, switched and nonswitched.
- 2741 Communications Terminal, switched and nonswitched.
- Western Union Teletypewriter Exchange Service (TWX) M33/35, switched and nonswitched.
- World Trade Teletypewriter Terminal (WTTY), nonswitched only.

The support is provided for users of the DCB application interface and the TCAM subsystem interface. These devices can participate in a multiple system as well as a single system environment.

In addition to the existing support for non-SNA devices, TSO/TCAM supports the 2741 and TWX M33/35 via the NTO program product.

ACF/TCAM Version 2 Release 3 also supports the following CCITT X.21 switched function when attached to an X.21 Interface via the 3705-II:

- Address calling.
- Auto Answer.
- Call progress signal.
- Direct call.
- Closed User Groups.
- Abbreviated Address Calling.

**CUSTOMER RESPONSIBILITIES**

To install and use ACF/TCAM V2 R3, the customer must:

- Design the single system network.
- Order and install all required communications equipment.
- Have prerequisite TCAM SCP for ACF/TCAM V2 R3 installed.
- Install ACF/TCAM V2 R3.
- Define the network to ACF/TCAM V2 R3.
- Install NCP/VS 6.0, ACF/NCP/VS R1, ACF/NCP/VS R2, or ACF/NCP/VS R3 (unless all terminals defined to ACF/TCAM V2 R3 are channel-attached to the host processor or are EP/VS - defined).
- Define the network to NCP/VS 5.0, ACF/NCP/VS R1, ACF/NCP/VS R2 or ACF/NCP/VS R3.

To install and use the ACF/TCAM V2 R3 Multisystem Networking Facility feature, the customer must:

PROGRAM PRODUCTS

**ACF/TCAM V2 R3 (cont'd)**

- Design the single or multisystem network.
- Order and install any additional communications equipment (for example, intersystem links between interconnected 3705 Communications Controllers).
- Have prerequisite TCAM SCP for ACF/TCAM V2 R3 installed.
- Install ACF/TCAM V2 R3.
- Install ACF/NCP/VS R1, ACF/NCP/VS R2, or ACF/NCP/VS R3.
- Install the ACF/TCAM V2 R3 Multisystem Networking Facility feature.
- Define the network to ACF/TCAM V2 R3 and to ACF/NCP/VS R1, ACF/NCP/VS R2, or ACF/NCP/VS R3 in each host system.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Hardware Configurations: ACF/TCAM V2 R3 operates with the following communication controllers:

- 3705-I Communications Controller.
- 3705-II Communications Controller.

Hardware Features: ACF/TCAM V2 requires the following features in support of the Compare and Swap instruction: Conditional Swapping (#1051) on the 3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

System Configuration: ACF/TCAM V2 R3 runs in a virtual storage environment in any operating system configuration that supports the OS/VS1 or OS/VS2 MVS operating system as specified in the "Programming Requirements" section below.

**SOFTWARE REQUIREMENTS**

ACF/TCAM V2 R3 needs one of the following operating systems: OS/VS1 Release 7.0, or OS/VS2 MVS Release 3.8, and all subsequent releases and modifications unless otherwise stated.

Software Configuration: ACF/TCAM V2 R3 requires one of the following operating systems at the specified level, or subsequent levels, unless otherwise specified:

- OS/VS1 Release 7.0.
- OS/VS2 (MVS) Release 3.8.

ACF/TCAM V2 will operate in a VM/370 virtual machine which supports the required release of the operating system (OS/VS1, OS/VS2 MVS). VM/370 provides a means of supporting any combination of TCAM and VTAM systems in the same processor each running in its own virtual machine. This facility can be helpful when changing TCAM releases, and when testing the ACF/TCAM Multisystem Networking Facility. Further, one VTAM and one TCAM system can coexist in one virtual machine. Operation of ACF/TCAM V2 under VM/370, even with the virtual machine assist feature, may add additional processor overhead, which should be considered in your review of customer performance needs.

Each OS/VS1 or OS/VS2 (MVS) virtual machine in which ACF/TCAM V2 resides requires a dedicated sub-channel address to a 3705.

Prerequisite SCP: Use of ACF/TCAM requires the concurrent installation of prerequisite TCAM system control programming (SCP) modules.

Other Considerations: In a mixed ACF/TCAM - ACF/VTAM multisystem environment, the ability of ACF/VTAM to access device characteristics or terminals controlled by ACF/TCAM V1 or ACF/TCAM V2 is limited to those indicators defined and maintained by these versions of ACF/TCAM. In particular, the ability to determine the physical device address, used with the copy function of a 3271-11, -12, is not supported.

3274 mdl 1A and 3274 mdl 1C/SNA Inbound Pacing ... Is supported under ACF/TCAM V2 R2 and ACF/TCAM V2 R3. These products must be at the appropriate EC level for this function.

**COMPATIBILITY**

See "Migration and Planning Considerations" section for important compatibility exceptions.

Object code compatibility is retained in ACF/TCAM V2 R3 for related IBM programs (see *Related IBM program charts*) written to the VTAM Record Application Programs Interface (Record API). User programs written directly to the VTAM Record API are not supported by the ACF/TCAM V2 subsystem interface.

ACF/TCAM V2 R3 enhancements made in support of parallel links, multiple routes, and extended NCP interconnection result in minor operational differences from previous releases of TCAM. Users should

refer to the *ACF/TCAM V2 Installation and Migration Guide* available at first customer shipment.

**MIGRATION AND PLANNING CONSIDERATIONS**

**ACF/TCAM V2 R3 with NCP/VS and ACF/NCP/VS:** With the exception of the dynamic NCP Dump facility and Reduced Cross Domain Network Definition Requirements, the enhanced functions of ACF/TCAM V2 R3 are supported only in conjunction with ACF/NCP/VS R3.

The NCP Dump facility will operate with NCP/VS 5.0 (with appropriate PTFs), ACF/NCP VS R1, R2 or R3.

Reduced Cross Domain Network Definition Requirements will operate with ACF/NCP/VS R1, R2 or R3.

**ACF/TCAM V2 R3 with EP/VS:** ACF/TCAM R3 will continue to support the latest current level of the Emulator Program (EP/VS) and Partitioned Emulator Program (PEP). See the Terminal Support chart for specific device support.

**Migrating from ACF/TCAM R1, ACF/TCAM V2 R1, or ACF/TCAM V2 R2 to ACF/TCAM V2 R3**

The following support alternatives are provided to aid in migration planning:

	NCP/VS 5.0	ACF/NCP/VS R1	R2	R2.1 (1)	R3
TCAM 10	X	X	X*	X	No
ACF/TCAM V1	X	X	X*	X	X
ACF/TCAM V2 R1	X	X	X	X	X
ACF/TCAM V2 R2	X	X	X	X	X
ACF/TCAM V2 R3	X	No	X	X	X

- \* Requires applicable access method PTFs.
- (1) Requires EREP PTFs for LPDA level maintenance data records.

Note: The above matrix assumes that customers will be at current access method maintenance levels when migrating from one NCP release to another.

The following significant differences between ACF/TCAM V2 and ACF/TCAM V1 may require special planning. All other functions supported by ACF/TCAM V1 are also supported by ACF/TCAM V2 R1, R2 and R3.

OS/VS2 (SVS) is not supported by ACF/TCAM V2, and consideration must be given to migrating a user's operating system support before or at the same time as migrating to ACF/TCAM V2.

In an ACF/TCAM V1 multisystem networking environment, when one host had two or more 3705s with ACF/NCP/VS, cross-domain session traffic could be routed either through an ACF/TCAM host transit node or directly through the 3705s without host involvement. In ACF/TCAM V2, the host transit node capability has been removed. Therefore, cross-domain session traffic which does not use host-to-host data flows must be routed directly through the 3705s. The new 3705-II high-speed local attachment feature for communication between 3705-II's offers an attractive means of off-loading this function.

**Multisystem Considerations:** In a multiple host system environment:

- The ACF/TCAM V2 R3 enhancements are supported for each respective ACF/TCAM V2 R3 host system.
- The ACF/TCAM V2 R3 host system can coexist with ACF/TCAM V2 R2, ACF/TCAM V2 R1, ACF/TCAM V1, ACF/VTAME, ACF/VTAM R3, ACF/VTAM R2, and/or ACF/VTAM R1 host systems at the level of function supported by these host systems.

**PERFORMANCE and STORAGE CONSIDERATIONS**

Machine and storage requirements will be provided in the *Advanced Communications Function for TCAM (ACF/TCAM) Version 2 Installation: Sample Programs*, at the availability of ACF/TCAM V2 R3 on each supported operating system.

The new functions provided by the ACF/TCAM V2 R3 Multisystem Networking Facility feature may increase storage requirements and path lengths over those in ACF/TCAM V2 R1 and R2. The actual performance impact (if any) to a customer will vary depending upon his particular hardware and network configuration.

**DATA SECURITY, AUDITABILITY, and CONTROL**

Previously announced security functions such as support for the Programmed Cryptographic Facility continue to be supported in ACF/TCAM V2 R3.

User management is responsible for the selection, adequacy, and implementation of these features and the appropriate application and administration control.

ACF/TCAM V2 R3 (cont'd)

RELATED IBM PROGRAMS

The following summarizes relationships:

		ACF/TCAM V2 R3			
OS/VS1	OS/VS2 MVS		GET/PUT Interface*	Subsystem Interface	
*	*	DB/DC	CICS/VS	*	*
*	*		IMS/VS 1.1.5		*
	*	JOB ENTRY	JES2/RJE 4.1		*
	*		JES2/NJE 3.0		*
	*		JES3/R3.0		*
	*	Interactive	TSO	*	
*	*		VSPC		*
*	*		II S	*	
*	*	Device Suppt.	SSS 5.0	*	
*	*		DSX	*	*
*	*		PSS Host Support**		*
*	*		Host Command Facility	*	*
*	*	Communication Network Mgt.	NCCF-NPDA	*	
*	*	Programmed Cryptographic Facility		See Note	See Note

\* Includes programs utilizing TGET, TPUT, READ, WRITE, and native TCAM applications.

\*\* Host Support for 3650 Programmable Store System.

Note: Supported by ACF/TCAM V2 R3 but independent of application program interface.

PROGRAM CURRENCY

TCAM and ACF/TCAM levels are currently supported on each operating system release as follows:

- TCAM Level 8 \* OS/VS2 (MVS) - 3.7
- TCAM Level 9 \* OS/VS1 - 6.0  
OS/VS2 (MVS) - 3.7
- TCAM Level 10 \* OS/VS1 - 6.0, 6.7, 7.0  
OS/VS2 (SVS) - 1.7  
OS/VS2 (MVS) - 3.7, 3.8
- ACF/TCAM V1 OS/VS1 - 6.0, 6.7  
OS/VS2 (SVS) - 1.7  
OS/VS2 (MVS) - 3.7, 3.8
- ACF/TCAM V2 R1, R2 OS/VS1 - 6.7, 7.0  
OS/VS2 (MVS) - 3.8

\* These releases will no longer be supported when currency terminates for the associated operating system. Currency is as follows:

- OS/VS1 6.0 - 12 months after availability of VS1 Release 6.7
- OS/VS2 (SVS) 1.7 - No longer current
- OS/VS2 (MVS) 3.7 - 21 months after availability of OS/VS2 (MVS) Release 3.8

DOCUMENTATION

(available from Mechanicsburg)

Advanced Communications Function for TCAM (ACF/TCAM) Version 2 General Information Manual: Introduction (GC30-3057) ...  
ACF/TCAM Version 2 Release 3 Program Summary (GC30-9526) ...  
Introduction to Advanced Communications Function (GC30-3033).

Introduction to Advanced Communication Function for TCAM Program Product Specifications will be available at ACF/TCAM V2 R3 availability.

MVS INTEGRITY

IBM will accept APARs describing any situation where the installation of ACF/TCAM V2 R3 causes an exposure to the system integrity of OS/VS2 (MVS).

ACF/TCAM V2 R3 Terminal Support Summary

Local Terminals	DCB API	Subsystem Interface (3)	TSO
2260	X	-	X
2715-1	X		
3272-1,2	X	X	X
3274-1A,21A,31A (3791)	X	X	X
3274-1D,21D,31D (3272)	X	X	X
3791 (1)	X	X	
3791/3730 (1)	X	X	
3791 (3270) (1)	X	X	X
3791/3730 (3270) (1)	X	X	X
7770-3	X		

Start/Stop Terminals	DCB API		Subsys. Int'f'ce (3)	TSO	
	(2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
1030	X		N		
1050	X	X	O	X	X
1060	X		T		
2260	X			X	
2265	X		A	X	
2740-1,2	X	X	P	-	
2741	X	X	P	X	X
2760	X		L		
3101	X	X	I	X	X
3232	X	X		X	X
AT&T 83B3	X	X	C		
WU 115A	X	X	A		
CPT-TWX (M33/35)	X	X	B	X	X
WT Telegraph	X	X	L		
3767-1,2 (2740-1)	X	X	E		
3767-1,2 (2740-2)	X(5)	X(5)			
3767-1,-2 (2741)	X	X		X	X
CMCST (2741)	X	X(4)		X	X
S/7 (2740-1)	X	X			
5100 (2741)	X	X		X	X
5110 (2741)	X	X		X	X
6733 (M33/35)	X(1)	X(10,11)	X(9,11)	X(1)	X(10,11)

PROGRAM PRODUCTS

ACF/TCAM V2 R3 (cont'd)

BSC Terminals	DCB API		Subsys. Int'f'ce	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
2715-2	X	X			
2772	X	X			
2780	X	X			
2922	X				
2972-8,11	X(5)	X(5)			
3271-1,2	X(5)	X(5)	X(5)	X(5)	X(5)
3275-1,2	X(5)	X(5)	X(5)	X(5)	X(5)
3670	X				
3/35	X	X			
3741-2,4	X	X			
3747	X	X			
5110	X	X			
1131	X	X			
1826	X	X			
S/3	X	X			
3274-1C,21C,31C,51C (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
3276-1,2,3,4 (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
3771-1,2,3 (2772)	X	X			
3773-1,2,3,P1,P2,P3 (2772)	X	X			
3774-1,2,P1,P2 (2772)	X	X			
3775-1,P1 (2772)	X	X			
3776-1,2 (2772/3780)	X	X			
3777-1 (2772/3780)	X	X			
3780 (2772)	X	X			
5265 (3271-2,4)	X	X			
5275 (3275-1,2)	X(5)	X(5)	X(5)	X(5)	X(5)
5285/5288 (3741)	X	X	-	-	-
5285/5288 (3271-2)	X(5)	X(5)	X(5)	X(5)	X(5)
5937 (3271-1,2)	X(5)	X(5)	X(5)		
6670 (2772)	X	X			
8100/DPPX (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
8100/DPPX/SP (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
S/7 (S/3)	X	X			
S/32 (S/3)	X	X			
S/34 (S/3)	X	X			
S/38 (S/3)	X	X			
S/38 (3271-2)		X(5)			X(5)
Series /1 (S/3)	-	X			

SDLC Terminals	DCB API		Subsys. Int'f'ce	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
3232-1	-	X	X	-	X
3271-11,12	N	X(5)	X(5)	N	X(5)
3274-1C,21C,31C,51C	O	X(5)	X(5)	O	X(5)
3275-11,12	T	X(5)	X(5)	T	X(5)
3276-1,2,3,4		X(5,8)	X(5,8)		X(5,8)
3276-11,12,13,14		X	X		X
3601	A	X	X	A	
3602	P	X	X	P	
3614	P	X(5)	X(5)	P	
3624	L	X(5)	X(5)	L	
3651	I		X(6)	I	
3694		X	X		
3767-1,2,3	C	X	X	C	X
3771-1,2,3	A	X	X	A	
3773-1,2,3,P1,P2,P3	B	X	X	B	
3774-1,2,P1,P2	L	X	X	L	
3775-1,P1	E	X	X	E	
3776-1,2,3,4		X	X		
3777-1,3,4		X	X		
3791		X	X		X(7)
3791/3730		X	X		X(7)
5285/5288 (3274-1C)		X(5)	X(5)		X(5)
5285/5288 (3770)		X	X		
6670		X	X		
Series /1		X			
3631,3632 (3601,3602)		X	X		
3771-1,2,3 (3767)		X	X		X
3773-1,2,3 (3767)		X	X		X
3774-1,2 (3767)		X	X		X
3775-1,3 (3767)		X	X		X
5520 (3791/3730)		X			X
5937 (3271)			X(5)		
8100/DPPX (3791)		X	X		X(7)
8100/DPPX/SP (3791)		X	X		X(7)
8100/DPCX (3791)		X	X		X(7)
System/32 (3770)		X	X		X
System/34 (3767,3770, 3791)		X	X		X
System/38 (3275-51C)		X	X		X

Notes

- 1) Configuration support #9165 and #9169 only.
- 2) No multisystem support unless host to host data flows are utilized.
- 3) ACF/TCAM V2 R2 and subsequent releases only.
- 4) Switched support only.
- 5) Nonswitched support only.
- 6) Applies to 3651 mdls A25, B25, A75, B75, C75, and D75.
- 7) TSO support applies to 3276 mdls 1, 2, 3, and 4 with BSC/SDLC switch set to SDLC mode.
- 8) Applies to 3276 mdls 1, 2, 3 and 4 with BSC/SDLC switch set to SDLC mode.

**5735-RC3 - ACF/TCAM V2 R4  
ADVANCED COMMUNICATIONS FUNCTION for TCAM  
VERSION 2 RELEASE 4**

**PURPOSE**

ACF/TCAM Version 2 Release 4 offers significant extensions and enhancements to TCAM customers in a single and multiple networking environment. Advanced Communications Function for TCAM Version 2 Release 4 is a program product for users of OS/VS1 and OS/VS2 (MVS) that offers expanded network configurability, network management capability, enhanced queue recoverability, and improved migration. To support multiple S/370 networks, a user must install the ACF/TCAM V2 R4 Multisystem Networking Facility feature. With multiple TCAMs a user may network in the same CPU as well as run two or more copies of ACF/TCAM V2 R4.

**HIGHLIGHTS OF ACF/TCAM V2 R4**

- Multiple TCAMs: Capability of running multiple copies of ACF/TCAM V2 R4 concurrently in the same CPU. This function is not supported on an MVS/XA system.
- Reusable Queues Enhancement: Sequence of messages on a reusable queue will be maintained after queue reorganization is completed. Also most 045-2 ABEND conditions have been eliminated.
- Support Local Non-SNA 3270 Networking.
- Model MCP Supports Remote SNA 3270 Controllers.
- Support for 3274 Notify: Ability to sense power on/off status of LUs attached to 3274.
- Support for MVS/XA: The ability of ACF/TCAM to run on hardware supported by MVS/XA.
- Support for TAF (Terminal Access Facility) and HCF V2 (Host Command Facility)
- 3270 SNA Local REQMS/RECFMS Support: New options to retrieve messages.
- Tote Removal.

**SUMMARY AND ADVANTAGES OF ACF/TCAM V2 R4**

**Multiple TCAM's:** Multiple copies of ACF/TCAM V2 R4 may run concurrently in the same CPU. This capability is only supported in OS/VS2 MVS SP1.3.1. All copies of ACF/TCAM V2 R4 must be at the same maintenance level. Only one TSO/TCAM can run in a CPU.

**Reusable Queue Enhancements:** The possibility of overlaying a message during reusable queue reorganization has been greatly reduced. Also during reuse, sequence of messages is retained.

**Local Non-SNA 3270 Networking:** Local non-SNA 3270 terminals owned by ACF/TCAM may now participate in cross-domain sessions with either another ACF/TCAM or an ACF/VTAM.

**Model MCP Supports Remote SNA 3270 Controllers:** The Model MCPs are enhanced to support the remote 3270 SNA devices. Two additional SNA message handlers are included in the models. A message handler which supports displays (LU 2) and a message handler which supports printers (LU 1 and LU 3).

**Retrieval Enhancements:** New options have been provided to allow retrieval of very old messages, messages that have a higher sequence number than the current message number (rollover of sequence number) and other capabilities.

**New Subsystem Support:** Support of the Terminal Access Facility (TAF) feature of NCCF and Host Command Facility (HCF) V2.

**Support for 3274 Notify:** Support of the powered on/powered off feature on the model 1A control unit or model 1C or 51C control unit when BSC/SDLC switch is in SDLC mode.

**3270 SNA Local REQMS/REQFMS Support:** Allows 3274 model 1A maintenance statistics to be collected and transmitted to the host for processing by NPDA.

**TOTE Removal:** The Teleprocessing Online Test Executive (TOTE) is no longer supported.

**OS/VS2 (MVS/SP Version 2):** Support for expanded (3 byte) UCB in OS/VS2 (MVS/SP V2).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

ACF/TCAM V2 R4 operates with the following communication controllers as supported by NCP/VS 5.0, ACF/NCP V1 R1, R2, R3 or ACF/NCP V2:

- 3705-I Communications Controller
- 3705-II Communications Controller
- 3705-80 Communications Controller
- 3725 Communications Controllers

ACF/TCAM V2 requires the following features in support of the Compare and Swap Instruction: Conditional Swapping (#1051) on the

3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

**SOFTWARE REQUIREMENTS**

ACF/TCAM V2 R4 requires one of the following operating systems at the specified level, or subsequent levels, unless otherwise specified:

- OS/VS1 7.0
- MVS/370
- MVS/XA

ACF/TCAM V2 will operate in a VM/370 virtual machine which supports the required release of the operating system (OS/VS1, OS/VS2 (MVS)). VM/370 provides a means of supporting any combination of TCAM and VTAM systems in the same CPU each running in its own virtual machine. This facility can be helpful when changing TCAM releases, and when testing the ACF/TCAM Multisystem Networking Facility. Further, one VTAM and one TCAM system can coexist in one virtual machine.

**Prerequisite SCP:** Use of ACF/TCAM requires the concurrent installation of prerequisite TCAM System Control Programming (SCP) modules.

**Other Considerations:** In a mixed ACF/TCAM - ACF/VTAM multisystem environment, the ability of ACF/VTAM to access device characteristics of terminals controlled by ACF/TCAM V1 or ACF/TCAM V2 is limited to those indicators defined and maintained by these versions of ACF/TCAM. In particular, the ability to determine the physical device address used with the copy function of a 3271-11, 12 is not supported.

**COMPATIBILITY**

See section on "Migration and Planning Considerations" for important compatibility exceptions.

Object code compatibility is retained in ACF/TCAM V2 R4 for related IBM programs (see "Related IBM Programs" chart) written to the VTAM Record Application Program Interface (Record API). User programs written directly to the VTAM Record API are not supported by the ACF/TCAM V2 subsystem interface.

**RELATED IBM PROGRAMS:** The following summarizes ACF/TCAM Version 2 Release 4 relationships:

		ACF/TCAM V2 R4				
OS/VS1	OS/VS2 MVS			GET/PUT Interface*	Subsystem Interface	
*	*	DB/DC	CICS/VS 1.4	*	*	
*	*		IMS/VS 1.1.6		*	
	*	Job Entry	JES2/RJE 4.1		*	
	*		JES2/NJE 3.0		*	
	*		JES3/R3.0		*	
	*	Interactive	TSO	*		
*	*		IIS	*		
*	*		IIPS	*		
*	*	Device Suppt.	SSS 5.0	*		
*	*		DSX	*	*	
*	*		HTF		*	
	*		IDWS		*	
*	*		Programmable Store System Host Support **			*
*	*		Host Command Facility ***		*	*
*	*	Communication Network Mgt.	NCCF-NPDA	*		
*	*		TAF			*
*	*	Programmed Cryptographic Facility		See Note	See Note	

\* Includes programs utilizing TGET, TPUT, READ, WRITE, and native TCAM applications.  
 \*\* Host Support for 3650 Programmable Store System.  
 \*\*\* Host Command Facility (HCF) runs only on Get/Put interface and V2 runs only on subsystem interface.

PROGRAM PRODUCTS

ACF/TCAM V2 R4 (cont'd)

Note: Supported by ACF/TCAM V2 R3 but independent of application program interface.

PROGRAM CURRENCY

TCAM and ACF/TCAM Levels are currently supported on each operating system release as follows:

TCAM Level 10	OS/VS1 - 7.0*
	OS/VS2 (MVS) - 3.8*
ACF/TCAM V1	OS/VS2 (MVS) - 3.8*
ACF/TCAM V2 R2, R3	OS/VS1 - 7.0**
	OS/VS2 (MVS) - 3.8**

\* Corrective service only.

\*\* ACF/TCAM V2 R2 is no longer current.

MIGRATION AND PLANNING CONSIDERATIONS

ACF/TCAM V2 R4 with NCP/VS and ACF/NCP/VS: All functions that are supported by ACF/TCAM V2 R2 and R3 are also supported by this release.

ACF/TCAM V2 R4 with EP/VS: ACF/TCAM R4 will continue to support the latest current level of the Emulator Program (EP/VS) and Partitioned Emulator Program (PEP). See the Terminal Support Chart for specific device support.

Migrating from ACF/TCAM V1, ACF/TCAM V2 R1, R2, R3 to ACF/TCAM V2 R4: Migration plans can take advantage of the following support alternatives:

	NCP/VS 5.0	ACF/NCP V1 R1	ACF/NCP V1 R2, 2.1	ACF/NCP V1 R3	ACF/NCP V2
ACF/TCAM V1	X	X	X*	X*	
ACF/TCAM V2 R1	X	X	X	X	
ACF/TCAM V2 R2	X	X	X	X	
ACF/TCAM V2 R3	X	X	X	X	X
ACF/TCAM V2 R4	X	X	X	X	X

\* Requires applicable TCAM PTFs.

The following significant differences between ACF/TCAM V2 and ACF/TCAM V1 may require special planning. All other functions supported by ACF/TCAM V1 are also supported by ACF/TCAM V2 R1, R2, R3 and R4.

OS/VS2 (SVS) is not supported by ACF/TCAM V2, and consideration must be given to migrating a user's operating system support before or at the same time as migrating to ACF/TCAM V2.

In an ACF/TCAM V1 multisystem networking environment, when one host had two or more 3705s with ACF/NCP/VS, cross-domain session traffic could be routed either through an ACF/TCAM host transit node or directly through the 3705s without host involvement. In ACF/TCAM V2, the host transit node capability has been removed. Therefore, cross-domain session traffic which does not use host to host data flows must be routed directly through the 3705s. The new 3705-II high-speed local attachment feature (see 278-95) for communication between 3705-II's offers an attractive means of off-loading this function.

Multisystem Considerations: In a multiple host system environment:

- The ACF/TCAM V2 R4 enhancements are supported for each respective ACF/TCAM V2 R4 host system.
- An ACF/TCAM V2 R4 host system can coexist with ACF/TCAM V2 R2, ACF/TCAM V2 R3, ACF/TCAM V1, ACF/VTAME, ACF/VTAM V2, ACF/VTAM R3, ACF/VTAM R2, and/or ACF/VTAM R1 host systems at the level of function supported by these host systems.

PERFORMANCE and STORAGE CONSIDERATIONS

Machine and storage requirements will be provided in the *Advanced Communications Function for TCAM (ACF/TCAM) Version 2 Installation: Sample Programs* at the availability of ACF/VTAM V2 R4 on each supported operating system.

The new functions provided by ACF/TCAM V2 R4 may increase storage requirements and path lengths over those in ACF/TCAM V2 R3. The actual performance impact (if any) to a customer will vary depending upon his particular hardware and network configuration.

**Security, Auditability, and Control:** Previously announced security functions such as support for the IBM Programmed Cryptographic Facility, continue to be supported in ACF/TCAM V2 R4.

User management is responsible for the selection, adequacy, and implementation of these features and for appropriate application and administration control.

DOCUMENTATION  
(available from Mechanicsburg)

*Advanced Communications Function for TCAM (ACF/TCAM) Version 2 General Information Manual: Introduction (GC30-3057) ... ACF/TCAM Version 2 Release 4 Program Summary (GC30-9526).*

MVS INTEGRITY

IBM will accept APARs where the installation of ACF/TCAM V2 R4 introduces an exposure to the system integrity of OS/VS2 (MVS). This program is intended to run authorized.

ACF/TCAM V2 R4 enhancements made in support of multiple concurrent ACF/TCAMs, result in minor operational differences from previous releases of TCAM. Users should refer to the *ACF/TCAM V2 Installation and Sample Programs* manual available at first customer shipment.

RPOs ACCEPTED: No

ACF/TCAM V2 R4 Terminal Support Summary

Local Terminals	DCB API	Subsys. Int'f'ce. (3)	TSO
2260	X		X
2715-1 (10)	X		
3272-1,2	X	X	X
3274-1A (3791),1B,1D	X	X	X
3791 (1)	X	X	
3791/3730 (1)	X	X	
3791 (3270) (1)	X	X	X
3791/3730 (3270) (1)	X	X	X
7770-3	X		

Start/Stop Terminals	DCB API		Subsys. Int'f'ce (3)	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
1030	X				
1050	X	X		X	X
1060 (10)	X				
2260	X			X	
2265	X			X	
2740-1	X	X	X(9)		
2740-2	X	X			
2741	X	X	X(9)	X	X
2760	X				
AT&T 83B3	X	X			
WU 115A	X	X			
CPT-TWX (M33/35)	X(4)	X(4)	X(4,9)	X(4)	X(4)
WT Telegraph	X	X	X(5,9)		
3101	X	X	X(4,9)		
3767-1,2 (2740-1)	X	X			
3767-1,2 (2740-2)	X(5)	X(5)			
3767-1,-2 (2741)	X	X		X	X
CMCST (2741)	X	X(4)		X	X
S/7 (2740-1)	X	X			
5100 (2741)	X	X		X	X
5110 (2741)	X	X		X	X

PROGRAM PRODUCTS

ACF/TCAM V2 R4 (cont'd)

BSC Terminals	DCB API		Subsys. Int'f'ce	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
2715-2	X	X	-	-	-
2772	X	X	-	-	-
2780	X	X	-	-	-
2922	X	-	-	-	-
2972-8,11	X(5)	X(5)	-	-	-
3271-1,2	X(5)	X(5)	X(5)	X(5)	X(5)
3275-1,2	X(5)	X(5)	X(5)	X(5)	X(5)
3670 (10)	X	-	-	-	-
3735	X	X	-	-	-
3741-2,4	X	X	-	-	-
3747	X	X	-	-	-
5110	X	X	-	-	-
1131	X	X	-	-	-
1826	X	X	-	-	-
S/3	X	X	-	-	-
3274-1C (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
3276-1,2,3,4 (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
3771-1,2,3 (2772)	X	X	-	-	-
3773-1,2,3,P1,P2,P3 (2772)	X	X	-	-	-
3774-1,2,P1,P2 (2772)	X	X	-	-	-
3775-1,P1 (2772)	X	X	-	-	-
3776-1,2 (2772/3780)	X	X	-	-	-
3777-1 (2772/3780)	X	X	-	-	-
3780 (2772)	X	X	-	-	-
5275 (10) (3275-1,2)	X(5)	X(5)	X(5)	X(5)	X(5)
5937 (3271-1,2)	X(5)	X(5)	X(5)	-	-
6670 (2772)	X	X	-	-	-
8100/DPPX (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
8100/DPPX/SP (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
S/7 (S/3)	X	X	-	-	-
S/32 (S/3)	X	X	-	-	-
S/34 (S/3)	X	X	-	-	-
S/38 (S/3)	X	X	-	-	-
Series/1 (S/3)	-	X	-	-	-

SDLC Terminals	DCB API		Subsys. Int'f'ce.	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
3271-11,12	N	X(5)	X(5)	N	X(5)
3274-1C	O	X(5)	X(5)	O	X(5)
3275-11,12	T	X(5)	X(5)	T	X(5)
3276-1,2,3,4		X(5,8)	X(5,8)		X(5,8)
3276-11,12,13,14		X	X		X
3601	A	X	X	A	-
3602	P	X	X	P	-
3614	P	X(5)	X(5)	P	-
3624	L	X(5)	X(5)	L	-
3651	I	-	X(6)	I	-
3767-1,2,3	C	X	X	C	X
3771-1,2,3	A	X	X	A	-
3773-1,2,3,P1,P2,P3	B	X	X	B	-
3774-1,2,P1,P2	L	X	X	L	-
3775-1,P1	E	X	X	E	-
3776-1,2,3,4		X	X		-
3777-1,3		X	X		-
3791		X	X		X(7)
3791/3730		X	X		X(7)
6670		X	X		-
Series/1		X	-		-
3631,3632 (3601,3602)		X	X		-
3771-1,2,3 (3767)		X	X		X
3773-1,2,3 (3767)		X	X		X
3774-1,2 (3767)		X	X		X
3775-1,3 (3767)		X	X		X
5937 (3271)			X(5)		-
8100/DPPX (3791)		X	X		X(7)
8100/DPPX/SP (3791)		X	X		X(7)
8100/DPCX (3791)		X	X		X(7)
System/32 (3770)		X	X		X
System/34 (3767, 3770, 3791)		X	X		X
System/38 (3275-51C)		X	X		X

Notes:

- 1) Configuration support #9165 and #9169 only.
- 2) No multisystem support unless host to host data flows are utilized.
- 3) ACF/TCAM V2 R2 and subsequent releases only.
- 4) Switched support only.
- 5) Nonswitched support only.
- 6) Applies to 3651 mdls A25, B25, A75, B75, C75, and D75 with the appropriate SDLC feature.
- 7) TSO support applies only with 3270 data stream compatibility.
- 8) Applies to 3276 mdls 1, 2, 3 and 4 with BSC/SDLC switch set to SDLC mode.
- 9) Supported via Network Terminal Option (NTO) program product.
- 10) These devices are not supported by MVS/XA.

The terminal types in parentheses designate the programming support provided by ACF/TCAM, e.g., System/32 (3770) means the System/32 is supported as a 3770.

**VIRTUAL MACHINE/VTAM  
COMMUNICATIONS NETWORK APPLICATION  
VM/VCNA (5735-RC5)**

**PURPOSE**

The Virtual Machine/VTAM Communications Network Application (VM/VCNA) program product provides the VM/System Product (VM/SP) user the capability of using an SNA, BSC, SS or local terminal as an operator console for a virtual machine. Support is included for Control Program/Conversational Monitor System (CP/CMS) command processing, CMS editor processing and VM full screen support. VM/VCNA is an application program that provides an interface between VM's console support and ACF/VTAM's or ACF/VTAME's application program interface in order to support SNA, BSC, SS or local devices as virtual machine consoles.

VM/VCNA, in conjunction with ACF/VTAM or ACF/VTAME, provides SNA, BSC, SS or local console support for virtual machines for VM/SP users and supports those S/370, 303X and 4300 processors announced as supported by VM/SP. All references to ACF/VTAM refer to ACF/VTAM Version 1 Release 2 or Release 3 or ACF/VTAM Version 2 (VSE or OS/VS1).

VM/VCNA, in conjunction with ACF/VTAM, ACF/VTAME, NTO and ACF/NCP/VS, provides VM users the advantages and capabilities of the multisystem networking facilities of the ACF products and allows the VM system to participate in an existing or planned multisystem ACF network based on Systems Network Architecture (SNA).

The SNA support for VM is located in what will be referred to as the VTAM (SNA) Service Machine (THE VSM, Figure 1) and provides SNA, BSC, SS or local terminal services to virtual machine consoles as well as providing ACF networking services. The VSM is a VM/SP Virtual Machine which consists of the following components:

- VSE and VSE/AF or OS/VS1 and OS/VS1 BPE
  - ACF/VTAM or ACF/VTAME
  - VM/VCNA
- or
- SSX/VSE (which includes ACF/VTAM Version 2)
  - VM/VCNA

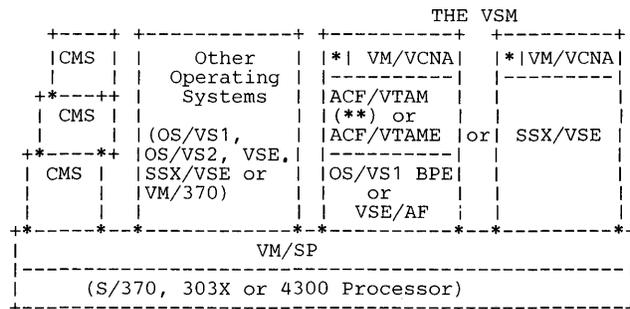


FIGURE 1

\* Other application programs and subsystems; for example, CICS/VS or NCCF/NPDA.

\*\* For ACF multisystem networking, ACF/VTAM Version 2 (VSE or OS/VS1) or the MSNF feature on ACF/VTAM Version 1 Release 2 or 3 is required.

The VSM owns and controls the network through ACF/VTAME or ACF/VTAM, including the SNA, BSC, SS or local terminals that will be used as VM Virtual Machine consoles. It is this ownership that permits terminals attached to the VM system, through ACF/VTAME (locally or through a Communications Adapter) or ACF/VTAM (locally or through ACF/NCP/VS), to gain access to the facilities of a multisystem (cross domain) ACF network.

Additional IBM and user application programs may also be present in the VSM (e.g., CICS/VS, NCCF/NPDA). VM/VCNA uses both the Console Communication Services and the Inter-User Communication Vehicle facilities available with the VM/System Product. The communication between the VSM and Console Communication Services of VM/SP is by the Inter-User Communication Vehicle available with VM/SP.

The terminals owned by the VSM may now be used by applications or subsystems in the VSM, such as CICS/VS, as well as virtual machine consoles for systems such as: CMS, OS/VS1, OS/VS2, SSX/VSE or VSE.

**DESCRIPTION**

VM/VCNA, in conjunction with ACF/VTAME, ACF/VTAM, NTO and ACF/NCP/VS, offers the following advantages to the VM user:

- Terminal sharing (assuming NTO support for SS devices) of the VSM across multiple ACF/VTAM or ACF/VTAME applications or subsystems, such as the Customer Information Control System/Virtual Storage (CICS/VS), the Information Management System/Virtual Storage (excluding NTO devices), user-written application programs and the CP/CMS system. This increases the usage of the terminal since it can now be located anywhere in a multisystem ACF network and may be used as a virtual machine console on VM systems in addition to having access to other systems that are not VM-based, (such as CICS/VS under ACF/VTAM or ACF/VTAME or TSU under ACF/VTAM or ACF/TCAM on an operating system running in native mode on another processor).

**NTO Device Support by VM/VCNA:** NTO is an IBM program product that extends the capabilities of ACF/NCP/VS in a 3705 Communications Controller to allow a select group of non-SNA devices to be supported as SNA devices. VM/VCNA's support of NTO allows VM installations with non-SNA devices to migrate to SNA. NTO support also allows an installation with S/S or asynchronous non-SNA devices to have the use of SNA services that:

- Provide a consistent and comprehensive structure for data communications growth.
- Minimize the effects of system changes.
- Distribute data communication functions throughout the SNA network.
- Allow for network sharing of asynchronous non-SNA devices.
- Extend data communication functions conveniently and effectively to the end-user in a distributed data processing (DDP) network.
- Minimize the end user's involvement in the details of data communications operations.

The support of NTO by VM/VCNA is transparent to both the NTO devices and the VM/SP control program. The NTO devices are supported by VM/VCNA through the application programming interface (API) of ACF/VTAM.

These supported NTO devices appear to ACF/VTAM as Physical Unit Type 1 (PU type 1), Logical Unit Type 1 (LU type 1) devices and support the same bind parameters as the SDLC 3767 Communications terminal. Therefore, the NTO support by VM/VCNA is an enhancement to the LU type 1 support provided by VM/VCNA. Thus the support provided for the 3101 display terminal is a line by line operation in character mode using the 64 graphic character set.

For a description of the facilities of related SNA products, see the following announcement letters:

ACF VTAM Version 1 R2

ACF/VTAM Version 1 R3

ACF/VTAME

ACF/NCP/VS R2.1

ACF/NCP/VS R3

NTO R2

NCCF

NPDA

VM/VCNA

PROGRAM PRODUCTS

VM/VCNA (cont'd)

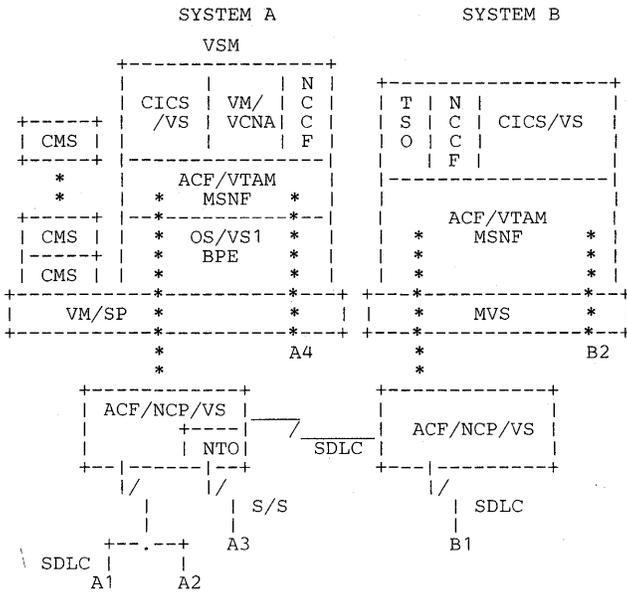


FIGURE 2

Figure 2 illustrates ACF/VTAM in the VSM and NTO support.

**Resource Sharing between SNA and VM networks:** Potential cost savings, and increased accessibility of applications to end-users, may be realized through the telecommunication resource sharing capabilities provided by ACF/VTAM. Type of link and terminal sharing which may be implemented are described below, in conjunction with FIGURE 2.

**System A**

- Terminals A1 and A2 are remote SNA devices on an SDLC link.
- Terminal A3 is a remote 3101 on an S/S link.
- Terminal A4 is a locally attached display.

**System B**

- Terminal B1 is a remote SNA device on an SDLC link.
- Terminal B2 is a locally attached display.
- Terminals A1, A2 and A4 are owned by ACF/VTAM in the VTAM Service Machine. Through the VM/VCNA support in the VSM, they may be used as operator consoles for virtual machines in the VM/SP system. For example, they may be used as CMS consoles. Support is included for CMS command processing, CMS editor processing and VM full screen support. Use of these terminals as virtual machine consoles does not require the MSNF feature of ACF/VTAM. Terminal A3 is also owned by ACF/VTAM in the VSM and may be used as an operator console for VM/SP virtual machines in a line operational mode.
- Because A1 to A4 are owned by ACF/VTAM, they also have access to ACF networking capabilities. In a single processor environment they may be used to access the CICS/VS applications running in the VSM. Other subsystems or applications running under ACF/VTAM could also be included in the VSM, and could then also share terminals A1 to A4 (A3 with NTO support). This sharing of terminals owned by the VSM among applications also running in the VSM does not require the MSNF feature of ACF/VTAM.
- With the addition of the MSNF feature to ACF/VTAM in the VSM, terminals A1 to A4 (A3 with NTO support) may now access remote applications or subsystems in other processors in an ACF network. For example, terminals A1 and A3 may access TSO or CICS/VS in System B, running under control of ACF/VTAM with the MSNF feature, while terminals A2 and A4 could be the operator consoles for CMS virtual machines in System A.
- Terminals B1 and B2, which are owned by ACF/VTAM in System B, also have access to SNA applications in System A, because of the MSNF feature in both systems. Through communication with VM/VCNA in the VSM in System A, terminals B1 and B2 may also be used as operator consoles for virtual machines, like CMS, in System A.
- In addition, if the NTO program product was present in ACF/NCP/VS on System B, then supported S/S device types attached to this NTO could also be used as virtual machine consoles through VM/VCNA.

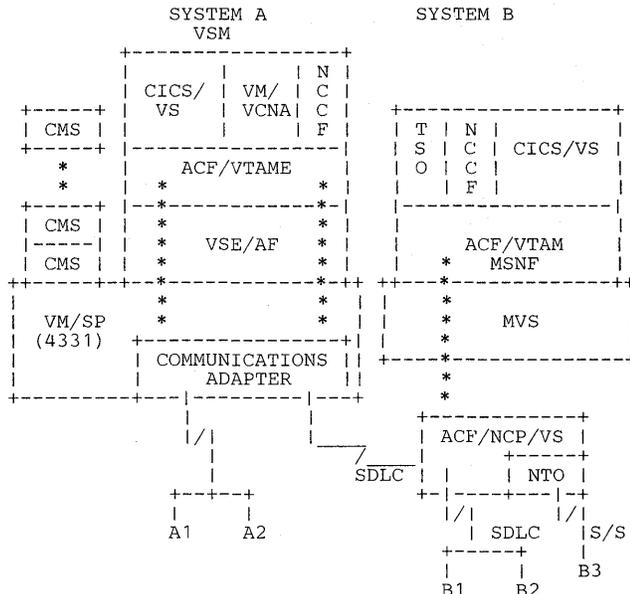


FIGURE 3

Figure 3 illustrates ACF/VTAME in the VSM and remote NTO Support when NTO and ACF/NCP/VS are attached to and owned by ACF/VTAM with the MSNF feature as shown in System B.

**System A**

- Terminals A1 and A2 are SNA devices on an SDLC link attached to the 4331 Communications Adapter.

**System B**

- Terminals B1 and B2 are SNA devices on a remote SDLC link.
- Terminal B3 is a remote 3101 on an S/S link.
- Terminals A1 and A2 are owned by ACF/VTAME in the VSM and may be used as operator consoles for virtual machines in the VM/SP system, as well as having access to the ACF networking facilities of ACF/VTAME to access subsystems on ACF/VTAM in System B.
- Terminals B1, B2 and B3 are owned by ACF/VTAM in System B and may be used as operator consoles for virtual machines in the VM/SP System A, as well as having access to the ACF networking facilities of ACF/VTAM to access subsystems on ACF/VTAME in System A.
- VSM usability and human factors characteristics include:
  - The VSM can be initialized and controlled from the console of another virtual machine, or VM/SP system operator console.
  - Terminals can be initialized and logged on to VM/VCNA automatically by specifying required information in the ACF/VTAM or ACF/VTAME system definition.
  - The VSM terminal user's LOGON procedures may be made compatible with existing VM/370 LOGON procedures by providing the proper entries in the ACF/VTAM or ACF/VTAME system specifications.
  - Better communication line utilization resulting in improved user response time may be achieved with remote VSM controlled SNA terminals when compared with CP controlled remote BSC terminals.
  - A "saved system" can be IPLed with the operating system and ACF/VTAM or ACF/VTAME already active. This can be accomplished through the CMS EXEC facility and the CP "SAVESYS/IPL" function.
- The extended color and highlighting capability of the 3279 display is supported by VM/VCNA in virtual machine console mode and the write-structured-field facility of the 3279 display is supported by VM/VCNA in full screen mode.
- Potential for cost savings to the VM installation due to the teleprocessing resource sharing capabilities of ACF/VTAM or ACF/VTAME that the VSM brings to the VM customer's network. This resource sharing can result in consolidation and sharing of terminals, communication controllers and leased lines.

PROGRAM PRODUCTS

VM/VCNA (cont'd)

- The functions of the Network Communications Control Facility (NCCF) and the Network Problem Determination Application (NPDA) are supported in the VSM by ACF/VTAM and ACF/VTAME and are now available for virtual machine console operations supported by the VSM.
- The VSM enhances the communications capabilities of VM since current VM restrictions are removed, such as:
  - Allowing multiple SNA (or BSC) controller attachment to a single communications line (multi-drop).
  - Providing for more than 16 active (3705 attached) BSC and/or SDLC communications lines for remote VM communications service.
  - Providing support for a remote 3705 connected via an SDLC link to a local 3705, under control of ACF/NCP/VS, attached to a VM/SP system.
  - Terminal networking support for SNA, BSC, local and S/S terminals through VM/VCNA's use of ACF/VTAM, NTO and ACF/NCP/VS.
- Coexistence with existing VM telecommunication capabilities for binary synchronous (BSC) or start-stop terminal support through a Partitioned Emulation Program (PEP) in the 3705. The loading and management of the PEP in the 3705 is controlled by ACF/VTAM in the VSM.
- NTO support by VM/VCNA may eliminate the need for a "PEP" configuration in the 3705.
- The ability to use a SNA, BSC, S/S or local terminal, supported by VM/VCNA through ACF/VTAM or ACF/VTAME, as an operator console for virtual machines (such as CMS) on VM.

**PLANNED AVAILABILITY:** The VM/VCNA functions are available now.

**SUMMARY OF VM/VCNA ADVANTAGES**

Resource-sharing improvements may translate directly into real cost savings for the installation in the day-to-day operations of the teleprocessing network.

The savings may take many forms:

- Real cost savings in resource consolidation, such as terminals, lines, controllers.
- Increased end-user productivity for application development due to increased subsystem accessibility through terminal sharing and device independence for the user's application program.
- Intangible savings in the form of:
  - Decreased complexity in network maintenance and control through elimination of a 3705/EP 3270 network.
  - Teleprocessing services can be made available to a greater number of remote users due to economies in network resource sharing advantages and the full function multisystem networking facilities available through VM/VCNA's use of the ACF/VTAME or ACF/VTAM application program interface.
  - Increased VM user network configuration and application program flexibility since any VSM SNA, BSC, S/S or local terminal has access to any ACF/VTAM or ACF/VTAME-based subsystem when part of an ACF multisystem network, in addition to being used as a virtual machine console on VM.
  - Communication network management and network problem determination capabilities offered by NCCF/NPDA for VM/SP virtual machine operator consoles that are supported by VM/VCNA.

**Advantages of SNA to VM/SP:** VM/VCNA, in conjunction with ACF/VTAM, NTO, ACF/NCP/VS or ACF/VTAME, offers many improvements in resource sharing to the VM user's virtual machine environment. The following improvements are made possible by VM/VCNA's use of the application programming interface of ACF/VTAM or ACF/VTAME and the principles of Systems Network Architecture (SNA).

**Terminal Sharing/Application Sharing:** Any terminal supported by VM/VCNA through ACF/VTAM or ACF/VTAME, regardless of location in the ACF network, may gain access as an operator console to a virtual machine, such as CMS.

The same terminal that is used to access CMS may later be used to access applications in the VSM, such as CICS/VS. In addition, other subsystems (such as TSO or CICS/VS) may also be accessed by the VSM owned SNA, BSC, local and S/S (via NTO) terminals through the same multisystem networking feature (MSNF) or ACF/VTAM. These other subsystems may be in different virtual machines on the same VM processor as the VSM, in virtual machines on remote processors or remote processors not under control of VM/SP.

**Controller Sharing (ACF/VTAM Only):** In addition to the consolidation and sharing of terminals, SNA allows sharing of communications controllers through ACF/NCP's support of the 3705. SNA also allows transfer of many teleprocessing functions and responsibilities to ACF/NCP/VS. Prior to SNA, these functions were totally performed in the host processor and consumed processor cycles and system resources. Examples of such functions that the ACF/NCP/VS program has support responsibility for are:

- Terminal polling and addressing.
- Dial/Answer service.
- Character/Bit Service.
- Error recording/Diagnostics.
- Online terminal tests.
- Switched network backup.
- Transmission groups.
- Parallel links.
- Multiple active routes.
- Transmission priority.

In addition, the VSM provides for the remote attachment of 3705 controllers to 3705 controllers attached to the VM processor, in a tandem-like fashion, through ACF/NCP/VS Release 3.

**Line Sharing:** SNA allows multiple attachment of similar and dissimilar controller types (such as 3270 and 8100) on the same line. This may result in a decrease in the total number of leased lines the VM installation must have to provide remote teleprocessing services. This SNA multi-drop attribute can result in cost savings to the VM installation.

This capability is provided to VM only through the usage of VM/VCNA in conjunction with ACF/VTAME or ACF/VTAM Version 1 Release 2 or 3 or ACF/VTAM Version 2 (VSE or OS/VS1).

**Function Sharing:** SNA enhances application development for the VM user through the use of the logical unit concept. This concept provides device independence to the user's program for different classes of terminal devices. Therefore, a customer's application program design need not be sensitive to specific device types and unique device functions.

**Non-disruptive Network Growth:** SNA allows for growth to future technologies and functions without disrupting the customer's current SNA application programming investment. SNA provides for growth in:

- New network configurations for control and performance.
- Distributed data processing.

**Communications Network Management (CNM):** The VSM supports the program products (NCCF/NPDA) that provide a basis for communications network management for the resources owned and controlled by the VSM.

**NCCF:** The Network Communications Control Facility (NCCF) provides a network operator with convenient and efficient network control functions. In addition, NCCF provides communications and data base facilities for the collection, storage and retrieval of network error data in support of the Network Problem Determination Application (NPDA) program product. NCCF is also a program base, providing access method services, operating system services and an application interface for IBM or user-written network management programs.

**NPDA:** The Network Problem Determination Application (NPDA) runs under NCCF. NPDA collects, organizes and displays error statistics and data about communications controllers, lines, clusters, IBM micro-processor modems, control units and terminals. NPDA helps the NCCF operator to determine which communication subsystem may have caused a reported problem. In a VM/SP environment NPDA supports locally attached ACF/NCP 3705 controllers and remotely attached controllers/terminals.

**CUSTOMER RESPONSIBILITIES**

To install and use VM/VCNA, the user must:

- Design the single or multiple system ACF network configuration.
- Order and install all required communications equipment.
- Install VM/SP.
- Install the prerequisite operating system:
  - VSE and VSE/Advanced Functions Release 3.
  - OS/VS1 Rel. 7 and OS/VS1 Basic Programming Extensions.
- Install ACF/VTAM Version 2 (VSE or OS/VS1) or ACF/VTAM Version 1 Release 2 or 3 (with the MSNF feature if ACF networking is required) or ACF/VTAME.
- Define the single or multiple system ACF network to ACF/VTAM or ACF/VTAME (and to other remote ACF/VTAM or ACF/VTAME systems if ACF multisystem networking is required) in each host.
- Install ACF/NCP/VS if required.

**VM/VCNA (cont'd)**

- Install NTO if required.
- Install VM/VCNA.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

VM/VCNA, in its own partition, in conjunction with the ACF/VTAM or ACF/VTAME partition, provides SNA, BSC, S/S or local console support for virtual machines for VM/SP users and supports those IBM S/370, 303X and 4300 processors announced as supported by VM/SP. A 1024K processor storage size is the recommended minimum entry configuration for a VM/SP system running VM/VCNA.

**SOFTWARE REQUIREMENTS**

The VM/System Product is required for VM/VCNA. VM/VCNA executes in its own partition on VSE/AF or SSX/VSE or on OS/VS1 BPE systems and supports the following combinations:

- OS/VS1 Release 7 with OS/VS1 Basic Programming Extensions and ACF/VTAM Version 1 Release 2 or 3 of ACF/VTAM Version 2.
- VSE and VSE/Advanced Functions Release 3 with ACF/VTAM Version 1 Release 2 or 3, or ACF/VTAME or ACF/VTAM Version 2.
- SSX/VSE Release 3
- NTO Release 1 or 2.
- ACF/NCP/VS Release 2 or 3.

**COMPATIBILITY**

VM/VCNA operates with the ACF/VTAME or ACF/VTAM Release 2 or 3, application program interface. The Console Communication Services of VM/SP and VM/VCNA's support of the SIO and DIAGNOSE-58 interface for virtual machine console I/O is compatible with the existing virtual machine console I/O interface. Programs, like CMS, currently using these interfaces in VM/370, VM/Basic System Extensions program product or VM/System Extensions program product should run using a VM/VCNA supported terminal as a virtual machine operators console. The "VSM" can coexist with existing VM telecommunication capabilities for binary synchronous (BSC) or start/stop terminals with a partitioned emulation program.

**MIGRATION and PLANNING CONSIDERATIONS**

The following considerations should be evaluated in planning for the installation of VM/VCNA:

- ACF/VTAME or ACF/VTAM Version 2 (VSE or OS/VS1).
- ACF multisystem networking considerations.

For additional information on migration and planning considerations, consult the *VM/VCNA General Information* publication, (GC27-0501).

**DATA SECURITY, AUDITABILITY AND CONTROL**

In addition to existing VM/SP functions, the OS/VS1 ACF/VTAM Encrypt/Decrypt feature is supported for "VSM" owned terminals. User management is responsible for the selection, adequacy and implementation of these features and the appropriate application and administrative control.

**RELIABILITY, AVAILABILITY and SERVICEABILITY (RAS)**

RAS characteristics for VM are provided by VM/370 Release 6 and VM/SP. RAS characteristics for VSM owned and controlled resources are provided by the components of the VSM.

An internal trace capability is provided in VM/VCNA to correlate VM/SP Console Communication Services interface data to ACF/VTAM or ACF/VTAME API requests to the ACF network. Error recording in VM/VCNA is provided through storage dumps and error messages at the time the error is detected.

**PERFORMANCE CONSIDERATIONS**

Any individual system's performance may vary significantly depending on the number of terminals, types of terminals, transaction rates, the number of active batch operations and application subsystems and the system priority that is assigned to the batch and interactive subsystems. Performance options and tuning parameters are available in VM/SP, OS/VS1, VSE/AF, ACF/VTAM, ACF/VTAME and VM/VCNA to allow the user to tune and monitor system and network performance in the user's environment. Response time in a single-domain environment depends on a variety of host processor and data communication load factors, such as:

- Line speeds.
- Number, type and organization of terminals.
- Amount of processing performed by the application programs.

Response time in a multisystem environment depends on the factors noted above and, additionally, on various network load factors, such as the number of domains or nodes the interactive traffic must traverse.

User storage requirements depend on the specific configuration and upon user-supplied areas and functions as they relate to ACF/VTAME or ACF/VTAM Version 1 Release 2 or 3 or ACF/VTAM Version 2 (VSE or OS/VS1). Estimated storage requirements will be provided in *Virtual Machine/VTAM Communications Network Application (VM/VCNA) General Information* (GC27-0501).

The total storage requirements and path lengths to support the VSM are greater than for VM non-networking native support for non-SNA devices. This increase in path length may increase VM processor utilization and potentially reduce the total number of VM/CMS active users supported on a specific VM processor configuration. This increase in path length is due to the significant number of functions performed by the component parts of VM/SP and the VTAM (SNA) Service Machine (VSM) in order to:

- Provide a SNA, BSC, S/S and local interface to VM/SP.
- Provide single/cross domain ACF networking to VM users.
- Provide the network resource sharing/problem determination capabilities of SNA through ACF/VTAM or ACF/VTAME to VM/SP.

**VM/VCNA DEVICE SUPPORT:** VM/VCNA supports the following IBM devices as virtual consoles using ACF/VTAM or ACF/VTAME support in the VSM:

**Control Units**

- 3271 mdl 2 (BSC, Note 4).
- 3271 mdl 12 (SDLC, Note 1).
- 3272 mdl 2 (local).
- 3274 mdl 1A, 21A, 31A (local SNA).
- 3274 mdl 1B, 21B (local non-SNA).
- 3274 mdl 1C, 21C, 31C, 51C (SNA/BSC, Note 4).
- 3274 mdl 1D, 21D, 31D (local non-SNA).
- 3274 mdl 51C (SNA/BSC).
- 4331 Display Adapter (supported as a 3272-2).
- System/34 (as a 3271 mdl 2 BSC, Notes 4 and 6).
- System/36 (as a 3274 mdl 1C SNA, Note 6).
- 8100 Controller (Note 3).

**Control Unit/Displays**

- 3275 mdl 2 (BSC - 1,920 characters, Note 4).
- 3275 mdl 12 (SDLC - 1,920 characters, Note 1).
- 3276 mdl 1 (BSC - 960 characters, Notes 2, 4).
- 3276 mdl 2 (BSC - 1,920 characters, Note 4).
- 3276 mdl 3 (BSC - 2,560 characters, Note 4).
- 3276 mdl 4 (BSC - 3,440 characters, Note 4).
- 3276 mdl 11 (SNA - 960 characters, Note 2).
- 3276 mdl 12 (SNA - 1,920 characters).
- 3276 mdl 13 (SNA - 2,560 characters).
- 3276 mdl 14 (SNA - 3,440 characters).

**Displays**

- 3277 mdl 2 (1,920 characters).
- 3278 mdl 1 (960 characters, Note 2).
- 3278 mdl 2 (1,920 characters).
- 3278 mdl 3 (2,560 characters).
- 3278 mdl 4 (3,440 characters).
- 3278 mdl 5 (3,564 characters, 27 x 132).
- 3279 mdl 2A, 2B (1,920 characters).
- 3279 mdl 3A, 3B (2,560 characters).
- 8775 mdl 1 (960, 1,920, 2,560 characters, Notes 2, 3).
- 8775 mdl 2 (960, 1,920, 2,560, 3,440 characters, Notes 2, 3).

**Printers**

- 3268 mdl 2.
- 3284 mdls 2, 3.
- 3286 mdl 2.
- 3287 mdls 1, 1C, 2, 2C.
- 3288 mdl 2.
- 3289 mdl 1, 2.
- 3262 mdls 3, 13 (supported as 3289 mdls 1, 2).

**Note:** These printers are only supported, by VM/VCNA, for the VM program function key (PFK) COPY command.

**Note 1:** Supported by ACF/VTAM only.

**Note 2:** 960 character displays are supported on VM through VM/VCNA as virtual machine operator consoles. The new CMS editor available with VM/SP supports this display in full screen mode, while the current CMS editor supports this display in line mode through the NODISP option of the EDIT command.

**Note 3:** VM/VCNA supports 3790 (or 3730 as a 3790) attached 3270s or 8100 controller attached 3270s or 8775s in 3270 data stream compatibility mode only. The Distributed Processing Programming Executive 3270 Data Stream Compatibility (DPPX/DSC) licensed program provides this capability for the IBM 8100 Information System processor.

**Note 4:** Nonswitched connection only.

**VM/VCNA (cont'd)**

**Note 6:** Supported with the System/36 System Support program product (5727-SS1), the Communications feature (#6001), and the 3270 Device Emulation feature (#6003).

The following non-SNA start-stop terminals are supported by VM/VCNA through NTO and ACF/NCP/VS as 3767 line-by-line devices in console mode:

- IBM 2741 Communication Terminal
- IBM 3101 Display Terminal
- IBM 6733 Communication Module
- Western Union Teletypewriter Exchange Services (TWX) mdl 33/35

**Keyboard/Printers**

3232 Keyboard Printer Terminal mdl 1  
3767 Communication Terminal mdls 1, 2, 3.

The following communication terminals are supported in the interactive mode of operation:

3771 mdls 1, 2, 3.  
3773 mdls 1, 2, 3.  
3774 mdls 1, 2.  
3775.

**DOCUMENTATION**  
(available from Mechanicsburg)

*VM/VCNA Program Summary* (GC27-0500) ... *VM/VCNA General Information* (GC27-0501).

The following publications will be provided prior to or with the availability of VM/VCNA:

*VM/VCNA Installation, Operation and Terminal Use* (GC27-0502) ...  
*VM/VCNA Licensed Program Specifications* (GC27-0503) ...  
*VM/VCNA Messages* (GC27-0510) ... *VM/VCNA Logic* (LY38-3033).

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**HOST COMMAND FACILITY (5735-XR1)**

**PURPOSE**

The Host Command Facility is a key program for distributed systems that includes S/370, 4300, and 8100 Information Systems processors. A host support program, the Host Command Facility gives a central S/370 or 4300 terminal operator the capability to:

- Operate and control SNA-connected 8100 Information Systems with DPPX or DPPX/SP as the operating system.
- Use nearly all operation and service functions that are available at an 8100 location. The exceptions are functions that require manual intervention, such as tape mounting and diskette insertion.
- Perform the operator-oriented tasks related to DPPX or DPPX/SP or DPCX problem determination and isolation.

**HIGHLIGHTS**

The Host Command Facility permits a S/370- or 4300-attached terminal to function in most requests, as if it were directly attached to an 8100/DPPX or DPPX/SP system, provided an SNA link exists between the S/370 or 4300 and 8100. This facility will provide the ability of the network control point 'Host' to have nearly complete control over the 8100 DPPX or DPPX/SP or DPCX system in the network. Some tasks will require manual intervention at the remote 8100 site (tape mounting, for example).

The Host Command Facility will allow the host terminal operator to perform all the standard system configuration, and problem determination and isolation procedures that can be accomplished from a terminal connected directly to the 8100/DPPX or DPPX/SP or 8100/DPCX system.

**Host Command Facility/DPPX or DPPX/SP Functions:** Functions provided by the Host Command Facility for DPPX or DPPX/SP include:

- Remote control and operation of a single 8100 system selected by the terminal operator.
  - Remote initiation and termination of work
  - Remote configuration control
- Remote examination of DPPX or DPPX/SP data sets, including dumps and logs, using the DPPX or DPPX/SP interactive editor.
- Remote problem determination and isolation
  - Examination of error logs and error log summaries
  - Examination of dumps, traces, etc.
  - Invocation of test programs, online tests, and diagnostics, and examination of their results.
  - Application of program patches via the DPPX or DPPX/SP interactive editor
- Remote program development, using the full set of DPPX or DPPX/SP tools for interactive program writing, compiler invocation, and problem determination.
- Submission of transactions and control commands to DPPX or DPPX/SP and the Data Base and Transaction Management (DPPX/DTMS) System or the DTMS component of DPPX/SP.

In general, the Host Command Facility allows the host terminal to access any function available to the command facility or DPPX/DTMS user or the DTMS component of DPPX/SP.

In addition, the Host Command Facility will provide the S/370-to-8100/DPPX or DPPX/SP or 4300-to-8100/DPPX or-DPPX/SP logical connection verification (LCV) function. This function verifies the logical connection path between the host S/370 or 4300 and the 8100/DPPX or DPPX/SP System. LCV can be initiated, through the Host Command Facility, by the host terminal operator. The test involves the transmission of a 'canned pattern', or operator-entered pattern from the corresponding DPPX or DPPX/SP LCV program to the initiating host terminal. The number of times the pattern is transmitted is controlled by the host terminal operator. When used in conjunction with the DPPX 3270 Data Stream Compatibility licensed program, the purpose of this facility is to verify the logical connection path (program-to-program, including links) between the S/370 or 4300 and 8100/DPPX or DPPX/SP.

**Host Command Facility/DPCX Functions:** Functions provided by the Host Command Facility for DPCX include:

- Remote control and operation of a single 8100/DPCX system
  - Setting IPL system parameters, operator passwords, time and date, and access codes to application programs
  - Activating and deactivating devices
  - Listing configurations and a summary of the application library contents
  - Initiating the packing of transactions, printing from queued printer support, and orderly shutdown of the system

- Remote problem determination and isolation
  - Initiating host link echo tests, host link, data link and loop traces
  - Listing the contents of the 8100/DPCX hardware incident log, the status of host communications sessions, applied PTFs and currently active tasks, terminals, and operators
  - Retrieval of unique system operation messages
  - Debugging an application program using the Program Execution Monitor
- Remote system performance control
  - Initiating the collection of system performance data
  - Listing the disk status

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Host Command Facility requires 64K to 128K bytes of IBM S/370 or IBM 4300 virtual storage depending on the number of users allowed for the HCF and LCV functions. It will operate on a DOS/VS, DOS/VSE, OS/VS1 or OS/VS2 MVS system with sufficient real storage to satisfy the combined requirements of Host Command Facility, VTAM or TCAM, and other customer required programs.

The configuration must include an IBM S/370 or IBM 4300 attached (local or IBM 370X, BSC or SDLC) IBM 3276-1, 2, 3, 4, 11, 12, 13, 14 or IBM 3277-2 or IBM 3278-1, 2, 3, 4 displays using an IBM 3271-2, 12 or IBM 3272-2 or IBM 3274-1A, 1B, 1C, 1D, 21B, 21C, 21D, 31A, 31C, 31D or IBM 3275-2, 12 or IBM 3276-1, 2, 3, 4, 11, 12, 13, 14 as control units.

**Note:** Although Host Command Facility supports BSC, SDLC and local attachment for displays, it only supports SDLC links to the IBM 8100 systems.

**SOFTWARE REQUIREMENTS**

This licensed program is designed to work with the following:

- ACF/VTAM Version 2
- DOS/VS Release 34 with VTAM Version 1 Release 2 or ACF/VTAM Release 1.
- DOS/VSE with VSE Advanced Functions Releases 1 or 2 and ACF/VTAM Version 1 Release 2 or ACF/VTAME.
- OS/VS1 Releases 6, 6.7, and 7 with VTAM Release 2 or ACF/VTAM Version 1.
- OS/VS1 Releases 6, 6.7, and 7 with TCAM Release 10 or ACF/TCAM.
- OS/VS2 Releases 3.7 and 3.8 with TCAM Release 10 or ACF/TCAM
- OS/VS2 Releases 3.7 and 3.8 with VTAM Release 2 or ACF/VTAM Version 1.

For communication with IBM 8100/DPPX systems, Service Level 0200, which includes Functional Enhancement Package 1 (FEP 1), or later level of DPPX/BASE, is required. For communication with IBM 8100 DPPX/SP, the current service level of DPPX/SP is required.

Source code is available on tape and program listings on microfiche as related optional material.

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where installation of the Host Command Facility causes an exposure to the systems integrity of MVS.

**RPOs ACCEPTED: No.**

## ADVANCED DATA COMMUNICATION for STORES RELEASE 5 (5735-XR2)

### PURPOSE

The Advanced Data Communication for Stores is a host S/370 application which provides support for batch communications between the host system and individual controllers in: 3650 Programmable Store Systems ... 3650 Retail Store Systems ... 3660 Scanning and Key Entry Supermarket Systems ... 3660 Programmable Store System.

This program product's primary functions are to control and execute store data transmissions, both inbound to the central host and outbound to the store system controllers. Advanced Data Communication for Stores offers extensive facilities to help minimize the operational and administrative activities required for an expanding store communications network.

Advanced Data Communication for Stores provides a schedule command language that allows the user to create, alter and execute planned schedules for batch data transmissions. Extensive recovery and reconciliation facilities will either immediately handle exceptions or automatically retry them in subsequently scheduled transmissions. The capability to automatically expand user schedules for logical store and/or data groups reduces user input requirements. This can be significant in a complex network environment. Comprehensive offline support, including summary and exception reporting and data set maintenance utilities and subroutines, further simplifies the operational environment.

### HIGHLIGHTS

Highlights of Advanced Data Communication for Stores program product are:

- BTAM/BSC switched line support is provided for the 3650 and 3680 Programmable Store Systems and the 3660 Scanning and Key Entry Supermarket Systems.
- BTAM/BSC nonswitched line support is provided for the IBM 3650 Programmable Store Systems.
- VTAM/SDLC and ACF/VTAM/SDLC lines (switched and/or nonswitched) are supported for the 3650 Retail Store System and the 3650 and 3680 Programmable Store Systems.
- The network may consist of a mixture of all supported controller and line types.
- Line Pooling allows controllers to be assigned to a group of switched lines.
- Concurrent multiple line communications capability is provided to help optimize network efficiency.
- A high level scheduling command language is used to ease communication schedule planning and execution by minimizing required user inputs.
- Logical communication groupings of stores can be defined by the user to accommodate unique customer factors, such as optimum store hours for communications, backup store assignments, distribution regions, sales districts, etc.
- Communications may be scheduled at a specific time with an individual controller, with a group of controllers or with all controllers in the network.
- Data to be transmitted by the host may be grouped for a single controller, for all controllers or for a variety of controller application/combinations (for example, price and tax zones, common check authorization areas, stores with special or common departments, etc.).
- User application data may dynamically drive communication schedules by the inclusion or exclusion of data and control information (such as passwords) in the outbound data set.
- The program product produces a comprehensive set of reports to display summary, exception and detail information about jobs (program runs) and pending and reconciled schedule requests. These reports can provide aid for problem solving, performance tuning and for the user auditing necessary to ensure the security and integrity of the data resources.
- An optional journal log may be created reflecting all data received and/or sent.
- A data audit trail is available for every batch of transmitted data.
- Utilities and subroutines are provided to assist the user in host data file maintenance.
- Shared access files can be created at the 3650 Programmable Store System.
- The program product can be used at the host to randomize (determine the sector locations of) records in the 3650 Retail System and the 3650 and 3680 Programmable Store System keyed files. This allows the transmission of complete sectors, instead of individual records, and can help to minimize file maintenance processing in the controller(s) and reduce overall transmission time.
- The program product can assign item movement indexes and build an image of the item movement file while randomizing the item record file.
- Host processing used in conjunction with the Programmable Store System POS Application/Store Data Management (SDM) program product (5748-D22) includes building/deleting the Program Request Blocks (PRBs) used by SDM and managing the SDM source files.

- The Console Operator may display current transmission status or quiesce transmission.
- Error recovery capabilities include:
  - Data batches saved for a subsequent warmstart if the communication link(s) fail.
  - Recovery from inbound and outbound request timeouts.
  - Recovery from line control errors (such as lost end-of-transmission characters, phone busy conditions, etc.).
  - Console interaction. For example, warmstart from the console is provided.
  - Physical and logical error recovery procedures span multiple connections to stores and multiple independent executions of this program product.
- An automatic warm start option is provided.

### Additional Functions for the 3660 Scanning and Key Entry Systems

- Automatic retrieval is provided, whenever a controller is called, for all or certain controller output queues containing prepared data/response information. This is in conjunction with the automatic management of store input and output queues.
- Automatic reconciliation of each host initiated request is made to its corresponding controller response/report. This applies to both the immediate and the delayed types of controller maintenance.

### SYSTEM DESCRIPTION

The major functional areas of this program product are Communications, Automatic Schedule Generation, Recovery and Reconciliation, Off-line Support and Report Routines. These functions interface with user data sets. They also interface with system data sets that contain user specified configuration, scheduling and status information.

**Automatic Schedule Generation (ASG):** ASG is based on a high level scheduling command language. ASG expands internal scheduling information from a single input statement that is propagated for all the designated stores in a user specified logical group. The same scheduling command language is used to create planned batch communications at system generation time and to revise and create special and one-time schedules as required. For the 3660 Supermarket Scanning and Key Entry Systems, ASG internally develops required request/retrieval information pairs, and appends all required information (such as output queues, passwords, etc.) from the Advanced Data Communication for Stores data base.

**Recovery and Reconciliation:** Recovery capabilities consist of restart functions for correctable error conditions. Recovery capability exists at three levels:

- Specific events.
- Store reconnections.
- Schedule restarts, (either operator-initiated or as a result of an abnormal termination).

Reconciliation, for the 3660 Supermarket Scanning and Key Entry System, consists of a programmed pairing of retrieved responses (and data) with their originating requests. The Advanced Data Communication for Stores data base contains the current status of the delayed and immediate execution store input queues, and the high and low priority store output queues for all the outstanding scheduled requests of all the 3660 stores in the network.

Off-line Support Routines and Off-Line Report Routines provide maintenance programs to generate the Advanced Data Communication for Stores system files and to initialize new and/or existing system values. Additionally, these routines provide exception status, detail statistics and summary reports. Reliability and serviceability features are implemented by maintaining a System Integrity Log to record all informational, statistical, diagnostic and error messages issued by this system.

### CUSTOMER RESPONSIBILITIES

- Creating and loading private Advanced Data Communication for Stores macro and object libraries.
- Coding and assembling the Advanced Data Communication for Stores network configuration.
- Providing host programs to create and load user data files with store controller data, in formats specified for the 3650 and 3680 Programmable Store Systems and/or the 3650 Retail Store System and/or the 3660 Supermarket Systems. Data formats are cribed in the respective *Programmer's Guides* for each store system.
- Creation of batch communication transmission schedules using the scheduling command language.
- Providing host programs to process data retrieved from the store.
- Making effective use of system reports and logs to maintain integrity of data throughout the system.



PROGRAM PRODUCTS

Adv. Data Comm. for Stores R4 (cont'd)

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Advanced Data Communication for Stores may be used on any IBM S/370 Mdl 115 or larger or 4300 processor capable of operating with:

- VSE and VSAM and BTAM/BSC and/or VTAM/SDLC or ACF/VTAM/SDLC.
- OS/VS1 and VSAM and BTAM/BSC and/or VTAM/SDLC or ACF/VTAM/SDCL.
- OS/VS2 and VSAM and BTAM/BSC and/or VTAM/SDLC or ACF/VTAM/SDLC.

This product is announced for use with the following programs and subsequent releases unless otherwise identified:

- For DOS/VSE Operation: VSE Release 1 with VSAM and BTAM-ES and/or ACF/VTAME.
- For OS/VS Operation: OS/VS1 Release 7.0 or OS/VS2 Release 3.8 with VSAM and BTAM and/or VTAM and/or ACF/VTAM.

**Minimum Virtual Storage Requirements:**

Environment	Minimum Virtual
OS/VS	256K + VSAM and VTAM requirements
VSE using BTAM	306K + VSAM requirements
VSE using VTAM	292K + VSAM and VTAM requirements

The system must include S/370 or 4300 control units and features which are necessary for support of the 3650 and/or 3680 Programmable Store Systems and/or the 3650 Retail Store System and/or the 3660 Supermarket Systems.

**SOFTWARE REQUIREMENTS**

This program product is written in S/370 Assembler language and requires the S/370 Assembler for installation, modification and program error correction.

The OS/VS version of this program release uses the System Modification Program (SMP) for distribution and maintenance; the VSE/AF version uses the Maintain System History Program (MSHP). SMP and MSHP both provide improved installability and serviceability, and allow the user to better control the function and service level of his system.

**COMPATIBILITY**

The inbound and outbound data sets for the Supermarket controllers and the Supermarket schedule commands are compatible with 3660 Supermarket Batch Communication Subsystem/Advanced Scheduling Environment (FDP 5798-CJQ) and 3660 Advanced Scheduling Environment for CICS/VS (FDP 5798-CQC).

**DOCUMENTATION** (available from Mechanicsburg)

*General Information Manual* (GH20-2188) ... *Program Reference and Operations Guide* (SH20-2406) ... *Logic Manual* (LY20-2476) ... *Licensed Program Specifications* (GH20-1566).

**MVS INTEGRITY:** Yes (see GI 23.1 section)

**RPQs ACCEPTED:** Yes

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**5735-XR3 - HOST PREP for DPCX R 5.0, 6.0  
HOST PREP LICENSED PROGRAM FOR SUPPORT OF  
DISTRIBUTED PROCESSOR CONTROL EXECUTIVE (DPCX)  
RELEASES 5.0 and 6.0**

**PURPOSE**

Host Prep provides host support for 8100/DPCX to OS/VS1 Release 7.0, OS/VS2 (MVS) Release 3.8, and DOS/VSE users (and to users of all subsequent releases of these SCPs unless otherwise specified) on S/370, 30XX and 4300 Processors. Included are Instruction Support, Program Validation Services, Batch Data Exchange Services and Subsystem Information Retrieval Facility, for application programs using functions offered with DPCX Version 1 Releases 3 and 4 and DOSF Releases 3 and 4.

**HIGHLIGHTS**

Host Prep Release 5 is required to support the following DPCX Release 4 functions:

- Support of up to 191 user data areas.
- Support for Document Content Architecture, Revisable Form Text, Level 3 (L3DCA).
- Support of the 8140 model C.
- Up to 62 concurrently active user tasks.
- Set of programming statements enhancing data movement, editing, and index record update capabilities.
- Set of programming statements supporting 8775 and 3274-51C Enhanced Display Functions.
- Set of programming statements supporting distributed indexed access method (DPCX/DXAM/RSAM).
- Set of programming statements accessing the 32K byte virtual storage offered as part of the enhanced symbolic machines.
- Set of programming statements supporting large displays with 2560 and 3440 characters.
- Set of programming statements supporting the general spool file.
- Support for batch data exchange of the larger Relative Sequential Data Set (RSDS) data records.
- Support for receipt of the larger application program dump resulting from the enhanced symbolic machines, and its formatted printing.
- Text programming statements used with the 8775 loaded with the Interactive Display Text Facility (IDTF) program product.
- Translate and table lookup instructions.
- Modified instructions providing a capability to by-pass waiting after trying to access locked records or writing to a terminal.
- Support for transmission of user programs, panels, categories and subcategories, relative DSCBs, indexed DSCBs and RSDS DSCB key fields.
- Text programming statements used with a 327X/8775 terminal.
- A GOTO instruction which has forward and backward branches.
- Call/Return and Save/Restore facilities allowing an unlimited number of levels.
- Support for creation of subcategories for disk space allocation.
- Support for receipt of the 8100 standalone system dump, and its formatted printing.

If the above functions are not required, the SCP programs 5747-BQ1 (DOS/VS) and 5744-BZ3 (OS/VS) provide the required support.

Host Prep provides the following support:

- The Instruction Sets provide the ability to write 8100/DPCX, 3790, 3770 and 3730 programs, panels and data set control information.

This support includes:

- Assembly rules for S/370 OS/VS and DOS/VS assemblers.
- Assembly time error messages.
- High level macros.
- Program Validation Services (PVS) validates all 8100/DPCX, 3790, 3770, and 3730 programs and panels and creates data set control information. PVS provides the ability to test most of the functions of the above distributed processors, specifically:
  - Validates assembled programs.
  - Hardcopy of panels.
  - Simulates running of programs w/wo interactive interface.
  - Creates data set control information.
  - Formats and blocks programs, panel and data set control information for transmission to the distributed processors.

- The Subsystem Information Retrieval Facility (SYSINFOREF) provides centralized control of PTFs and REAs for 8100/DPCX, 3790 distributed processor networks. Also provided is access (from the S/370) to selected problem determination tools resident at the distributed processor. The SYSINFOREF provides:
  - Central control/monitoring of PTF/REA conditions of the network.
  - Ability to retrieve and monitor selected error indicators.
  - Retrieval of program and system dumps.
  - Transmission of user programs, panels, categories and subcategories, relative DSCBs, indexed DSCBs and RSDS DSCB key fields.

- Batch Data Exchange Services (BDES) is a substitute for the 8100/DPCX or 3790 to host teleprocessing link. BDES uses diskette and tape as its transmission media for:
  - Transmission of programs, panels and data set control blocks information.
  - Transmission of data records and messages.
  - Receipt of program dumps, completed transactions and messages.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

- Host Prep is designed to operate on IBM S/370, 30XX and 4300 processors with a minimum of 1M bytes above operating system requirements.

**SOFTWARE REQUIREMENTS**

- Operating System
  - OS/VS1
  - MVS/370
  - MVS/XA
  - VSE
- Access Method Support
  - ACF/VTAM V1R2, V1R3, and V2 (For SYSINFOREF & Interactive PVS)
  - ACF/TCAM V1, V2R2 and V2R3 (For SYSINFOREF & Interactive PVS)
  - ACF/VTAME
  - VSAM
  - QSAM
  - VTAM Level 2.0 or TCAM Release 10 (For SYSINFOREF & Interactive PVS Support)

**DOCUMENTATION**

(available from Mechanicsburg)

*Host Prep Licensed Program Specifications (GC27-0543 ... Host Prep Licensed Program Summary (GC27-0571) ... Host Prep General Information: Introduction (GC27-0572)*

**MVS SYSTEM INTEGRITY APPLIES: Yes**

**RPQs ACCEPTED: No**

PROGRAM PRODUCTS

**5735-XXA - ACF/SSP V2.1.1**  
**ACF/SYSTEM SUPPORT PROGRAMS**  
**VERSION 2 RELEASE 1.1**

**PURPOSE**

ACF/System Support Programs (ACF/SSP) Version 2 Release 1.1 provides generation and utility functions for users of ACF/NCP Version 2 and users of EP on 3705-II and 3705-80 Communication Controllers, plus ACF/NCP Version 2 for the 3725, and users of Emulation Program (EP) on the 3725 Communications Controllers.

**HIGHLIGHTS**

Supports the 3725 and 3705 Communication Controllers.

Provides the generation and utility functions offered by ACF/SSP Version 1 (Assembler, load utility, dump utility, dynamic dump utility, and ACF Trace Analysis program) plus:

- Configuration management, through a configuration report program which is a stand-alone utility by which the user may produce a report of his resource and line information, tailored to provide meaningful and representative information on his configuration.
- Reduced system generation time for ACF/NCP Version 2 for the 3725.

**DESCRIPTION**

- Supports the 3725 and 3705 Communication Controllers.
- A stand-alone configuration report program, which uses as input one or more stage 1 NCP, EP or PEP generation decks, provides the user a detailed report of resources and resource attributes of his network. The report, which separates SNA devices from non-SNA devices, can contain the following information:
  - Resource Level: Group, line, service (for SNA devices: PU, LU); (for non-SNA devices: Cluster, terminal, component).
  - Resource Name.
  - Network Address (actual).
  - Address (as specified on the appropriate macro).
  - Control Unit Type.
  - Physical Unit Type (SNA devices only).
  - Data Mode (duplex or half-duplex - SNA devices only).
  - Line Type (duplex or half-duplex).
  - Line Speed.
  - Resource Type (NCP, EP or PEP - non-SNA devices only).
  - Subarea Address (SNA devices only).
  - Clocking (internal and external).
  - Line Control (for SNA devices: User or SDLC; for non-SNA devices: BSC or S/S).
  - Dial (yes or no).
  - Dial number (non-SNA devices only).
  - For SNA Devices: Virtual or real status, NRZ or NRZI encoding, PUDRPOOL, LUDRPOOL, LUPOOL, NCPNAU, Service Order.

By optionally selecting only certain macros for processing, and by using comments, the user may tailor the report to provide meaningful and representative information on his configuration.

- The time required to generate a network control program for the 3725 Communication Controller has been reduced by the elimination of conditional assemblies. The resultant NCP will support both normal and character modes for the scanners, primary and secondary links, all terminal type parameters, all line controls, both local and remotely-loaded NCPs, panel test and online test. Although the controller storage required is now larger, the benefits of reduced complexity and generation time should outweigh the impact to storage. This impact will vary depending on configuration size; an NCP user who previously selected more options (representing a complex and varied configuration) will have a smaller increase in storage capacity than will the user who previously selected fewer options.
- Allows generation of ACF/NCP Version 2, its partitioned emulation programming (PEP) extension, and EP for the 3705, provided by Program Number 5747-CH2 with the EP/VS feature.
- Allows generation of ACF/NCP Version 2 for the 3725, its partitioned emulation programming (PEP) extension, and EP/3725.
- Loads the 3705 and 3725 Communication Controllers with a specified load module.
- Dumps the storage and register contents (in formatted or unformatted mode) of the 3705 and 3725 Communication Controllers.

- Formats the Maintenance Operator Subsystem (MOSS) and Communication Scanner Processor (CSP) dump data sets of the 3725.
- Allows the EP user to obtain a dynamic dump of emulation mode trace table entries, to activate or deactivate the character mode line trace function, to obtain a dump of 3705 or 3725 storage, or display portions of storage at the system console
- Assembler programs written in 3705 or 3725 Assembler language.
- Utilizes the ACF Trace Analysis Program (ACF/TAP) to provide a common trace facility for use with the appropriate release of ACF/TCAM Version 2 or ACF/VTAM and ACF/NCP Version 2 for the 3705 or Version 2 for the 3725 with SDLC, BSC, or start-stop line disciplines.

**PLANNING CONSIDERATIONS**

The Network Control Program user will require ACF/NCP Version 2 (5735-XX9) for the 3705 or 3725, ACF/SSP Version 2 Release 1.1 (5735-XXA), and the required access methods and operating systems.

The 3725 Partitioned Emulation Programming user will, in addition, require EP/3725.

The 3705 Partitioned Emulation Programming user will require Program Number 5747-CH2 for the EP feature, in order to generate and operate ACF/NCP Version 2 for the 3705 PEP.

The stand-alone Emulation Program user will require EP/3725 or 5747-CH2 with the EP feature and ACF/SSP Version 2 Release 1.1 in order to generate and operate EP on the 3725 or 3705.

**CUSTOMER RESPONSIBILITIES**

To install and use ACF/SSP Version 2, the customer must:

- Order ACF/System Support Programs Version 2 (5735-XXA).
- Design the single system network or multiple host communications system network.
- Meet the configuration and system requirements for the 3725 or 3705 and ACF/NCP Version 2 for the 3705 or Version 2 for the 3725, or EP for the customer environment.
- Install ACF/SSP Version 2 Release 1.1.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

ACF/SSP Version 2 is designed to operate with at least one locally-attached 3705-II or 3705-80 Communication Controller meeting the storage requirements of ACF/NCP Version 2 or EP for the 3705. ACF/SSP Version 2 Release 1.1 is designed to operate the same as Version 2, and, in addition, to operate with at least one locally-attached 3725 Communication Controller meeting the storage requirements of ACF/NCP Version 2 for the 3725 or EP/3725.

**SOFTWARE REQUIREMENTS**

ACF/SSP Version 2 is supported under VSE/AF Release 3, SSX/VSE Release 3, OS/VS1 Release 7, VM/SP Release 2.1, and OS/VS2 MVS Release 3.8 or MVS/SP Release 1.3.1. For reasons of compatibility and co-existence, ACF/SSP Version 2 will operate with the appropriate VTAM release in MVS Extended Architecture (MVS/XA) 24-bit addressing mode.

ACF/SSP Version 2 operates as a non-system task under DOS/VSE, SSX/VSE, OS/VS1, and OS/VS2 MVS. It is designed to operate with ACF/NCP Version 2 for the 3725, and Program Number 5747-CH2 with the EP/VS feature or EP/3725.

**DOCUMENTATION**

(available from Mechanicsburg)

*ACF/System Support Programs Version 2 Release 1.1 Licensed Program Design Objectives (GC30-9559) ... Advanced Communications Function for the Network Control Program Version 2 for the IBM 3725, Advanced Communication Function for the Support Programs Version 2, and Emulation Program for the 3725, General Information (GC30-3071) ... Advanced Communications Function for Network Control Program and System Support Programs, Installation and Resource Definition (SC30-3167) ... Advanced Communications Function for Network Control Program and System Support Programs, Utilities (SC30-3168) ... Advanced Communications Function for Network Control Program and System Support Programs, Messages and Codes (SC30-3169) ... Advanced Communications Function for Network Control Program and System Support Programs, Diagnosis Guide (SC30-3171) ... Advanced Communications Function System Support Programs, Diagnosis Reference (LY30-3060) ... Advanced Communications Function for Network Control Program and System Support Programs, for the IBM 3705, General Information (GC30-3058).*

**MVS SYSTEM INTEGRITY APPLIES: Yes**



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PP 5735-XXA.2  
Nov 83

PROGRAM PRODUCTS

ACF/SSP V2R1.1 (cont'd)

RPOs ACCEPTED: No

**5735-XXA - ACF/SSP V2 R2  
ACF/SYSTEM SUPPORT PROGRAMS  
VERSION 2 RELEASE 2  
MVS/370 and MVS/XA (Compatibility Mode)**

ACF/System Support Programs (ACF/SSP) Version 2 Release 2 is a licensed program which provides generation and utility functions for users of ACF/NCP Version 3 for the 3705 and the 3725 (5667-124) and Emulation Program for the IBM Communication Controllers (5735-XXB).

ACF/SSP Version 2 Release 1.1 will remain available for support of ACF/NCP Version 2, Emulation Program for the 3705, and EP/3725.

**HIGHLIGHTS**

- Supports 3725 and 3705 Communication Controllers
- Provides for ACF/NCP Version 3 the generation and utility functions offered by ACF/SSP Version 2 R1.1 (assembler, load utility, dump utility, dynamic dump utility, configuration report program, and ACF Trace Analysis Program) plus:
  - Reduced system generation time for ACF/NCP Version 3 for the 3705, previously incorporated in ACF/SSP Version 2 Release 1.1 for the 3725
- Usability enhancements to the ACF Trace Analysis Program
- Configuration Report Program enhancements

**DESCRIPTION**

- Supports the 3725 and 3705 Communication Controllers.
- For the 3705, allows generation of ACF/NCP Version 3, its partitioned emulation programming (PEP) extension, and EP for the 3705 provided by program product 5735-XXB.
- For the 3725, allows generation of ACF/NCP Version 3, its partitioned emulation programming (PEP) extension, and EP for the 3725 also provided by program product 5735-XXB.
- The stand-alone configuration report program is enhanced to provide extraction and printing of additional macros and their operands. Information concerning the 386X modems has also been added.
- The time required to generate a network control program for the 3705 has been reduced through elimination of conditional assemblies. The resultant NCP will support primary and secondary links, all terminal-type parameters, all line controls, both local and remotely-loaded NCPs, panel test, and online test. Although the controller storage required is now larger, the benefits of reduced complexity and generation time should outweigh the impact to storage. This impact will vary depending on configuration size; an NCP user who previously selected more options (representing a complex and varied configuration) will have a smaller increase in storage capacity than will the user who previously selected fewer options. This reduction in system generation time was previously included for the 3725 in ACF/SSP Version 2 Release 1.1 and ACF/NCP Version 2 for the 3725.
- Provides formatting for SNA Network Interconnection control blocks, direct addressable control blocks, and interrupt pointers.
- Enhances the ACF Trace Analysis Program (ACF/TAP) through increased selectivity to achieve data reduction and aid problem determination and problem source identification, and through printing of NTO and NRF traces.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

ACF/SSP Version 2 Release 2 is designed to operate with at least one IBM 3705-II, IBM 3705-80, or IBM 3725 Communication Controller meeting the storage requirements of ACF/NCP Version 3 or Emulation Program for the IBM Communication Controllers.

**SOFTWARE REQUIREMENTS**

ACF/SSP Version 2 Release 2 is supported under MVS Release 3.8 or MVS/SP Release 1 and MVS/XA in compatibility mode.

ACF/SSP Version 2 Release 2 operates as a non-system task under MVS. It is designed to operate with ACF/NCP Version 3 for the IBM 3705 and IBM 3725 (5667-124) and Emulation Program for the IBM Communication Controllers (5735-XXB).

**PLANNING CONSIDERATIONS**

The Network Control Program user will require ACF/NCP Version 3 for the IBM 3705 and the IBM 3725, ACF/SSP Version 2 Release 2, and the required access methods and operating systems.

The Partitioned Emulation Programming user will, in addition, require Emulation Program for the IBM Communication Controllers in order to generate and operate ACF/NCP Version 3.

ACF/SSP Version 2 Release 1.1 will continue to remain available in support of ACF/NCP Version 2 for the IBM 3705 and the IBM 3725,

Emulation Program for the IBM 3725 Release 1, and the Emulation Program (5747-CH2).

**Education:** ACF/SSP courses will be updated to include ACF/SSP Version 2 Release 2.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Network Program Products General Information (GC27-0657).*

Available January, 1984:  
*Network Program Products Planning (SC27-0658).*

Available at FCS of the ACF/NCP Version 3 support for the 3705:  
*Advanced Communications Function for Network Control Program Version 3 and Systems Support Programs Version 2 Release 2 for the IBM 3705: Installation and Resource Definition Guide (SC30-322A) ... Advanced Communications Function for Network Control Program Version 3 and Systems Support Programs Version 2 Release 2 for the IBM 3705: Resource Definition Reference (SC30-3199) ... Advanced Communications Function for Network Control Program Version 3 and Systems Support Programs Version 2 Release 2 for the IBM 3705: Diagnosis Guide (SC30-3225)*

Available at FCS of the ACF/NCP Version 3 support for the IBM 3725:  
*Advanced Communications Function for Network Control Program Version 3 and Systems Support Programs Version 2 Release 2 for the IBM 3725: Installation and Resource Definition Guide (SC30-3226) ... Advanced Communications Function for Network Control Program Version 3 and Systems Support Programs Version 2 Release 2 for the IBM 3725: Resource Definition Reference (SC30-3227) ... Advanced Communications Function for Network Control Program Version 3 and Systems Support Programs Version 2 Release 2 for the IBM 3725: Diagnosis Guide (SC30-3228) ... Advanced Communications Function for Network Control Program and Systems Support Programs: Messages and Codes (SC30-3169) ... Advanced Communications Function for Systems Support Programs: Diagnosis Reference (LY30-3060).*

**MVS INTEGRITY**

IBM will accept APARs where the installation of ACF/SSP Version 2 Release 2 introduces an exposure to the system integrity of MVS. This program is intended to run unauthorized.

**Licensed Program Material Availability:** ACF/SSP Version 2 Release 2 source code and microfiche will be available as restricted materials.

## 5735-XXB - EMULATION PGM for 3705-II, -80/3725 EMULATION PROGRAM for IBM COMMUNICATION CONTROLLERS

### PURPOSE

The Emulation Program for IBM Communication Controllers allows a channel-attached 3705-80 or 3705-II Communications Controller with Channel Adapter Type 4 (CA-4), or a channel-attached 3725 Communication Controller, to perform most of the functions of a 2701 Data Adapter Unit and the 2702 or 2703 Transmission Control Units.

#### HIGHLIGHTS of EMULATION PROGRAM for the 3705

Offers users of 3705 Communications Controllers with Channel Adapter Type 4 (CA-4), operating in a MVS environment, function equivalent to that offered by existing releases of EP/VS, plus:

- Increased flexibility in storage utilization, which can be used for additional EP lines.
- Users of the Partitioned Emulation Programming (PEP) Extension of ACF/NCP V3 for the 3705, can have emulation mode capability only in conjunction with Emulation Program for the 3705.

#### HIGHLIGHTS of EMULATION PROGRAM for the 3725 RELEASE 1

Offers users of 3725 Communication Controllers operating in OS/VS1, MVS/370, VSE, or VM/SP environments function equivalent to that offered by existing releases of EP/VS, plus:

- Support of up to six channel adapters.
- Enhanced problem determination tools.
- Enhanced error recording and notification.
- Improved availability through continued operation and controlled shutdown in various failure situations.
- Incorporates the S.W.I.F.T. PRPQ (5799-AQT), which assists the EP or PEP user to directly link to the network of the Society for Worldwide Interbank Financial Telecommunication, S.C.
- Supports the 3101 Display Terminal at 1200 bps over switched and nonswitched lines.

#### HIGHLIGHTS of EMULATION PROGRAM for the 3725 RELEASE 2

Offers users of 3725 Communication Controllers, operating in an MVS environment, function equivalent to that offered by the Emulation Program for the 3725, Release 1, plus

- Support for the enhanced Start/Stop capability of the 3725.
- Support for the BSC tributary normal mode capability of the 3725.
- Users of the Partitioned Emulation Programming (PEP) Extension of ACF/NCP V3 for the 3725, can have emulation mode capability only in conjunction with Emulation Program for the 3725, Release 2.

### DESCRIPTION

#### Emulation Program for the 3705:

- Emulation Program for the 3705 takes advantage of the capability of ACF/NCP V3 for the 3705 that allows key control blocks to be extended above the 64K boundary, and is therefore required for PEP operation in conjunction with ACF/NCP V3 for the 3705.
- Emulation Program for the 3705 supports Channel Adapters Type 4 (CA-4) only. The removal of CA-1 support, in combination with the extension of key control blocks above 64K as noted above, allows for increased flexibility in storage utilization, which can be used for the addition of EP lines.

#### Emulation Program for the 3725:

- The 3725 Communication Controller provides a keyboard/display that Emulation Program for the 3725 supports with problem determination tools, allowing the controller operator to:
  - Perform wrap test.
  - Activate line test in order to test the operation of lines, modems, and terminals.
- Emulation Program for the 3725 additionally offers problem determination tools that allow the system operator to:
  - Obtain a dump of controller's maintenance and diagnostic records, or of communications scanner processor storage.
  - Activate line trace for a given line in order to verify that the controller is sending and receiving correct data to and from a station.
  - Activate scanner interface trace for a given line in order to isolate problems to EP or communications scanner processor.
- Emulation Program for the 3725, in conjunction with the 3725 Maintenance and Operator Subsystem, maintains several types of error and statistical records that are helpful in problem determination:

- Channel adapter errors, communication scanner errors, program checks, and unresolved interrupts.
- The 100 most recent such error records may be accessed through the 3727.

- In addition to existing availability and recovery functions in the emulation program, Emulation Program for the 3725 and the 3725 Maintenance and Operator Subsystem offer improved availability through continued operation and controlled shutdown of the failing components in the following situations:

- Unrecoverable Level 1 error on a 3725 channel adapter.
- Unrecoverable Level 1 error on a single communications scanner.

- Emulation Program for the 3725 incorporates the S.W.I.F.T. PRPQ (5799-AQT), which is designed to assist the EP or PEP user to directly link to the network of the Society for Worldwide Interbank Financial Telecommunication, S.C.

- Emulation Program for the 3725 supports the 3101 Display Terminal at 1200 bps over switched and nonswitched lines.

- Emulation Program for the 3725, Release 2, supports the Start/Stop performance improvement and BSC Tributary Normal Mode capabilities of the 3725. Emulation Program for the 3725, Release 2, is required for PEP operation in conjunction with ACF/NCP V3 for the 3725.

### PLANNING INFORMATION

Emulation-mode capability for the user of the Partitioned Emulation Programming (PEP) extension of ACF/NCP Versions 2 and 3, is provided according to the following support matrix:

	ACF/NCP Version 2		ACF/NCP Version 3	
	3705	3725	3705	3725
Emulation Pgm/3705	No	No	Yes	No
Emulation Pgm/3725, R1	No	Yes	No	No
Emulation Pgm/3725, R2	No	No	No	Yes

Emulation Program for the 3705 is designed to operate only in 3705 Communications Controllers with Channel Adapter Type 4 (CA-4). Channel Adapters Type 1 (CA-1) are not supported. In a PEP environment, ACF/NCP Version 3 for the 3705 is required. Coexistence of 270X, 370X, and 3725 in a common host environment is supported, as is co-existence of EP/VS and Emulation Program for the 3705.

Emulation Program for the 3725 is designed to operate only in the 3725 Communication Controller. Coexistence of 270X, 370X, and 3725 in a common host environment is supported.

Host access methods which currently support existing levels of EP/VS, within the specified operating environment of Emulation Program for IBM Communication Controllers, will support Emulation Program for IBM Communication Controllers without any host access method modifications.

Existing PRPQs, FDPs, and IUPs are not supported with Emulation Program for the 3705.

Changes will be required to the system generation deck to migrate to Emulation Program for the 3725. These modifications are not extensive and are relatively simple to implement. They include the addition and deletion of certain macros and macro operands. See *ACF/NCP and SSP, Installation and Resource Definition* (SC30-3167) for details.

For users of Emulation Program for the 3725, changes will be required to any user-written programs or online test programs using any of the following: ALC line support, the Host Wrap command, TTY Echo check detection, the host Dial command with more than 64 dial digits, the host Poll command with poll entries greater than 56 bytes used on a normal mode line (i.e., one providing Level-2 interrupts on a buffer, rather than a character, basis), or terminal support for 2703 (as a terminal), 2760, 2980, 3940, or 3980.

### CUSTOMER RESPONSIBILITIES

To install and use Emulation Program for the 3705 in a Partitioned Emulation Programming (PEP) environment, the customer must:

- Design the network.
- Meet minimum 3705 configuration requirements to support Emulation Program for the 3705 and ACF/NCP V3 for the 3705 in the planned environment.
- Order and install all required communications equipment.
- Order and install Emulation Program for the 3705 (5735-XXB), ACF/NCP V3 for the 3705 (5667-124), and ACF/System Support Programs V2 R2 (5735-XXA).

## PROGRAM PRODUCTS

**Emulation Program for 3705-II, -80/3725 (cont'd)**

- Generate Emulation Program for the 3705 and ACF/NCP V3 using the ACF/System Support Programs V2 R2 for the network configuration.
- Load the 3705 with the generated PEP load module, using, for example, the ACF/System Support Programs V2 R2.
- Meet the requirements of the host processor access method that is to communicate with the generated and loaded Emulation Program for the 3705 and ACF/NCP V3 PEP load module.

To install and use Emulation Program for the 3705 in a Stand-Alone Emulation Programming environment, the customer must:

- Design the network.
- Meet minimum 3705 configuration requirements to support Emulation Program for the 3705 in the planned environment.
- Order and install all required communications equipment.
- Order and install Emulation Program for the 3705 (5735-XXB), and ACF/System Support Programs V2 R2 (5735-XXA).
- Generate Emulation Program for the 3705 using the ACF/System Support Programs V2 R2 for the network configuration.
- Load the 3705 with the generated EP load module, using, for example, the ACF/System Support Programs V2 R2.
- Meet the requirements of the host processor access method that is to communicate with the generated and loaded Emulation Program for the 3705.

To install and use Emulation Program for the 3725, Release 1, in a Partitioned Emulation Programming (PEP) environment, the customer must:

- Design the network.
- Meet minimum 3725 configuration requirements to support Emulation Program for the 3725 Release 1, and ACF/NCP V2 for the 3725 in the planned environment.
- Order and install all required communications equipment.
- Order and install Emulation Program for the 3725 Release 1 (5735-XXB), ACF/NCP V2 for the 3725 (5735-XX9), and ACF/System Support Programs V2 R1.1 (5735-XXA).
- Generate Emulation Program for the 3725 and ACF/NCP V2 using the ACF/System Support Programs V2 R1.1 for the network configuration.
- Load the 3725 with the generated PEP load module, using, for example, the ACF/System Support Programs V2 R1.1.
- Meet the requirements of the host processor access method that is to communicate with the generated and loaded Emulation Program for the 3725 and ACF/NCP V2 PEP load module.

To install and use Emulation Program for the 3725 Release 1 in a Stand-Alone Emulation Programming environment, the customer must:

- Design the network.
- Meet minimum 3725 configuration requirements to support Emulation Program for the 3725 Release 1 in the planned environment.
- Order and install all required communications equipment.
- Order and install Emulation Program for the 3725 Release 1 (5735-XXB), and ACF/System Support Programs V2 R1.1 (5735-XXA).
- Generate Emulation Program for the 3725 using the ACF/System Support Programs V2 R1.1 for the network configuration.
- Load the 3725 with the generated EP load module, using, for example, the ACF/System Support Programs V2 R1.1.
- Meet the requirements of the host processor access method that is to communicate with the generated and loaded Emulation Program for the 3725.

To install and use Emulation Program for the 3725, Release 2, in a Partitioned Emulation Programming (PEP) environment, the customer must:

- Design the network.
- Meet minimum 3725 configuration requirements to support Emulation Program for the 3725 Release 2, and ACF/NCP V3 for the 3725 in the planned environment.
- Order and install all required communications equipment.
- Order and install Emulation Program for the 3725 Release 2 (5735-XXB), ACF/NCP V3 for the 3725 (5667-124), and ACF/System Support Programs V2 R2 (5735-XXA).

- Generate Emulation Program for the 3725 and ACF/NCP V3 using the ACF/System Support Programs V2 R2 for the network configuration.
- Load the 3725 with the generated PEP load module, using, for example, the ACF/System Support Programs V2 R2.
- Meet the requirements of the host processor access method that is to communicate with the generated and loaded Emulation Program for the 3725 and ACF/NCP V3 PEP load module.

To install and use Emulation Program for the 3725 Release 2 in a Stand-Alone Emulation Programming environment, the customer must:

- Design the network.
- Meet minimum 3725 configuration requirements to support Emulation Program for the 3725 Release 2 in the planned environment.
- Order and install all required communications equipment.
- Order and install Emulation Program for the 3725 Release 2 (5735-XXB), and ACF/System Support Programs V2 R2 (5735-XXA).
- Generate Emulation Program for the 3725 using the ACF/System Support Programs V2 R2 for the network configuration.
- Load the 3725 with the generated EP load module, using, for example, the ACF/System Support Programs V2 R2.
- Meet the requirements of the host processor access method that is to communicate with the generated and loaded Emulation Program for the 3725.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Emulation Program for the IBM 3705 is designed to operate only on channel-attached IBM 3705-80 and 3705-II with Channel Adapter Type 4. Channel Adapters Type 1 are not supported. Emulation Program for the IBM 3725, Releases 1 and 2 are designed to operate only on channel-attached IBM 3725 Communication Controllers.

**SOFTWARE REQUIREMENTS**

Emulation Program for the IBM 3725, Release 1, is generated using the ACF/System Support Programs (ACF/SSP) Version 2 Release 1.1 licensed program 5735-XXA, and operates with OS/VS1 Release 7, OS/VS2 MVS Release 3.8 or MVS/SP Release 1, VSE/AF Release 3, and VM/SP Release 2.1, and subsequent releases and modifications unless otherwise stated.

Emulation Program for the IBM 3705, and Emulation Program for the 3725, Release 2, are generated using the ACF/System Support Programs (ACF/SSP) Version 2 Release 2 licensed program 5735-XXA, and operate with OS/VS2 MVS Release 3.8 or MVS/SP Release 1, and MVS/XA in compatibility mode, and subsequent releases and modifications unless otherwise stated.

In a Partitioned Emulation Programming (PEP) environment, ACF/NCP Version 2 for the IBM 3725 (5735-XX9) is required for Release 1 of Emulation Program for the IBM 3725; ACF/NCP Version 3 (5667-124) is required for Emulation Program for the IBM 3705 and for Release 2 of Emulation Program for the IBM 3725.

Emulation Program for the IBM 3705 and 3725 supports the following access methods: BTAM, BTAM-SP, ACF/TCAM, RTAM.

**Ordering Previous Releases of EP/VS and EP for the 3725:** 3705 Communications Controller customers desiring CA-1 support, and/or not requiring PEP mode support in conjunction with ACF/NCP Version 3, can continue to order 5747-CH1 and 5747-CH2 with the EP/VS feature, after the availability of the Emulation Program for the 3705.

3725 Communication Controller customers not requiring PEP mode support in conjunction with ACF/NCP Version 3, or the additional capabilities of Emulation Program for the 3725, Release 2, can continue to order Release 1 of Emulation Program for the 3725, after the availability of Release 2 of the Emulation Program for the 3725.

**PERFORMANCE and STORAGE CONSIDERATIONS**

For users of Emulation Program for the 3705, the elimination of Channel Adapter Type 1 (CA-1) support, in combination with the ability for key control blocks to be extended above the 64K boundary can result in increased flexibility in storage utilization, which can be used for the addition of EP lines.

Path lengths for Emulation Program for the 3725 should closely approximate those for Emulation Program for the 3705. This, in combination with the performance improvements of the 3725 Communication Controller, should result in a substantial gain in performance.

For users of Emulation Program for the 3725, Release 2, the support of the start/stop performance improvement and BSC Tributary Normal Mode capabilities of the 3725 can result in increased performance in those areas.



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PP 5735-XXB.3

Nov 83

Major Revision

PROGRAM PRODUCTS

**Emulation Program for 3705-II, -80/3725 (cont'd)**

The actual performance impact (if any) will vary depending on particular hardware and network configuration. IBM Aids, such as the 3705 and 3725 configurators, should be used to assess individual customer performance capability and storage requirements.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Network Program Products General Information (GC27-0657) ...  
Emulation Program for IBM Communication Controllers, Program  
Summary (GC30-9570).*

**RPQs ACCEPTED: No**



**ADVANCED COMMUNICATIONS FUNCTION  
FOR NCP/V5 (ACF/NCP/V5)  
VERSION 1 RELEASE 2  
5735-XX1**

**PURPOSE**

Advanced Communications Function for NCP/V5 Version 1 Release 2 is a program product for users of DOS/V5, OS/V51, and OS/V52 (MVS) that can provide additional capabilities for problem determination, network operation and data communications.

ACF/NCP/V5 R2 is designed to operate with ACF/TCAM Version 2 and ACF/VTAM Version 1 R2.

**HIGHLIGHTS of ACF/NCP/V5 RELEASE 2**

Problem determination and network operation ... Includes additional functions that can assist in optimizing management and control of a user's data communication installation.

- Enhanced SDLC data link test.
- SNA terminal connectivity test.
- Enhanced recording of SDLC data link error conditions.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices.
- Expanded display, through ACF/TCAM Version 2 or ACF/VTAM Version 1 Release 2 of network control program storage in the 3705.
- Enhancements to line trace for Communications Scanner, Type 3.
- Supports the Network Communications Control Facility program product and its related Network Problem Determination Application program product.

Additional data communications capabilities ... Includes improved flexibility for session operations and enhanced device support.

- Negotiable session initialization parameters.
- Provides additional parameters that are used by the Network Terminal Option program product.
- Supports 3705-II Communications Controller enhancement.

**SUMMARY and ADVANTAGES of ACF/NCP/V5 R2**

Problem determination and network operation functions ...

- **Enhanced SDLC Data Link Test:** Offers the capability to dedicate one station on an SDLC link to testing while allowing the remaining stations on that link to remain active. When a station comprises a cluster controller and its attached devices, the control unit is dedicated to the test; its attached devices are deactivated.
- **SNA Terminal Connectivity Test:** Provides the capability of initiating an echo test from the terminal end of a session to determine that a SNA terminal and the connection to its owning SSCP are functioning correctly.
- **Enhanced Recording of SDLC Link Error Conditions:** Includes improved error statistics counters, as well as intensive mode error recording. Intensive mode error recording provides, through operator control, the capability of informing ACF/NCP/V5 Release 2 to record detailed error information about temporary SDLC data link errors. Such detailed information could preclude the need for specific testing in order to recreate an error situation.
- **Dynamic reconfiguration:** Allows the user to selectively alter the physical network definition for SNA-SDLC physical unit types 1 and 2 (i.e., SNA-SDLC devices excluding host processors and communications controllers), without stopping network operation. The result is greater network configuration flexibility for additional or relocated SDLC terminal support, supporting temporary or test configurations in a non-disruptive fashion, until a permanent network control program generation can be done.
- **Dynamic Display:** Allows the network operator, through ACF/TCAM Version 2 or ACF/VTAM Version 1 Release 2, to display any contiguous 256 bytes of ACF/NCP/V5 storage without disrupting normal ACF/NCP/V5 operation. ACF/VTAM Version 1 Release 2 takes advantage of this support to dynamically dump entire ACF/NCP/V5 storage excluding program and hardware registers, in 256 byte increments, without disrupting normal ACF/NCP/V5 operation.
- **Enhancements to Line Trace for Communications Scanner, Type 3:** Includes the address of the network control program routine that will handle the interrupt, the network control program I/O operation being performed and the condition of the data set leads.
- **Support for the Network Communication Control Facility Program Product:** Offers enhanced problem determination and network operation via programmed support.

Additional data communications capabilities ...

- **Negotiable Session Initialization Parameters:** Allow a more flexible session initialization process. Actual BIND parameter values can be

selected at session initiation; the receiver of the BIND image may alter the image and send it back to the issuer, who may accept or reject it.

- **Support for the Network Terminal Option and Related Capabilities:** Allows the inclusion of IBM-provided code that extends record mode operation to 2741, 2740 mdl 1, Western Union TWX mdl 33/35, and World Trade Teletypewriter (WTTY) terminals, and permits these terminals to participate in a multisystem as well as a single system environment.

When special user requirements make it necessary to add user-written code to the network control program, the support provided by ACF/NCP/V5 R2 allows the inclusion of user initialization routines to be executed during ACF/NCP/V5 R2 initialization, and the inclusion of user-written network addressable units which execute as part of ACF/NCP/V5 R2. These routines may be used to add programmed SNA resources, to support non-SNA devices through user-written code, or for the addition of line control support not supported by ACF/NCP/V5 but compatible with the 3705 communications scanner type 2 or type 3. This support should be used with the understanding that subsequent releases of ACF/NCP/V5 might precipitate changes to the user-written code.

- **3705-II enhancements (mdls J, K, & L) include**

- Support of additional memory up to 512K bytes of storage.
- A cycle utilization counter that allows ACF/NCP/V5 R2 to accumulate statistical data on 3705 cycle utilization for user access. This includes cycles taken for instruction execution and cycle steal operation, as well as operator panel maintenance cycles. From this data ACF/NCP/V5 R2 can provide information on the percentage of available cycles utilized. In a similar manner, ACF/NCP/V5 R2 can provide information on the percentage of buffers available.

**CUSTOMER RESPONSIBILITIES**

To install and use ACF/NCP/V5 R2 the customer must:

- Design the single system network or multiple host communications system network.
- Meet minimum 3705 configuration requirements to support ACF/NCP/V5 R2 in the planned environment.
- Order and install all required communications equipment.
- Order and install ACF/NCP/V5 R2 and the System Support Programs for ACF/NCP/V5 R2 program products and prerequisite system control programming.
- Generate ACF/NCP/V5 R2 using the System Support Programs for ACF/NCP/V5 R2, for the network configuration.
- Load the 3705-I or 3705-II with the generated ACF/NCP/V5 load module, using, for example, the System Support Programs for ACF/NCP/V5 R2.
- Meet the requirements of the host communications access method products to be operational with ACF/NCP/V5 R2.

**MIGRATION and PLANNING CONSIDERATIONS**

**Migrating from NCP/V5 5.0 or ACF/NCP/V5 R1 to ACF/NCP/V5 R2:** The following migration paths are available for the given levels of NCP/V5 and ACF/NCP/V5:

NCP/V5 5.0 will operate with the following access method levels:

- TCAM 10.0.
- ACF/TCAM V1.
- ACF/TCAM V2 R1 and R2.
- VTAM 2.0.
- ACF/VTAM V1 R1.

ACF/NCP/V5 R1 will operate with the following access method levels:

- TCAM 10.0.
- ACF/TCAM V1.
- ACF/TCAM V2 R1.
- ACF/TCAM V2 R2.
- VTAM 2.0.
- ACF/VTAM V1 R1.
- ACF/VTAM V1 R2.

ACF/NCP/V5 R2 will operate with:

- TCAM 10.0.
- ACF/TCAM V1.
- ACF/TCAM V2 R1.
- ACF/TCAM V2 R2.
- VTAM 2.0 (OS/V51 & OS/V52 MVS only).



PROGRAM PRODUCTS

**ACF/NCP/VS V1R2 (cont'd)**

- ACF/VTAM V1 R1.
- ACF/VTAM V1 R2.
- ACF/NCP/VS R1 (either local or remote).
- ACF/NCP/VS R2 (either local or remote).

Functions supported by NCP/VS 5.0 or ACF/NCP/VS R1 with the appropriate level of TCAM, ACF/TCAM, VTAM, or ACF/VTAM Version 1 are also supported by ACF/NCP/VS R2 with the appropriate access method and PTF levels.

**Planning Considerations:** Use of ACF/NCP/VS requires the concurrent installation of prerequisite NCP/VS System Control Programming (SCP).

ACF/NCP/VS R2 is generated using the System Support Programs for ACF/NCP/VS Release 2, program product 5735-XX3.

ACF/NCP/VS R2 operates with the following communications controllers:

- 3705-I Communications Controller with a minimum of 80K bytes of storage.
- 3705-II Communications Controller with a minimum of 96K bytes.

Although ACF/NCP/VS R2 will support existing levels of ACF/TCAM and ACF/VTAM Version 1, the support is at the functional level of the access method; full capability depends on coexistence with ACF/TCAM Version 2 and/or ACF/VTAM Version 1 Release 2.

**COMPATIBILITY**

ACF/NCP/VS R2 retains compatibility with ACF/NCP/VS R1 and offers compatibility with ACF/TCAM V1, ACF/TCAM V2, ACF/VTAM Version 1 Release 1, and ACF/VTAM Version 1 Release 2.

**PROGRAM CURRENCY**

ACF/NCP/VS R1 is currently supported under DOS/VS release 34, OS/VS1 releases 6.0 and 6.7, OS/VS2 (SVS) release 1.7, and OS/VS2 (MVS) releases 3.7 and 3.8.

ACF/NCP/VS R2 will be supported under DOS/VS release 34, OS/VS 1 releases 6.0 and 6.7, and OS/VS2 (MVS) releases 3.7 and 3.8, and subsequent releases unless otherwise specified.

**DOCUMENTATION**

(available from Mechanicsburg)

*Advanced Communications Function for NCP/VS (ACF/NCP/VS) Release 2, Network Control Program ... System Support Programs General Information ... ACF/NCP/VS Release 2 Program Summary.*

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**ADVANCED COMMUNICATIONS FUNCTION FOR  
NCP/VS (ACF/NCP/VS)  
VERSION 1 RELEASE 2 MODIFICATION LEVEL 1  
5735-XX1**

ACF/NCP/VS Version 1 Release 2.1 supports the following new IBM product offerings:

- Link Problem Determination Aid (LPDA) for the new microprocessor-based modems.
- 230.4K bps line speed compatibility of the 3705-II.

Advanced Communications Function for NCP/VS Release 2.1 (ACF/NCP/VS R2.1) is a program product for users of DOS/VS, DOS/VSE, SSX/VSE Release 3, OS/VS1, and OS/VS2 (MVS), that provides support for LPDA and the 230.4K bps line speed capability of the 3705-II.

**HIGHLIGHTS of ACF/NCP/VS RELEASE 2.1**

- Support of LPDA for the new microprocessor based modems (3863, 3864, and 3865).
  - Generation of LPDA diagnostic test commands.
    - Automatically upon permanent station or link errors.
    - Automatically upon generation of Statistical Data Records.
    - On command from the Network Problem Determination Application (NPDA), Release 2.
  - Results of the LPDA tests are forwarded to NPDA for further processing.
- Support of the 230.4 KBPS line speed capability of the 3705-II.
  - Full Duplex SDLC or half duplex SDLC or BSC lines.
  - Line trace capability.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS:**

ACF/NCP/VS R2.1 is designed to operate in the following communications controllers

- 3705-I Communications Controller with a minimum of 80K bytes of storage.
- 3705-II Communications Controller with a minimum of 96K bytes of storage.

**SOFTWARE REQUIREMENTS**

**Co-requisite SCP:** Use of ACF/NCP/VS requires the concurrent installation of Co-requisite NCP/VS system control programming (SCP).

**Program Currency:** ACF/NCP/VS R2 is currently supported under DOS/VS Release 34, DOS/VSE, SSX/VSE, OS/VS1 Releases 6.0, 6.7, and 7.0 and OS/VS2 (MVS) Releases 3.7 and 3.8.

ACF/NCP/VS R2.1 will be supported under DOS/VS Release 34, DOS/VSE, SSX/VSE, OS/VS1 Releases 6.7 and 7.0, and OS/VS2 (MVS) Release 3.8, and subsequent releases unless otherwise specified.

Customers can continue to order ACF/NCP/VS R2.1 after the availability of ACF/NCP/VS R3.

**MIGRATION**

**Migrating to ACF/NCP/VS R 2.1:** The following support alternatives are provided to aid in migration planning:

	NCP/VS 5.0	ACF/NCP/VS.....		R2.1 (2)	R3
		R1	R2		
TCAM 10.0	X	X	X*	X	NO
ACF/TCAM V1	X	X	X*	X	X
ACF/TCAM V2 R1	X	X	X	X	X
ACF/TCAM V2 R2	X	X	X	X	X
ACF/TCAM V2 R3	X	NO	X	X	X
VTAM 2	X	X*	X*(1)	X*(1)	NO
ACF/VTAM V1 R1	X	X	X*	X*	X
ACF/VTAM V1 R2	NO	X	X	X	X
ACF/VTAM V1 R3	NO	NO	X	X	X
ACF/VTAM V2	NO	NO	NO	X	X
NCP/VS V5	X	NO	NO	NO	NO
ACF/NCP/VS R1	NO	X	X	X	NO
ACF/NCP/VS R2	NO	X	X	X	X**
ACF/NCP/VS R2.1	NO	X	X	X	X**
ACF/NCP/VS R3	NO	NO	X**	X**	X

\* Requires applicable access method PTFs.

\*\* Requires applicable ACF/NCP/VS R2 and R2.1 PTF's.

1. OS/VS1 and OS/VS2 (MVS) only.

2. Requires EREP PTFs for LPDA level maintenance data records.

**Note:** The above matrix assumes that customers will be at current access method maintenance levels when migrating from one NCP release to another.

**Planning Considerations:** ACF/NCP/VS R3 is generated using the System Support Programs for ACF/NCP/VS Release 3, program product 5735-XX3.

Although ACF/NCP/VS R3 will support existing levels of ACF/TCAM and ACF/VTAM, the support is at the functional level of the access method; full capability depends on coexistence with ACF/TCAM V2 R3 and/or ACF/VTAM V1 R3 or ACF/VTAM V2.

**COMPATIBILITY**

ACF/NCP/VS R3 retains compatibility with ACF/NCP/VS R1 and R2 and offers compatibility with ACF/TCAM V1 and V2, and ACF/VTAM V1 R1, R2 and R3 with the exception of the SDLC/BSC Path Function.

**Planning considerations:** ACF/NCP/VS R2.1 is generated using the System Support Programs for ACF/NCP/VS Release 2.1, program product 5735-XX3.

Although ACF/NCP/VS R2.1 will support existing levels of ACF/TCAM and ACF/VTAM, the support is at the functional level of the access method; full capability depends on coexistence with ACF/TCAM V2 R2 and/or ACF/VTAM V1 R3 or ACF/VTAM V2.

**Statement of Direction:** It is IBM's direction to make available the LPDA and 230.4K bps line speed functions supported by ACF/NCP/VS R2.1 in ACF/NCP/VS R3. For planning purposes, we anticipate that availability dates for this support in ACF/NCP/VS R3 will be announced by the last quarter of 1979.

**Compatibility:** ACF/NCP/VS R2.1 retains compatibility with ACF/NCP/VS R1 and R2 and offers compatibility with ACF/TCAM V1 and V2, ACF/VTAM V1 R1, R2, R3 or ACF/VTAM V2 and ACF/NCP/VS R3.

**PERFORMANCE and STORAGE CONSIDERATIONS**

The functions provided by ACF/NCP/VS R2.1 will increase NCP storage requirements and path lengths over those of ACF/NCP/VS R2. The actual performance impact (if any) to a customer will vary depending upon his particular hardware and network configuration.

RPQs ACCEPTED: No

**ADVANCED COMMUNICATIONS FUNCTION  
FOR NCP/VS (ACF/NCP/VS)  
VERSION 1 RELEASE 3  
5735-XX1**

Advanced Communications Function for NCP/VS Version 1 Release 3 is a program product for users of DOS/VS, DOS/VSE, OS/VS1 and OS/VS2 (MVS) that offers expanded network configurability, network management capability and enhanced network recoverability.

**HIGHLIGHTS OF ACF/NCP/VS R3**

- **Parallel Links:** Multiple active SDLC links between adjacent 3705s.
- **Transmission Groups:** Logical groupings of transmission links between adjacent network nodes.
- **Multiple Routes:** Multiple routes for SNA and non-SNA message transmission between nodes in a network.
- **Multiple Priority Levels:** Three levels of transmission priorities, selectable by session.
- **Extended NCP Interconnection:** New capabilities for interconnecting 3705s in single and multiple system networks.
- **Extended NCP Ownership.**
- **Flow Control:** Enhanced management of network traffic demands.
- **Session Outage Notification:** Enhanced awareness of session outages.
- **Enhanced Recovery Capabilities.**
- **Route Verification and Error Notification Facilities.**
- **Transmission Group Option for Line Trace.**
- **Support of Release 2 of the Network Terminal Option program product.**
- **Supports the CCITT X.21 switched interface when the 3705-II is attached to an X.21 Interface via the 3705-II feature (#5656).**

**SUMMARY and ADVANTAGES of ACF/NCP/VS R3**

**Parallel Links:** Multiple active SDLC links between adjacent 3705s: Parallel Links allows data traffic to flow simultaneously over two or more SDLC links between adjacent 3705s. All such links can be operational and in use at the same time, and each can be activated or deactivated independently of the others. This capability can provide increased message flow and improve the availability and reliability of transmissions between 3705s.

**Transmission Groups:** Logical groupings of transmission links between adjacent network nodes: A user may define up to eight Transmission Groups, each with one or more SDLC links between adjacent 3705s with ACF/NCP/VS R3. A Transmission Group permits multiple SDLC links to be defined as a single logical link. A single channel between a host and its channel attached 3705 is also defined as a Transmission Group. If a link or links in a Transmission Group fails, session traffic will automatically be placed on remaining active links without loss of data. This enhances the reliability and availability of service between 3705s. Multiple Transmission Groups and appropriate route selection permit a user to specify message traffic for different applications to flow through a network via pre-assigned Transmission Groups. For example, interactive processing may be assigned one group and batch processing may be assigned a different group, each with its own physical link support.

**Multiple Routes:** Multiple routes for SNA and non-SNA message transmission between nodes in a network: A user may define up to eight routes for message transmission between two host systems or between a host system and a 3705. When a session is initiated between two application programs or between a terminal and an application program, one of the routes is automatically selected to transmit the session traffic. The user may limit the selection to a particular route or to one of an ordered sequence of routes. Thus, it is possible to distribute the traffic for different sessions to different routes, dividing the load among several routes.

The ordered sequence of routes, determined by the installation, defines the set of alternate routes available for session traffic. In the event a route becomes inoperative during a session, the application program or terminal may request that the session be re-initiated. This causes automatic selection of one of the alternate routes. The user can then resynchronize the session data traffic and continue data communications and application processing via network routes that remain in operation.

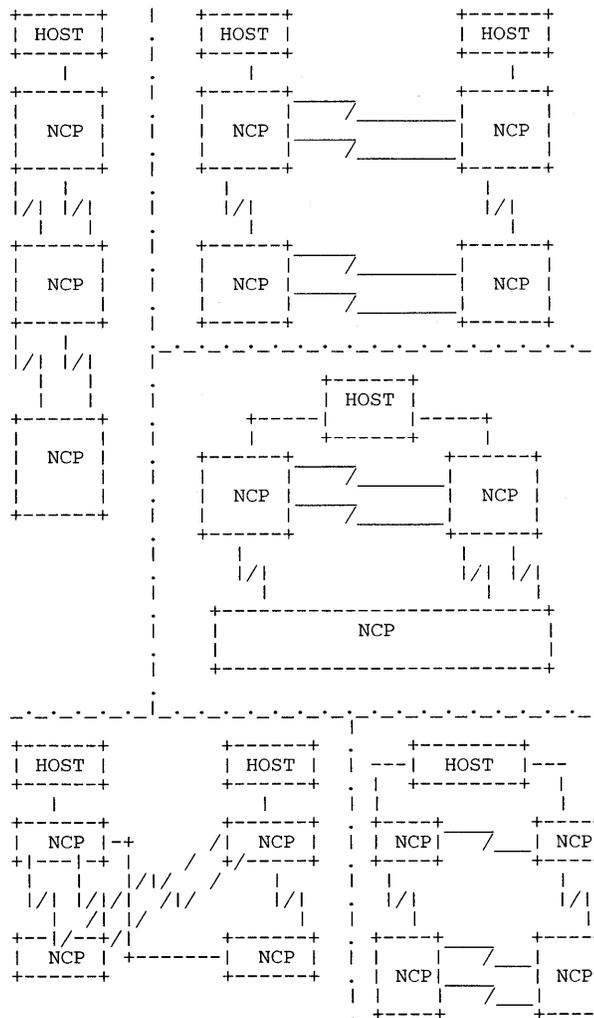
**Multiple Priority Levels:** Three levels of transmission priorities, selectable by session: A user can specify one of three message traffic priorities for a session between two application programs or between a terminal and an application program. For example, this permits message traffic for a time dependent session to be transmitted through a network ahead of other message traffic. That is, interactive processing may be given top priority by a user while other network traffic, such as batch processing, is assigned to a lower priority by the user.

**Extended NCP Interconnection:** New capabilities for interconnecting 3705s in single and multiple system networks: In ACF/NCP/VS R2, a remote NCP could only be link-attached via a single link to a single channel-attached 3705. In ACF/NCP/VS R3, a 3705 may now be link-attached via Transmission Groups to one or more channel-attached and/or link-attached 3705s.

These capabilities can significantly expand the installation's configurability options. Also, they can improve the overall efficiency of the network and improve the ability of a host processor to take over a 3705 whose current owner (or a link to that owner) has failed or has been deactivated.

See Figure 1 for interconnection flexibility.

**FIGURE 1**



**Extended NCP Ownership:** As many as eight host systems can share the ownership of a 3705 that is channel-attached \* and/or link-attached to another 3705(s). Each of the owning host systems is notified in the event the 3705 becomes inoperative. This permits re-instatement of a failed or deactivated 3705 via any one of the host systems that shares in its ownership.

\* The channel attachments cannot exceed the number of channels supported by the 3705-I or the 3705-II Communications Controllers.

**Flow Control:** Enhanced Management of network traffic demands: Via SNA protocols, the flow of message traffic is dynamically regulated between a host system and a 3705 and between two host systems. Continuous feedback is exchanged between network resources in order to regulate network traffic and reduce the possibility of network congestion.

PROGRAM PRODUCTS

**ACF/NCP/VS R3 (cont'd)**

**Session Outage Notification:** If a session message route becomes inoperative, the session ends are made aware of the outage (via SNA protocols). Session reinitiation may be requested as described under "Multiple Routes".

**Enhanced Recovery Capabilities**

- **Enhanced Restart of Host-to-terminal Control Sessions:** In recovering from a host failure situation, a host system can recover its control session for a 3271-11\*\*, 3271-12\*\*, 3274-1C\*, 3275-11\*\*, 3275-12\*\*, 3684, 3770 MLU, 5285, 5288, S/32, S/34 or S/38 without disruption of existing sessions between the device and application programs on other host systems. This permits user applications that are not affected by such a failure to continue processing during recovery of the control session.

\* This product must be at an appropriate EC level to function properly for this function.

\*\* Support for these devices is provided by ACF/NCP/VS R3.

- **Enhanced Takeover of a 3705:** In the event a host system fails or otherwise gives up control of a 3705, any host system that is sharing ownership of the same 3705 will have its network operator notified about the lost host. Any of the notified host systems can take over control of the devices mentioned above without disrupting their existing cross-domain sessions with application programs. It is no longer necessary to deactivate corresponding cross-domain resource definitions before acquiring resources attached to the 3705 that were controlled by the lost host system.

- **Enhanced Multiple Host System Re-synchronization:** In recovering from a failure situation, two host systems can re-synchronize their control session without disruption of existing cross-domain sessions between two application programs or between a terminal and an application program. This permits user applications that are not affected by such a failure event to continue operations during re-instatement of the host systems' cross-domain control session.

- **Route Verification and Error Notification Facilities:** Via the DISPLAY command, a network operator can determine if a message route originating in his host is operative or inoperative. This permits a network operator to verify the availability of network routes and to take corrective action for routes that may have become inoperative. It also permits a network operator to verify that a route has been returned to service following a failure or deactivation. During the verification, appropriate resource owners are notified when an inactive or failed resource is encountered on a route.

In addition, if during network operation a route fails, an awareness message is issued at the host end point(s), identifying the inoperative route to the network operator. New display commands have been added which permit a network operator to take appropriate action to minimize the effects of an unusable message route on network applications.

- **Transmission Group Option for Line Trace:** Extends the existing SDLC line trace capabilities to Transmission Groups. Via the network operator MODIFY command, the message traffic over a Transmission Group between two 3705s can be traced as if it were a single SDLC link.
- **Support of Release 2 of the Network Terminal Option (NTO) program product:** ACF/NCP/VS R3 will support the devices and capabilities of Release 2 of NTO.

ACF/NCP/VS Release 3 supports the following CCITT X.21 switched functions when attached to an X.21 Interface via the 3705-II:

- Address calling.
- Auto Answer.
- Call progress signals.
- Direct call.
- Closed User Groups.
- Abbreviated Address Calling

**CUSTOMER RESPONSIBILITIES**

To install and use ACF/NCP/VS R3 the customer must:

- Design the single system network or multiple host communications system network.
- Meet minimum 3705 configuration requirements to support ACF/NCP/VS R3 in the planned environment.
- Order and install all required communications equipment.
- Order and install ACF/NCP/VS R3 and the System Support Programs for ACF/NCP/VS R3 program products and prerequisite system control programming.
- Generate ACF/NCP/VS R3 using the System Support programs for ACF/NCP/VS R3, for the network configuration.
- Load the 3705-I or 3705-II with the generated ACF/NCP/VS load module using, for example, the System Support Programs for ACF/NCP/VS R3.

- Meet the requirements of the host communications access method products to be operational with ACF/NCP/VS R3.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

ACF/NCP/VS R3 is designed to operate in the following communications controllers:

- 3705-I Communications Controller with a minimum of 144K bytes of storage.
- 3705-II Communications Controller with a minimum of 128K bytes of storage.

**SOFTWARE REQUIREMENTS**

**Co-requisite SCP:** Use of ACF/NCP/VS requires the concurrent installation of co-requisite NCP/VS system control programming (SCP).

**PERFORMANCE and STORAGE CONSIDERATIONS**

The new functions provided by ACF/NCP/VS R3 will increase NCP storage requirements and path lengths over those of ACF/NCP/VS R2. The actual performance impact (if any) to a customer will vary depending upon his particular hardware and network configuration.

**PROGRAM CURRENCY**

ACF/NCP/VS R2 is currently supported under DOS/VS Release 34, DOS/VSE, OS/VS1 Releases 6.0, 6.7 and 7.0 and OS/VS2 (MVS) Releases 3.7 and 3.8.

ACF/NCP/VS R3 will be supported under DOS/VSE, OS/VS1 Release 7.0, OS/VS2 (MVS) Release 3.8, and subsequent releases unless otherwise specified.

**MIGRATION and PLANNING CONSIDERATIONS**

**Migrating to ACF/NCP/VS R3**

The following support alternatives are provided to aid in migration planning:

	NCP/VS 5.0	ACF/NCP/VS..... R1	R2	R2.1 (2)	R3
TCAM 10.0	X	X	X*	X	NO
ACF/TCAM V1	X	X	X*	X	X
ACF/TCAM V2 R1	X	X	X	X	X
ACF/TCAM V2 R2	X	X	X	X	X
ACF/TCAM V2 R3	X	NO	X	X	X
VTAM 2	X	X*	X*(1)	X*(1)	NO
ACF/VTAM V1 R1	X	X	X*	X*	X
ACF/VTAM V1 R2	NO	X	X	X	X
ACF/VTAM V1 R3	NO	NO	X	X	X
ACF/VTAM V2	NO	NO	NO	X	X
NCP/VS V5	X	NO	NO	NO	NO
ACF/NCP/VS R1	NO	X	X	X	NO
ACF/NCP/VS R2	NO	X	X	X	X**
ACF/NCP/VS R2.1	NO	X	X	X	X**
ACF/NCP/VS R3	NO	NO	X**	X**	X

\* Requires applicable access method PTFs.

\*\* Requires applicable ACF/NCP/VS R2 and R2.1 PTF's.

1. OS/VS1 and OS/VS2 (MVS) only.
2. Requires EREP PTFs for LPDA level maintenance data records.

**Note:** The above matrix assumes that customers will be at current access method maintenance levels when migrating from one NCP release to another.

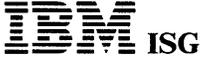
Functions supported by NCP/VS 5.0, ACF/NCP/VS R1 and R2 with the appropriate level of TCAM, ACF/TCAM, VTAM or ACF/VTAM Version 1 are also supported by ACF/NCP/VS R3, with the exception of the SDLC/BSC Path Function. In addition, ACF/NCP/VS R3 does not support Release 1 of the NTO program product (5735-XX7).

**Planning Considerations:** ACF/NCP/VS R3 is generated using the System Support Programs for ACF/NCP/VS Release 3, program product 5735-XX3.

Although ACF/NCP/VS R3 will support existing levels of ACF/TCAM and ACF/VTAM, the support is at the functional level of the access method; full capability depends on coexistence with ACF/TCAM V2 R3 and/or ACF/VTAM V1 R3 or ACF/VTAM V2.

**COMPATIBILITY**

ACF/NCP/VS R3 retains compatibility with ACF/NCP/VS R1 and R2 and offers compatibility with ACF/TCAM V1 and V2, and ACF/VTAM V1 R1, R2 and R3 with the exception of the SDLC/BSC Path Function. In addition, ACF/NCP/VS R3 does not support Release 1 of the NTO program product (5735-XX7).



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Nov 83

PROGRAM PRODUCTS

**ACF/NCP/VS R3 (cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*Advanced Communications Function for NCP/VS (ACF/NCP/VS) Release 3, Network Control Program, and System Support Programs General Information (GC30-3058) ... ACF/NCP/VS Release 3 Program Summary (GC30-9527). Advanced Communications for ACF Program Product Specifications will be available at the program product availability.*

RPOs ACCEPTED: No





## PROGRAM PRODUCTS

**SYSTEM SUPPORT PROGRAMS FOR  
ACF/NCP/VS VERSION 1 RELEASE 2  
5735-XX3****PURPOSE**

System Support Programs for ACF/NCP/VS Version 1 Release 2 is a program product for users of ACF/NCP/VS V1R2 under DOS/VS, OS/VS1, and OS/VS2 (MVS) that supports IBM 3705-II enhancements and provides enhanced generation and utility functions for single or multiple IBM S/370 networks.

**HIGHLIGHTS of SYSTEM SUPPORT PROGRAMS for ACF/NCP/VS**

Provides generation and utility functions in support of the following ACF/NCP/VS R2 enhancements.

- Enhanced SDLC data link test.
- SNA terminal connectivity test.
- Enhanced recording of SDLC data link error conditions.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices.
- Expanded display of network control program storage in the 3705.
- Enhancements to line trace for Communications Scanner, Type 3.
- Negotiable session initialization parameters.
- Support for 3705-II Communications Controller enhancements.
- Support for the Network Communications Controller enhancements.
- Support for the Network Communications Control Facility program product and its related Network Problem Determination Application Processor program product.
- Support for the Network Terminal Option program product.

The following capabilities have been added to the NCP system generation program which is one of the programs comprising SSP for ACF/NCP/VS R2:

- The option to Process Multiple NCP Generations concurrently.  
This option requires the user to specify a qualifier for the ACF/NCP/VS R2 conditional assemblies so that ACF/NCP/VS R2 generations with different names can be processed concurrently. This capability also eliminates having multiple object libraries for the ACF/NCP/VS R2 conditional assemblies.
- Additional Output Options (OS/VS Systems only).  
This capability allows the user to replace the JCL normally generated with user specified cataloged procedures. The user may specify procedures for the assembly steps, post-assembly steps and linkage editor step. All of the assembly steps and/or the link edit step may be replaced by the invocation of a cataloged procedure. The assembly step procedure allows the user to direct his assembly output to a media other than print. The post assembly procedure allows the user to retrieve his assembly output based on the condition code setting of the assembly step. The linkage editor procedure allows the user to replace the normally generated link edit JCL with the invocation of a cataloged procedure.
- Print Suppression Option.  
This option allows the user to suppress the printing of the macro expansion of NCP tables and NCP conditional assemblies.
- Print and Punch Output Reduction.  
The most frequently used Stage 2 macro operands will now be structured in a contiguous multiple operand format instead of requiring one line or card per operand. This will reduce the number of print lines and punched cards required in the Stage 2 output.

**Summary and Advantages:** Refer to the sales pages for ACF/NCP/VS R2 for detailed information on the above ACF/NCP/VS R2 functions.

**CUSTOMER RESPONSIBILITIES**

To install and use SSP for ACF/NCP/VS R2, the customer must:

- Order System Support Programs for ACF/NCP/VS R2
- Design the single system network or multiple host communications system network
- Meet the configuration and system requirements for the 3705-I or 3705-II, ACF/NCP/VS R2, for the customer environment
- Install SSP for ACF/NCP/VS R2 and prerequisite system control programming

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

A supported host operating system (DOS/VS, OS/VS1 or OS/VS2 (MVS)), and at least one locally-attached 3705-I or 3705-II Communications Controller meeting the storage requirements of ACF/NCP/VS R2.

**SOFTWARE REQUIREMENTS**

System Support Programs for ACF/NCP/VS R2 operates as a non-system task under DOS/VS, OS/VS1 and OS/VS2 (MVS). It is designed to operate with ACF/NCP/VS R2.

**COMPATIBILITY**

System Support Programs for ACF/NCP/VS R2 retains compatibility with load modules produced by ACF/NCP/VS R1.

**PROGRAM CURRENCY**

System Support Programs for ACF/NCP/VS Release 1 is currently supported under DOS/VS Release 34, OS/VS1 Release 6.0 and 6.7, OS/VS2 (SVS) Release 1.7, and OS/VS2 (MVS) Release 3.7 and 3.8.

System Support Programs for ACF/NCP/VS Release 2 will be supported under DOS/VS Release 34, OS/VS1 Releases 6.0 and 6.7, OS/VS2 (MVS) Releases 3.7 and 3.8 and subsequent releases unless otherwise specified.

**DOCUMENTATION**

(available from Mechanicsburg)

*Advanced Communications function for NCP/VS (ACF/NCP/VS) Network Control Program and System Support Programs, General Information ... Product Summary for System Support Programs for ACF/NCP/VS R2*

**SYSTEM SUPPORT PROGRAMS FOR  
ACF/NCP/VS VERSION 1 RELEASE 2  
MODIFICATION LEVEL 1  
5735-XX3****PURPOSE**

System Support Programs (SSP) for ACF/NCP/VS Version 1 Release 2.1 provides support for the following new ACF/NCP/VS V1R2.1 functions:

- Support of Link Problem Determination Aid (LPDA) for the new microprocessor-based modems (3863, 3864, and 3865).
- Support of the 230.4K bps line speed capability of the 3705-II.

System Support Programs (SSP) for ACF/NCP/VS Release 2.1 is a program product for users of DOS/VS, DOS/VSE, SSX/VSE, OS/VS1 and OS/VS2 (MVS) that supports ACF/NCP/VS Release 2.1.

**CUSTOMER RESPONSIBILITIES**

To install and use SSP for ACF/NCP/VS R2.1, the customer must:

- Order System Support Programs for ACF/NCP/VS R2.1.
- Design the single system network or multiple host communications system network.
- Meet the configuration and system requirements for the 3705-I or 3705-II, and ACF/NCP/VS R2.1 for the customer environment.
- Install SSP for ACF/NCP/VS R2.1 and prerequisite system control programming.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

At least one locally-attached 3705-I or 3705-II Communications Controller meeting the storage requirements of ACF/NCP/VS R2.1.

**SOFTWARE REQUIREMENTS**

A supported host operating system (DOS/VS, DOS/VSE, SSX/VSE, OS/VS1 or OS/VS2 (MVS)).

System Support Programs for ACF/NCP/VS R2.1 operate as a non-system task under DOS/VS, DOS/VSE, SSX/VSE, OS/VS1 and OS/VS2 (MVS). It is designed to operate with ACF/NCP/VS R2.1.

**Program Currency:** System Support Programs for ACF/NCP/VS Release 2 is currently supported under DOS/VS Release 34, DOS/VSE, SSX/VSE Release 3, OS/VS1 Releases 6.0, 6.7, and 7.0 and OS/VS2 (MVS) Releases 3.7 and 3.8.

System Support Programs for ACF/NCP/VS R2.1 will be supported under DOS/VS Release 34, DOS/VSE, SSX/VSE Release 3, OS/VS1 Releases 6.7 and 7.0 and OS/VS2 (MVS) Release 3.8 and subsequent releases unless otherwise specified.

Customers can continue to order SSP for ACF/NCP/VS R2.1 after the availability of SSP for ACF/NCP/VS R3.

**COMPATIBILITY**

System Support Programs for ACF/NCP/VS R2.1 retains compatibility with load modules produced by ACF/NCP/VS R2.

**Statement of Direction:** It is IBM's direction to make available the LPDA and 230.4K bps line speed functions supported by SSP for ACF/NCP/VS R2.1 in SSP for ACF/NCP/VS R3. For planning purposes, we anticipate that availability dates for this support in SSP for ACF/NCP/VS R3 will be announced by the last quarter of 1979.

**DOCUMENTATION**

(available from Mechanicsburg)

*Advanced Communications Function for NCP/VS (ACF/NCP/VS) Network Control Program and System Support Programs, General Information (GC30-3058) ... Product Summary for System Support Programs for ACF/NCP/VS R2.1*

**MVS INTEGRITY**

IBM will accept APARs describing any situation where the installation of System Support Programs for ACF/NCP/VS R2.1 causes an exposure to the system integrity of OS/VS2 (MVS).



## PROGRAM PRODUCTS

**SYSTEM SUPPORT PROGRAMS FOR ACF/NCP/VS  
DOS/VS, DOS/VSE, OS/VS1, OS/VS2 (MVS)  
VERSION 1 RELEASE 3  
5735-XX3****PURPOSE**

System Support Programs for ACF/NCP/VS Version 1 Release 3 provides generation and utility functions for users of ACF/NCP/VS V1R3 under DOS/VS, DOS/VSE, OS/VS1 and OS/VS2 (MVS).

**HIGHLIGHTS of RELEASE 3**

Provides generation and utility functions in support of the following ACF/NCP/VS R3 enhancements:

- **Parallel Links:** Multiple active SDLC links between adjacent 3705s.
- **Transmission Groups:** Logical groupings of transmission links between adjacent network nodes.
- **Multiple Routes:** Multiple routes for SNA and non-SNA message transmission between nodes in a network.
- **Multiple Priority Levels:** Three levels of transmission priorities, selectable by session.
- **Extended NCP Interconnection:** New capabilities for interconnecting 3705s in single and multiple system networks.
- **Extended NCP Ownership.**
- **Flow Control:** Enhanced management of network traffic demands.
- **Session Outage Notification:** Enhanced awareness of session outages.
- **Route Verification and Error Notification Facility**
- **Transmission Group Option for Line Trace**
- **Support of Release 2 of the Network Terminal Option program product.**
- **Support of the CCITT X.21 switched interface.**

**CUSTOMER RESPONSIBILITIES**

To install and use SSP for ACF/NCP/VS R3, the customer must:

- Order System Support Programs for ACF/NCP/VS R3.
- Design the single system network or multiple host communications system network.
- Meet the configuration and system requirements for the 3705-I or 3705-II, and ACF/NCP/VS R3 for the customer environment.
- Install SSP for ACF/NCP/VS R3 and prerequisite system control programming.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

At least one locally-attached 3705-I or 3705-II Communications Controller meeting the storage requirements of ACF/NCP/VS R3.

**SOFTWARE REQUIREMENTS**

A supported host operating system (DOS/VS, DOS/VSE, OS/VS1 or OS/VS2 (MVS)).

System Support Programs for ACF/NCP/VS R3 operate as a non-system task under DOS/VS, DOS/VSE, OS/VS1 and OS/VS2 (MVS). It is designed to operate with ACF/NCP/VS R3.

**Program Currency:** System Support Programs for ACF/NCP/VS Release 2 is currently supported under DOS/VS Release 34, DOS/VSE, OS/VS1 Releases 6.0 and 6.7 and OS/VS2 (MVS) Releases 3.7 and 3.8

System Support Programs for ACF/NCP/VS Release 3 will be supported under DOS/VSE, OS/VS1 Release 7.0, OS/VS2 (MVS) Release 3.8 and subsequent releases unless otherwise specified.

**COMPATIBILITY**

System Support Programs for ACF/NCP/VS R3 retains compatibility with load modules produced by ACF/NCP/VS R2 except for the SDLC/BSC Path Function. In addition, Release 1 of the NTO program product (5735-XX7) is not supported.

**DOCUMENTATION**

(available from Mechanicsburg)

*Advanced Communications Function for NCP/VS (ACF/NCP/VS) Network Control Program and System Support Programs, General Information (GC30-3058) ... Product Summary for System Support Programs for ACF/NCP/VS R3 (GC30-9528).*

**MVS INTEGRITY**

IBM will accept APARs describing any situation where the installation of System Support Programs for ACF/NCP/VS R3 causes an exposure to the system integrity of OS/VS2 (MVS).

**NETWORK COMMUNICATIONS CONTROL FACILITY  
FOR VTAM, ACF/VTAM, ACF/VTAME, TCAM AND  
ACF/TCAM  
NCCF (5735-XX6) (DOS/VSE, OS/VS)**

**PURPOSE**

The Network Communications Control Facility (NCCF) is a program product that operates with ACF/VTAM, ACF/VTAME or ACF/TCAM as an application program under the control of DOS/VSE, OS/VS1 or OS/VS2 MVS. NCCF provides a program base for communications network management (CNM) by providing telecommunications access method services and operating system services. With ACF/VTAM and ACF/VTAME, NCCF contains, and is compatible with, those access method operator control functions currently provided by the Network Operation Support Program (NOSP). NCCF extends telecommunications access method operator control to ACF/TCAM Version 2. NCCF provides communications network management application functions including: Network operations, data services for problem determination, and communications network management (CNM) operator data security and auditing. (A CNM operator is a person communicating with NCCF.) IBM-supplied or user-written programs may use NCCF services to provide additional functions of CNM beyond those provided by NCCF.

**HIGHLIGHTS**

- Support of the 3270 Information Display System (as listed in the System Configuration section) as a NCCF operator station.
- Support of multiple NCCF operators (see statement in "Programming Requirements" section).
- Support of local and/or remote NCCF operators.
- Routing of hardware error records to the appropriate command processor (for example, the Network Problem Determination Application (NPDA) and the Network Problem Determination Application Versions 2 and 3 (NPDA Version 2 and NPDA Version 3)).
- Routing of summary maintenance statistics.
- Capability for user-defined command lists stored in a disk file to be invoked by name for execution.
- Support of backup procedures for failing or deactivated CNM operator stations.
- Support of NCCF functions in single or multiple ACF/VTAM or ACF/TCAM host system configurations.
- Capability for the NCCF operator to enter ACF/VTAM or ACF/TCAM Version 2 operator control commands to be executed by the telecommunications access method.
- Support of operator-to-operator communications within the same host or between host systems.
- Cross-domain command and message routing.
- Capability for user-written command processors to support customized operator commands or program operator responses to network messages.
- Capability for user-written exit routines to screen and edit operator message traffic or data traffic.
- Data services for VSAM data sets used for hardware error or other CNM data collection and data access.
- Screen management functions for NCCF operator stations. Line by line and full screen formatting are supported.
- The ability, through use of authorization facilities, to limit each operator's capability to issue telecommunications access method operator control commands to specified portions of the network (ACF/VTAM or ACF/VTAME).
- Authorization checking based on operator and terminal identification.
- Logging of CNM operator activity to a VSAM disk data set that may be later used for offline printing.
- Logging of NCCF operator messages to a disk data set that may later be used for offline printing.
- Provides a conditional command list facility which allows the user to dynamically construct and modify commands, and to control the sequence of execution of the commands in a command list.
- The ability, through use of authorization facilities, to assign subsets of the total command set available to specific individual operators.
- Initiation of commands and command lists by timer events, either by time of day or repetitively after a specified interval.
- Initiation of command lists by the receipt of unsolicited messages from the access method.

**Note:** Cross-domain facilities provided with ACF/VTAM Version 1 and ACF/TCAM require access method features. (See ACF/VTAM Version 1 and ACF/TCAM pages for the additional features required).

**DESCRIPTION**

**SUMMARY and ADVANTAGES of NCCF**

- Enhances ACF/VTAM, ACF/VTAME and ACF/TCAM network operation management.
- Permits teleprocessing network operation control at program execution speeds.
- Supports the Network Problem Determination Application (NPDA), the Network Problem Determination Application Version 2 (NPDA Version 2) and the Network Problem Determination Application Version 3 (NPDA Version 3), and provides a program base upon which the user can build additional programs for the management of the teleprocessing network.
- Supports NPDA and NPDA Versions 2 and 3 access to error statistics in other domains allowing for a centralized problem determination station.
- Supports the Network Logical Data Manager (NLDM) product for the collection and presentation of access method path information unit and selected Network Control Program control data for software problem determination.
- Provides services that can insulate command processors from telecommunications access method and operating system differences.
- Provides telecommunications access method independent screen management and terminal input/output processing for command processors.
- Provides data services that allow command processors to request error data from the supporting products through the telecommunications access method and to store or retrieve error data from files.
- Provides operators with the ability to input telecommunications access method operator control commands (ACF/VTAM, ACF/VTAME or ACF/TCAM Version 2).
- Permits customized program control of a network through user-written command processors, so that a system console operator need be involved only in critical situations.
- Permits users to define their own commands for network operation.
- Allows an operator to initiate execution of command processors in domains other than his own.
- Enhances accuracy of network control via user-defined command sequences which can take the place of many human operator decisions and actions.
- Enhances network operation control via 3270 display devices with formatting and editing support. Line by line and full screen message formatting are provided.
- Permits multiple NCCF operators to share network control responsibility, where each may control a portion or all of an ACF/VTAM network.
- Improves operator efficiency through facilities for operator-to-operator communication.
- Permits NCCF operator stations to be located anywhere in a physical network, as supported by ACF/VTAM, ACF/VTAME and ACF/TCAM.
- Supports backup procedures which can provide recovery for failing or deactivated NCCF operator stations.
- Allows for the automation of various operator tasks (through the use of user-written exit routines, command lists, and command processors) to reduce the probability of human error.
- Supports the VSE/Operator Communications Control Facility (VSE/OCCF) program product that operates with DOS/VSE. VSE/OCCF and NCCF together allow a NCCF operator connected to one host system to control one or more remote DOS/VSE systems. This can minimize the need for operator attendance and DP skills at the remote sites.
- Supports Information/System Release 2 and the Information/Management feature for problem, change and systems configuration management.

In addition to the functions above, provided by NCCF, the Terminal Access Facility Feature of NCCF enhances the CNM operator's centralized control of components of the teleprocessing network and interactive capability with various CNM facilities.

PROGRAM PRODUCTS

**NCCF (cont'd)**

**HIGHLIGHTS of TERMINAL ACCESS FACILITY FEATURE**

Working with NCCF Release 2, the feature provides:

- Consolidated network operator control of CICS/VS, IMS/VS or 8100 DPPX or DPPX/SP systems via the Host Command Facility (HCF) Version 2.
- Centralized CNM Operator access to network management applications residing on CICS/VS, IMS/VS, TSO, Remote NCCF systems or, 8100 DPPX or DPPX/SP or DPCX systems via NCCF to HCF Version 2 Communication.

Summary of Terminal Access Facility Feature Functions:

- Concurrent access to system management facilities residing on local NCCF, CICS/VS Release 1.5 or subsequent releases, IMS/VS Version 1 Release 1.6 or subsequent releases, TSO, remote NCCF systems, or those on 8100 DPPX or DPPX/SP or DPCX systems accessible via HCF Version 2 is supported without requiring LOGON/LOGOFF procedures or separate terminals dedicated to each application.
- Operator access, using 3270 SNA conventions, to applications requiring full-screen display capability.
- Operator access to the facilities of local and remote TSO systems.
- Allows an NCCF operator to operate an NCCF system residing in another domain within the network.
- Ability to create a deferred session to an inactive IMS or CICS subsystem that allows the session to be completed automatically by the subsystem when it is activated.
- Concurrent session support for operator control capability and full-screen display transactions is provided. Network operator control messages may be queued for presentation upon completion of a full-screen display transaction, or the operator may elect to have the session interrupted.

**PLANNING CONSIDERATIONS**

NCCF executes in a VM environment on ACF/VTAM Release 2 and 3 or ACF/TCAM Version 2 Release 2 and 3; and on ACF/VTAME using a 4331 Processor in S/370 compatibility mode.

To assist conversion from NCCF Release 1 to NCCF Release 2; NCCF Release 1 is supported on ACF/VTAM Version 1 Release 3, ACF/TCAM Version 2 Release 2 and 3, and ACF/VTAME.

NCCF provides those functions currently provided for by NOSP. Existing user code written to NOSP Service Routine Interfaces (as described in the NOSP PIM) is source compatible with NCCF. A reassembly using NCCF macro libraries is required.

Cross-domain communication is not supported between NOSP and NCCF Release 2. Cross-domain communications between the following is supported:

- NOSP in both systems
- NCCF in both systems
- NOSP in one system and NCCF Release 1 in the other (ACF/VTAM Version 1 and ACF/VTAME only)

NOSP and NCCF can not reside in the same host processor. For systems with multiple teleprocessing access methods, a copy of NCCF is needed for each teleprocessing access method supported and both copies must be at the same release level.

**CUSTOMER RESPONSIBILITIES**

To use NCCF, the customer must:

- Define the NCCF, ACF/VTAM, ACF/VTAME and ACF/TCAM network environment.
- Determine the NCCF operators and CNM operator stations to be supported.
- Order and install any additional required communications equipment, e.g., 3270 terminals.
- Have the prerequisite ACF/VTAME, ACF/VTAM, or ACF/TCAM installed.
- Define all desired NCCF program definition parameters.
- Install NCCF.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Network Communications Control Facility and the Terminal Access Facility feature are designed to operate on IBM 4300, S/370 and 30XX processors.

The Network Communications Control Facility occupies a partition (in VSE and OS/VS1), or an address space (in OS/VS2 MVS). In VSE the program operates as a single task in its own partition or as a subtask in the ACF/VTAM or ACF/VTAME partition.

The minimum estimated storage required is 300,000 bytes of virtual storage for NCCF Release 1, and 400,000 bytes of virtual storage for

NCCF Release 2. This estimate may vary depending upon the device configuration chosen by the user and the size of the network being controlled. This storage is virtual, it is a non-system area requirement. It comes from the NCCF private area for MVS or the NCCF partition of VSE and OS/VS1.

NCCF is an interactive program whose utilization is expected to vary widely between individual installations and within a given installation. NCCF is not expected to have a significant impact on the overall system performance. CNM operator response time will depend upon the complexity of the functions (commands) being executed.

The amount of virtual storage required by the Terminal Access Facility depends upon the number of concurrent user sessions and the type of functions being performed. Generally, the feature requires a minimum of 75K bytes of virtual user storage; actual storage requirements depend upon the number of sessions established. This storage requirement is in addition to the NCCF R2 storage requirements.

The terminals supported by NCCF as CNM stations are:

**Controllers:**

- IBM 3271 mdl 2 (BSC remote)
- IBM 3271 mdl 12 (SDLC remote)
- IBM 3272 mdl 2 (local)
- IBM 3274 mdl 1A, 21A, 31A (local SNA)
- IBM 3274 mdl 1B, 1D, 21B, 21D, 31D (local non-SNA)
- IBM 3274 mdl 1C, 21C, 31C (SDLC/SNA, BSC)
- IBM 3274 mdl 51C (SDLC/SNA, BSC)
- IBM 3791 (with 3270 data stream compatibility), (configuration support #9169).
- IBM 8100 (under DPCX or DPPX or DPPX/SP with 3270 data stream compatibility)

**Controllers/Display Units:**

- IBM 3275 mdl 2 (BSC remote)
- IBM 3275 mdl 12 (SDLC remote)
- IBM 3276 mdls 2, 3, 4 (BSC)
- IBM 3276 mdls 12, 13, 14 (SNA/SDLC)

**Display Units:**

- IBM 3277 mdl 2
- IBM 3278 mdls 2, 3, 4, 5 (mdl 5 supported as a mdl 2)
- IBM 3279 mdls 2A and 2B (supported as IBM 3278 mdl 2),
- IBM 3279 mdls 3A and 3B (supported as IBM 3278 mdl 3)
- IBM 8775 mdls 1, 2, 11, 12

The following printers are supported by NCCF as hardcopy log devices:

- IBM 3262 mdls 3, 13
- IBM 3268 mdl 2
- IBM 3284 mdl 2
- IBM 3286 mdl 2
- IBM 3287 mdls 1, 1C (supported as mdl 1), 2, and 2C (supported as mdl 2). All IBM 3287 models require the SCD Support feature #9660 when operating with SNA controllers.
- IBM 3288 mdl 2
- IBM 3289 mdls 1, 2

**SOFTWARE REQUIREMENTS**

The Network Communications Control Facility runs as an application program on all IBM host processors that support the following access methods:

NCCF Release 1	MVS	VS1	VSE
TCAM Level 10	X	X	
ACF/TCAM Version 1	X	X	
ACF/TCAM Version 2 Rel 1	X	X	
ACF/TCAM Version 2 Rel 2	X	X	
ACF/TCAM Version 2 Rel 3	X	X	
VTAM Level 2	X	X	
ACF/VTAM Version 1 Rel 1	X	X	
ACF/VTAM Version 1 Rel 2	X	X	X
ACF/VTAM Version 1 Rel 3	X	X	X
ACF/VTAME			X
<b>NCCF Release 2</b>			
ACF/TCAM Version 2 Rel 2	X	X	
ACF/TCAM Version 2 Rel 3	X	X	
ACF/TCAM Version 2 Rel 4	X	X	
ACF/VTAM Version 1 Rel 2	X	X	X
ACF/VTAM Version 1 Rel 3	X	X	X
ACF/VTAM Version 2	X	X	X
ACF/VTAME			X
<b>Terminal Access Facility Feature</b>			
ACF/VTAM Version 1 Rel 2	X	X	X
ACF/VTAM Version 1 Rel 3	X	X	X
ACF/VTAM Version 2			

## PROGRAM PRODUCTS

**NCCF (cont'd)**

ACF/VTAME  
ACF/TCAM Version 2 Rel 4           X           X           X

Operating system levels supported by NCCF are as required by the supported access methods, with the requirement that OS/VS2 MVS Release 3.8 and OS/VS1 Release 7.0 are the earliest levels of OS/VS supported by NCCF. NCCF will also support subsequent releases of OS/VS2, unless otherwise stated by IBM.

NCCF also runs on ACF/VTAM Release 2 or 3, and ACF/VTAME on VSE, with the VSE/Advanced Functions licensed program. If NCCF data services or NCCF Release 2 disk log are used, VSAM is needed.

NCCF executes in a VM environment on ACF/VTAM Release 2 or 3 and ACF/TCAM Version 2 Releases 1, 2, 3 and 4 and on ACF/VTAME using an IBM 4331 Processor in S/370 compatibility mode.

The Terminal Access Facility will support application programs running on CICS/VS Release 1.5 and subsequent releases, IMS/VS Version 1 Release 1.6 and subsequent releases, TSO, remote NCCF systems, or those accessible via HCF Version 2 which operate under IBM 3270 protocol.

The NLDM program product requires NCCF Release 2 with the appropriate PTF. NLDM is supported only on OS/VS2.

Use of the Terminal Access Facility capability to access a TSO system, or establish deferred session, in a cross-domain host containing IMS or CICS, requires the presence of NCCF and the Terminal Access Facility in the cross-domain host.

Terminal Access Facility capability to provide operator access to TSO and remote NCCF systems is not supported under ACF/TCAM.

**SECURITY FEATURES**

NCCF provides the following facilities to help prevent unauthorized access of information:

- Operator station security. Access to NCCF may be restricted to only those operator stations that have been defined by the user during program installation procedures.
- Operator logon security. NCCF logon facilities are provided that check an individual operator's authorization prior to allowing the operator to use NCCF. On OS/VS2 (MVS) Systems, NCCF provides an interface to RACF to allow usage of RACF logon authorization checking. (See RACF pages for the release level of RACF required.)
- Resource control authorization. On ACF/VTAM systems a capability is provided to restrict an individual operator to a subset of the network resources to which commands can be issued or from which messages can be received.
- Command authorization. A capability is provided to restrict an individual operator to a subset of the total command set available through NCCF.

These facilities provide security only in the context of NCCF. The Resource Access Control Facility (RACF) program product (5740-XXH) can be used to provide an integral foundation for security in MVS, complementing NCCF facilities by controlling access to system resources.

**PERFORMANCE AND STORAGE CONSIDERATIONS**

The minimum estimated storage required is 400K bytes with a single operator; however, this estimate may vary depending upon the device configuration chosen by the user and the size of the network being controlled. This storage is virtual.

NCCF is an interactive program whose utilization is expected to vary widely between individual installations and within a given installation. NCCF is not expected to have a significant impact on the overall system performance. CNM operator response time will depend upon the complexity of the functions (commands) being executed.

**DOCUMENTATION**

(available from Mechanicsburg)

*NCCF General Information (GC27-0429) ... NCCF Program Summary (GC27-0427).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No

**Productivity Aid:** TPNS will provide terminal simulation in the networking environment.

**5735-XX7 - NETWORK TERMINAL OPTION (NTO) R1****PURPOSE**

The Network Terminal Option extends the capabilities of ACF/NCP/VS V1R2 in 3705-I and 3705-II Communications Controllers to allow access of the following non-SNA terminals through the Record Mode Application program (SNA) interface in ACF/VTAM Version 1 Release 2 or ACF/VTAM Version 2: 2740 Communication Terminal mdl 1 - nonswitched and switched ... 3232 Keyboard Printer mdl 51 - switched and nonswitched ... 2741 Communication Terminal - nonswitched and switched ... 6733 Typewriter Communication Module - switched and nonswitched as a CPT-TWX 33/35 ... Western Union Teletypewriter Exchanges Services (TWX mdl 33/35) - nonswitched and switched ... World Trade Teletypewriter Terminal (WTTY) - nonswitched only. The Network Terminal Option is available to users of the operating systems as supported by ACF/VTAM R2.

**HIGHLIGHTS**

- Supports 2740 mdl 1, 2741, 3232-51, 6733 (as a CPT-TWX 33/35), TWX 33/35 and WTTY via the Record Mode Application program (SNA) interface of ACF/VTAM Version 1 Release 2 or ACF/VTAM Version 2.
- Preserves the non-SNA device data streams minimizing changes to existing application programs.
- Provides single and multiple system networking capabilities for the supported non-SNA terminals.
- Allows sharing of the supported non-SNA terminals in a SNA environment.
- Supports TSO for ACF/VTAM Version 1 Release 2 (MVS only) or ACF/VTAM Version 2.

**ADVANTAGES**

Provides SNA Interface for supported non-SNA terminals. From a program control point of view, the Network Terminal Option supported terminals appear like SDLC 3767 Communication Terminals to ACF/VTAM.

Preserves Non-SNA Data Streams which minimizes changes to existing application programs using Network Terminal Option supported terminals. Application program code that constructs or analyzes the non-SNA data streams may not require modification to run with the Network Terminal Option.

Provides Single and Multiple System Networking capabilities for the supported non-SNA terminals. ACF/VTAM R2 applications can access the terminals in a single or multiple system environment. A Network Terminal Option terminal controlled by ACF/VTAM in one host may communicate with a user-written ACF/VTAM application program in a different host system.

Provides TSO/ACF/VTAM R2 support of the 2741, TWX 33/35, and WTTY Terminals, using the facilities of ACF/VTAM R2 (MVS only).

**PLANNING CONSIDERATIONS**

Machine and estimated storage requirements will be provided in the *Network Terminal Option General Information Manual* prior to availability.

The Network Terminal Option requires ACF/VTAM R2 and ACF/NCP/VS V1R2. The program product runs in a 3705-I or 3705-II Communications Controller.

The Network Terminal Option is independent of the host operating system. The same program product runs with OS/VS or DOS/VS.

The Network Terminal Option runs in ACF/NCP/VS Interrupt Level 5.

**CUSTOMER RESPONSIBILITIES**

To install and use the Network Terminal Option, the customer must:

- Design the network.
- Order and install all the required communications equipment.
- Have the prerequisite ACF/VTAM Version 1 Release 2 or ACF/VTAM Version 2 and ACF/NCP/VS Version 1 Release 2 installed.
- Define the network to ACF/VTAM.
- Define the network to ACF/NCP/VS.
- Define supported devices to the Network Terminal Option.

**COMPATIBILITY**

The Network Terminal Option is a new program product which may be used in place of the Basic Mode interface contained in ACF/VTAM Version 1 Release 1 to provide specific device support to ACF/VTAM Version 1 Release 2 or ACF/VTAM Version 2. There are, however, some compatibility considerations.

First, terminal control is via the SDLC 3767 Communication Terminal protocols at the application program interface in ACF/VTAM. The data streams are not, however, compatible with the 3767 data streams.

The data streams are unmodified non-SNA data streams. These data streams are preserved to minimize changes to existing application programs.

**PERFORMANCE and STORAGE CONSIDERATIONS**

- The design objective for the Network Terminal Option is to provide an ACF/NCP/VS V1R2 path length which is approximately 10% greater than the ACF/NCP Version 1 Release 1 path length for the same terminals, excluding user-written code.
- The ACF/VTAM path length will be significantly reduced when moving from the BASIC MODE to the RECORD MODE application program interface. (This assumes that the terminal set remains the same, and that communications remain in the same domains.) The user will have more processor processing power to handle increased transaction rates or to run other jobs.
- The Network Terminal Option will require approximately 24K bytes of additional storage in ACF/NCP. In addition, each supported terminal will require:

86 bytes for each line  
266 bytes for each terminal

in addition to the normal calculations for line and terminal in an NCP without the Network Terminal Option.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Network Terminal Option Licensed Program Design Objectives ...*  
*Network Terminal Option General Information (GC38-0297).*

RPGs ACCEPTED: No

**5735-XX7 - NETWORK TERMINAL OPTION R2 and 2.1****PURPOSE**

The Network Terminal Option Releases 2 and 2.1 (NTO 2 and NTO 2.1) extend support to ACF/VTAM Version 1 Release 3 and ACF/VTAM Version 2. For a description of ACF/VTAM Version 1 Release 3 and ACF/VTAM Version 2, see the program product pages. NTO 2 also supports the ACF/NCP/VS Version 1 Release 3 and ACF/NCP Version 2 function. NTO 2.1 supports ACF/NCP Version 3 only.

A description of ACF/NCP/VS V1R3 and ACF/NCP Versions 2 and 3 can be found in the program product pages.

**DESCRIPTION**

NTO 2 or NTO 2.1 with the corresponding level of ACF/NCP, and ACF/VTAM V1R3 or ACF/VTAM V2, allows Record Mode Application programs SNA access to the following terminals:

- 2740 Communication Terminal mdl 1 - nonswitched and switched.
- 2741 Communication Terminal - nonswitched and switched.
- Western Union Teletypewriter Exchanges Services (TWX mdl 33/35) - nonswitched and switched.
- World Trade Teletypewriter Terminal (WTTY) - nonswitched only.
- 3780 Data Communication Terminal - nonswitched

The Network Terminal Option will allow the SNA sessions to continue across the failure of the owning host (ACF/VTAM or ACF/TCAM) if the application program is not affected by the failure.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

NTO Releases 2 and 2.1 are designed to operate on the IBM 3705-II or 3725 Communication Controllers.

**SOFTWARE REQUIREMENTS**

NTO R2 with ACF/NCP/VS V1R3 operates with both ACF/VTAM V1R2 and ACF/VTAM V1R3. NTO 1 with ACF/NCP/VS V1R2 and ACF/NCP/VS V1R2.1 operates with both ACF/VTAM V1R2 and ACF/VTAM V1R3. On the IBM 3705, NTO R2 with ACF/NCP Version 2 operates with ACF/VTAM V1R3 and ACF/VTAM V2. On the IBM 3725, NTO R2 with ACF/NCP V2 operates with ACF/VTAM V1R3 (MVS only, with appropriate PTF) and ACF/VTAM V2. (Note: NTO 1 runs on ACF/NCP/VS V1R2 and ACF/NCP/VS V1R2.1; NTO 2 runs on ACF/NCP/VS V1R3 and ACF/NCP Version 2. NTO Release 2.1 operates with ACF/NCP Version 3 only, and any level of ACF/VTAM which operates with ACF/NCP Version 3.)

NTO Release 2 is independent of the host operating system. The same program product runs with OS/VS or DOS/VSE. NTO Release 2.1 runs on MVS/370 and MVS/XA (compatibility mode only).

The Network Terminal Option runs in ACF/NCP/VS Interrupt Level 5.

CICS/VS will support the Network Terminal Option (NTO) so that some terminals currently supported through BTAM can also be supported through ACF/VTAM and ACF/NCP/VS. Details for the physical attachment of these terminals is as specified by NTO. Support is specifically for the IBM 3232-51 and the IBM 6733 (as a CPT-TWX 33/35) and Western Union Teletypewriter Exchange Service (TWX Mdl 33/35) terminals and for World Trade Teletypewriter (WTTY) terminals. Existing applications for use with these terminals will run with NTO with minimal change.

Similar support is available with IMS/VS V1 R3. Note that IMS BTAM Dial Commands '/IAM' are not supported for NTO terminals.

**COMPATIBILITY**

Network Terminal Option/IBM Subsystems which run NTO with ACF/VTAM V1R2 will run on ACF/VTAM V1R3 or ACF/VTAM V2.

**PERFORMANCE and STORAGE CONSIDERATIONS**

The performance of NTO operating with the corresponding level of ACF/NCP is dependent upon particular hardware and network configuration. NTO Release 2 or Release 2.1 requires approximately 50K bytes of additional storage in ACF/NCP. For the NTO Release 2 user, the storage requirements of NTO Release 2.1 are approximately 15 additional bytes for each defined NTO terminal over the storage requirements of NTO Release 2.

Since the performance and storage requirements will vary depending upon particular hardware configuration, the 3705 Configurator (CF3705) or the 3725 Configurator (CP3725) should be used to assess individual customer performance capability and storage requirements.

**DOCUMENTATION**

(available from Mechanicsburg)

*Network Terminal Option Program Summary (GC27-0450) ...  
Network Terminal Option General Information (GC38-0297).*

RPQs ACCEPTED: No

## NETWORK PROBLEM DETERMINATION APPLICATION NPDA (5735-XX8)

### PURPOSE

The Network Problem Determination Application (NPDA) assists users in performing communication network problem determination. NPDA collects records of errors detected by a communication network and, upon request, displays them at the user's terminal.

### HIGHLIGHTS

The Network Problem Determination Application (NPDA) assists the user in locating hardware problems in a communications network by providing:

- Online, hierarchical, interactive viewing of error counts associated with communication controllers, BSC, S/S and SDLC lines, modems, cluster controllers, control units and terminals.
- Specific error data and a brief error description with suggested user action associated with each error event. The Network Problem Determination Application also allows the Display Exception Monitoring Facility (DEMF) to coexist within the same system environment.
- Permanent error records associated with:
  - 370X Communication Controllers.
  - SDLC, BSC and S/S lines attached to a 370X/NCP.
  - BSC and S/S lines connected to a 270X or a 370X/EP.
  - Inclusions and qualifications for ACF/VTAME support.
  - SDLC and BSC lines attached to the channel of a 4331.
  - 3232 Model 1
  - 3271 mdl 1 or 2 control units connected to a 370X/NCP, a 270X, a 370X/EP or a 4331 channel.
  - 3274 mdl 1C, 21C, 31C, 51C control units connected to a 370X/NCP, a 270X, 370X/EP or a 4331 channel.
  - 3274 mdl 1A, 21A, 31A (local SNA).
  - 3276 mdls 1, 2, 3, 4, 11, 12, 13 and 14.
  - 3275 mdls 1 and 2.
  - 3272 mdl 1 or 2 (local mode). \*
  - 3274 mdl 1B, 1D, 21B, 21D or 31D (local non-SNA). \*
  - 3770, MLU version models (3776 mdls 3 and 4, 3777 mdls 3 and 4).

Support in 3276 and 3274 SNA/SDLC mdls for the summary maintenance statistics function is required and will be available at first customer shipment of the NCCF and NPDA program products on ACF/VTAM Version 1 Release 2, ACF/TCAM Version 2 and ACF/VTAME.

- 3863, 3864, 3865 Modems. \*
- 3867 Link Diagnostic Unit.
- 8815 Scanmaster I mdls 1, 3 and 4.

\* Except with ACF/VTAME

NPDA functions consist of:

- Link quality measurement and alerting for improved recognition and resolution of intermittent transmissions errors.
- A presentation services processor, which processes user requests and formats the return display to the user.
- A data services processor, which structures the request for recording and retrieving error statistics data to and from an NCP data base, and requests retrieval of error statistics from the communications network.
- A logging component, which executes as an NCCF subtask to route and record BSC and local error statistics on the EP data base.
- A communications network management interface simulator which formats NCP error records in the VTAM 2, ACF/VTAM Version 1 Release 1, TCAM 10, and ACF/TCAM Version 1 environments to be compatible with the ACF/VTAM Version 1 Release 2 or ACF/TCAM Version 2 architecture format.

In addition, NPDA is dependent on system functions provided by the Network Communications Control Facility (NCCF) for transparency to the operating system and the communications access methods.

### MIGRATION

The Facility Error Recognition System (FERS) and the Display Exception Monitoring Facility (DEMF) coexist with NPDA. In a mixed EP and NCP environment, the Network Problem Determination Application constructs an EP data base which is organized identically to the DEMF data base. DEMF may be invoked independently from a DEMF terminal

and a user at an NPDA terminal is also able to request and display errors from the EP data base.

Enhancements to Release 2 of NPDA are supported on OS/VS1 Release 7 and higher releases and on the following access methods:

ACF/VTAM Release 2 and higher levels or ACF/VTAM Version 2  
ACF/TCAM Version 2 and higher levels  
ACF/VTAME

Communication between the FERS or DEMF facilities and the Network Problem Determination Application is not supported.

**Dependencies:** The Network Problem Determination Application (NPDA) program product is dependent upon the System Modification Program (SMP) for installation on OS/VS2 (MVS) and OS/VS1. The NCCF program product is a prerequisite for operation of NPDA.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

This licensed program is designed to operate on the following IBM processors: 4300, S/370 and 303X.

NPDA logging and simulation components execute as subtasks under NCCF. Network Problem Determination Application user commands and display responses run as application programs.

**Hardware:** User access to problem determination data is supported with the following IBM 3270 Information Display Systems: IBM 3277 mdl 2 ... IBM 3275 mdl 2, 12 ... IBM 3276 mdls 2, 3, 4, 12, 13, 14 ... IBM 3278 mdls 2, 3, 4, 5 ... IBM 3279 mdls 2A, 2B, 3A, 3B (monochromatic). For effective operation, ECs for individual controllers may be necessary. See sales pages for details. SNA/SDLC models of 3274 and 3276 must be at the appropriate EC level to function properly with the summary maintenance statistics support in NCCF and NPDA.

**Storage:** The Network Problem Determination Application requires approximately 450K bytes for OS/VS, and 355K bytes for DOS/VS of virtual storage.

**DASD:** The Network Problem Determination Application requires any DASD device supported under VSAM for program storage and the SNA data base. It requires any DASD device supported by BDAM for the EP data base.

#### SOFTWARE REQUIREMENTS

The Network Problem Determination Application is provided as a program product on OS/VS2 (MVS) Release 3.8 or OS/VS1 Release 6.7 or 7 with TCAM Release 10, ACF/TCAM Version 1, ACF/TCAM Version 2, VTAM Release 2, ACF/VTAM Version 1 or ACF/VTAM Version 2. NPDA will run with ACF/VTAM Version 1 Release 2 and 3 and with ACF/VTAME on DOS/VSE environment. NPDA will operate with ACF/VTAM Release 2 and Release 3 and ACF/TCAM Version 2 as an application of NCCF which operates in a VM/370 environment. NPDA supports only remote controllers/terminals in this environment. Documentation shipped with the Network Problem Determination Application includes the program directory containing instructions for the installation of the package.

#### DOCUMENTATION

(available from Mechanicsburg)

*Network Problem Determination Application General Information (GC34-2010) ... Network Problem Determination Application Program Summary (GC34-2008) ... Network Problem Determination Application Licensed Program Specifications (GC34-2009).*

#### MVS SYSTEM INTEGRITY

IBM will accept APARs describing any situation where the installation of the Network Problem Determination Application causes an exposure to the system integrity of OS/VS2 (MVS).

RPQs ACCEPTED: No.

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**ADVANCED COMMUNICATIONS FUNCTION for NCP  
(ACF/NCP) VERSION 2 for the 3705  
5735-XX9**

**PURPOSE**

Advanced Communications Function for the Network Control Program (ACF/NCP) Version 2 is a program product for users of OS/VS1, OS/VS2 MVS, SSX/VSE and DOS/VSE that offers the capabilities of ACF/NCP/VS Version 1, Release 3, plus improved diagnostic and performance tools for 3705 Communications Controllers.

ACF/NCP V2 is designed to operate in 3705-II and 3705-80 Communications Controllers, whether channel-attached to a host processor, or remotely connected to a host processor by an SDLC link to another controller. ACF/NCP V2 is generated using the ACF/System Support Programs (ACF/SSP) Version 2 (5735-XXA).

**HIGHLIGHTS of ACF/NCP V2**

Offers users of the 3705-II and 3705-80 function equivalent to that offered by ACF/NCP V1 R3, plus:

- A Generalized Path Information Unit Trace.
- Support for the session trace facility of the Network Logical Data Manager (NLDM) program product.
- Network Performance Analyzer function.
- Enhanced Address Trace.
- A Dispatcher Trace.
- Capability to load PEP load modules using data links.

**SUMMARY and ADVANTAGES:**

- A new trace for diagnosing and analyzing network operating data provides Path Information Unit (PIU) records for select resources in an SNA network. This Generalized PIU Trace is activated by the host access method and forwarded by ACF/NCP/VS to the host, where it can be recorded, formatted, and printed by a utility of ACF/SSP, the ACF Trace Analysis Program.
- The Session Trace function collects status information about NCP resources and identifies host and NCP session partners for session diagnosis and analysis. A host application program product, the Network Logical Data Manager (NLDM), activates the reporting of session trace data and solicits session trace data from ACF/NCP Version 2. The NLDM Session Trace is totally independent of other ACF/NCP trace facilities, including the Generalized PIU Trace.
- A performance tool, the Network Performance Analyzer, previously available as a field developed program (5798-CZT), is now provided as a part of ACF/NCP V2. The Network Performance Analyzer can highlight the causes of performance degradation, such as excessive traffic at certain periods, or insufficient line capacity. It may also aid in isolating performance problems induced by high line or cluster error rates caused by temporary errors or wide fluctuations in message rates. Data from this performance tool can be used to tune networks for greater efficiency and potentially improved response times. The Network Performance Analyzer host component, FDP number 5798-CZR, is a recommended co-requisite for this function.
- The Address Trace has been enhanced to permit tracing of either a register address or the address of a main storage location plus a displacement. The range of displacements that can be specified is 256 bytes. Multiple displacements may be specified following an address, and two-address or displacement combinations may be traced.
- The Dispatcher Trace is a service aid that is continuously active in the network control program, recording entries in the Dispatcher Trace Table for each QCB task that is dispatched by ACF/NCP/V2. The QCB regulates the sequential use of a programmer-defined facility among requesting tasks.
- The ACF/NCP Partitioned Emulation Programming (PEP) Extension load module can be loaded over a data link to a channel-attached 3705 Communications Controller.

**MIGRATION and PLANNING CONSIDERATIONS**

ACF/NCP Version 2 is designed to operate in the 3705-II and 3705-80 Communications Controllers. It supports and can communicate with:

**Host-resident Programs:**

- ACF/SSP V2
- ACF/TCAM V2 R3
- ACF/TCAM V2 R4
- ACF/VTAM V1 R3
- ACF/VTAM V2
- EREP
- NPA-Host, FDP Number 5798-CZR (Release 1.3)

- NPDA V2
- NLDM

**Controller-resident Programs:**

- ACF/NCP V2
- ACF/NCP V1 R2.1
- ACF/NCP V1 R3
- EP for the 3705 (SCP 5747-CH2 with EP/VS feature)
- Network Routing Facility (NRF)
- NTO R2
- X.25 NCP Packet Switching Interface (Release 3.1\*)

\* Support is provided at the X.25 NCP Packet Switching Interface (NPSI) Release 3 and ACF/NCP V1 R3 functional levels. The additional functions provided by ACF/NCP Version 2 are not supported. X.25 NPSI Release 3.1 support will be available July, 1983.

**CUSTOMER RESPONSIBILITIES**

To install and use ACF/NCP Version 2, the customer must:

- Design the single system network or multiple host communications system network.
- Meet the requirements of the host communications access method products to be operational with ACF/NCP Version 2.
- Meet minimum 3705-II or 3705-80 configuration requirements to support ACF/NCP V2 in the planned environment.
- Order and install all required communications equipment.
- Order and install ACF/NCP Version 2 (5735-XX9), and ACF/System Support Programs (ACF/SSP) Version 2 (5735-XXA).
- Generate ACF/NCP V2 using ACF/SSP Version 2 for the network configuration.
- Load the 3705 with the generated ACF/NCP V2 load module using, for example, the ACF/System Support Programs V2.

To install and use the PEP extension of ACF/NCP Version 2, the customer must:

- Design the network.
- Meet the requirements of the host processor access method that is to communicate with the generated and loaded PEP.
- Meet minimum 3705-II or 3705-80 configuration requirements to support ACF/NCP V2 and the PEP extension in the planned environment.
- Order and install all required communications equipment.
- Order and install ACF/NCP V2 (5735-XX9), ACF/SSP V2 (5735-XXA), and SCP Program (5747-CH2) with the EP/VS feature.
- Generate PEP using ACF/SSP V2 for the network configuration.
- Load the 3705 with the generated PEP load module using, for example, ACF/SSP V2.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM machines: IBM 3705-II or IBM 3705-80, either channel-attached to a host processor, or remotely connected to a host processor by an SDLC link to another controller.

**SOFTWARE REQUIREMENTS**

ACF/NCP Version 2 is generated using the ACF/System Support Programs (ACF/SSP) V2 (5735-XXA). ACF/NCP V2 operates with VSE/AF Release 3, SSX/VSE Release 3, OS/VS1 Release 7, and OS/VS2 MVS Release 3.8 or MVS/SP Release 1.3.1, and subsequent releases and modifications unless otherwise stated.

Use of the Partitioned Emulation Programming (PEP) extension of ACF/NCP V2 requires the additional installation of SCP, program number 5747-CH2, with the EP/VS feature.

ACF/NCP V2 supports the following releases of ACF/TCAM and ACF/VTAM, at the functional level of the access method:

Support For ACF/NCP V2 Generalized PIU Trace*	Support for NLDM*
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**ACF/NCP V2 for the 3705 (cont'd)**

ACF/TCAM V2 R3	No	No
ACF/TCAM V2 R4		
MVS	Yes	Yes
VS1	Yes	No
ACF/VTAM V1 R3		
MVS	Yes	Yes
VS1	No	No
VSE	No	No
ACF/VTAM Version 2		
MVS	Yes	Yes
VS1	Yes	No
VSE	Yes	No

**Notes:**

- (1) Generalized PIU Trace facility support provided only for MVS, with appropriate PTF.
- (2) Generalized PIU Trace support provided for MVS by PTF; PTF not required for Generalized PIU Trace support in VS1 and VSE environments.

**ACF/NCP VERSION 1**

IBM 3705 Communications Controller customers can continue to order ACF/NCP Version 1 Release 2.1 and 3, after the availability of ACF/NCP Version 2.

**Program Currency:** For program support purposes, ACF/NCP Version 1 Release 2 and its co-requisite programs will remain current until June 30, 1983.

**DATA SECURITY, AUDITABILITY and CONTROL**

ACF/NCP Version 2 enables the installation to establish and maintain integrity of the data communication network. The installation can control sessions between application programs and terminals.

Since sensitive data may be included in the Session Trace and Line Trace, user management may wish to control access to this information.

In OS/VS environments, the ACF/VTAM Encrypt/Decrypt Feature, and the Encrypt/Decrypt facility of ACF/TCAM can provide increased facilities to safeguard the information transmitted between logical units in the network.

User management is responsible for the selection, application, adequacy, and implementation of these facilities and for appropriate application and administrative controls.

**PERFORMANCE and STORAGE CONSIDERATIONS**

The functions provided by ACF/NCP V2 will increase NCP storage requirements and path lengths over those of ACF/NCP V1.

The actual performance impact (if any) to a customer will vary depending on particular hardware and network configuration.

**DOCUMENTATION**

(available from Mechanicsburg)

*Advanced Communications Function for the Network Control Program for the IBM 3705, Advanced Communications Function for System Support Programs for the IBM 3705, General Information (GC30-3058-2) .... Advanced Communications Function for the Network Control Program and System Support Programs, Installation and Resource Definition (SC30-3167-0) .... Advanced Communications Function for the Network Control Program and System Support Programs, Utilities (SC30-3168-0) .... Advanced Communications Function for the Network Control Program and System Support Programs, Messages and Codes (SC30-3169-0) .... Advanced Communications Function for the Network Control Program, Customization (SC30-3170-0) .... Advanced Communications Function for the Network Control Program and System Support Programs, Diagnosis Guide (SC30-3171-0) .... Advanced Communications Function for the Network Control Program for the IBM 3705, Logic (LY30-3061-0) .... Advanced Communications Function for Control Program for the IBM 3705, Reference Summary and Data Areas (LY30-3062-0)*

**RPOs ACCEPTED:** No

**ADVANCED COMMUNICATIONS FUNCTION for NCP  
(ACF/NCP) VERSION 2 for the 3725  
5735-XX9**

**PURPOSE**

Advanced Communications Function for the Network Control Program (ACF/NCP) Version 2 for the 3725 is a program product for users of OS/VS1, OS/VS2 MVS and DOS/VSE that offers the capabilities of ACF/NCP Version 2 for the 3705 plus reduced system generation time, enhanced problem determination tools, error recording and availability. ACF/NCP Version 2 for the 3725 is designed to operate with the 3725 Communications Controllers, whether channel attached to a host processor, or remotely connected to a host processor by an SDLC link to another controller. ACF/NCP Version 2 for the 3725 is generated using the ACF/System Support Programs (ACF/SSP) Version 2 Release 1.1 (5735-XXA).

**HIGHLIGHTS**

ACF/NCP/VS Version 2 for the 3725 offers users of the 3725 Communication Controller function equivalent to that offered users of the 3705 by ACF/NCP Version 2, plus:

- Enhanced problem determination and performance evaluation tools.
- Enhanced error recording and notification.
- Improved availability through continued operation and controlled shutdown in various failure situations.
- Reduced time required for system generation and maintenance.
- Support for Release 4 of the X.25 NCP Packet Switching Interface program.
- Support for storage sizes up to 1 megabyte.

**DESCRIPTION**

The 3725 Communication Controller provides a display console that ACF/NCP Version 2 for the 3725 supports with problem determination tools, allowing the controller operator to:

- Perform wrap tests.
- Activate line test in order to test the operation of lines and modems.

ACF/NCP Version 2 for the 3725 additionally offers problem determination tools that allow the system operator to:

- Obtain a dump of controller's service processor records, or of communication scanner processor storage or Maintenance and Operator Subsystem (MOSS) storage.
- Users may specify the number of bytes of trace data (up to 254) to be included in the trace, in lieu of activating a full trace.
- Activate scanner interface trace for a given line in order to isolate problems to NCP or communication scanner processor.

ACF/NCP Version 2 for the 3725, in conjunction with the 3725 MOSS, maintains several types of error and statistical records that are helpful in problem determination. These are basically of two types: Those that are stored in the controller and sent to the host processor in response to host processor requests; and those (alert messages) that are sent automatically without being requested, notifying the host processor operator of serious and permanent errors in the 3725 controller.

- For those systems that include the Network Problem Determination Application (NPDA) program product for network management, the network operator is informed of an alert message through the NPDA display.
- For those systems that do not include NPDA, the host operator is informed of an alert message through the access method control.
- At the same time, in either case, a message lamp is activated on the 3725 control panel, and an alarm message (containing the same information as in the alert message sent to the access method console) is displayed at the controller operator console.

In addition to these error notification messages, the types of error statistics maintained by NCP and the 3725's MOSS are:

Internal, or box error records:

- Channel adapter errors, program checks and unresolved interrupts.
- Communication scanner and CCU software errors.

(The 100 most recent such records can be accessed through the 3727 Operator Console, or by the host processor through the dump utility of ACF/NCP V2 Release 1.1 or the corresponding access method facility.)

External, or network error records:

- BSC/SS station statistics and permanent BSC/SS line errors.
- Permanent SNA link and station errors.

- In addition to existing availability and recovery functions in the network control program, ACF/NCP Version 2 for the 3725 and the 3725 MOSS offer improved availability through continued operation and controlled shutdown of the failing components, in the following situations:

- Unrecoverable level 1 error on a 3725 channel adapter.
- Unrecoverable level 1 error on a single communication scanner.
- Failure of the 3725 maintenance and operator subsystem.

- The time required to generate and maintain an NCP has been reduced by the elimination of conditional assemblies. Refer to the Announcement Letter for ACF/System Support Programs Version 2 Release 1.1 (5735-XXA) for details.

- Support of Release 4 of the X.25 NCP Packet Switching Interface (5668-981) provides X.25 support for the 3725 only. X.25 functional support is at the same level as that provided by Release 3.1 of the X.25 NCP Packet Switching Interface program product, which supports ACF/NCP V2 for the 3705.

In addition, NPDA support unavailable with X.25 NPSI releases 1, 2, 3 and 3.1, is provided by X.25 NPSI Release 4 in conjunction with a later version or release of NPDA.

**CUSTOMER RESPONSIBILITIES**

To install and use ACF/NCP Version 2 for the 3725, the customer must:

- Design the single system network or multiple host communication system network.
- Meet the requirements of the host communication access method products to be operational with ACF/NCP Version 2 for the 3725.
- Meet minimum 3725 configuration requirements to support ACF/NCP Version 2 for the 3725 in the planned environment.
- Order and install all required communication equipment.
- Order and install ACF/NCP Version 2 for the 3725 (5735-XX9), and ACF/System Support Programs (ACF/SSP) Version 2 Release 1.1 (5735-XXA).
- Generate ACF/NCP Version 2 for the 3725 using ACF/SSP Version 2 Release 1.1 for the network configuration.
- Load the 3725 with the generated ACF/NCP Version 2 for the 3725 load module using the ACF/System Support Programs Version 2 Release 1.1.

To install and use the PEP extension of ACF/NCP Version 2 for the 3725, the customer must:

- Design the network.
- Meet the requirements of the host processor access method that is to communicate with the generated and loaded PEP.
- Meet minimum 3725 configuration requirements to support ACF/NCP Version 2 for the 3725, and the PEP extension in the planned environment.
- Order and install all communication equipment.
- Order and install ACF/NCP Version 2 for the 3725 (5735-XX9), ACF/SSP Version 2 Release 1.1 (5735-XXA), and EP for the 3725 (5735-XXB).
- Generate PEP using ACF/SSP Version 2 Release 1.1 for the network configuration.
- Load the 3725 with the generated PEP load module using ACF/SSP Version 2 Release 1.1.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the IBM 3725 Communication Controller, either channel attached to a host processor, or remotely connected to a host processor by an SDLC link to another controller.

**SOFTWARE REQUIREMENTS**

ACF/NCP Version 2 for the IBM 3725 is generated using the ACF/System Support Programs (ACF/SSP) Version 2 Release 1.1 licensed program (5735-XXA). ACF/NCP Version 2 for the IBM 3725 operates with VSE/AF Release 3, OS/VS1 Release 7, and OS/VS2 MVS Release 3.8 or MVS/SP Release 1.3.1. For reasons of compatibility and co-existence, ACF/SSP Version 2 will operate with the appropriate release of VTAM in MVS Extended Architecture (MVS/XA) 24-bit addressing mode.

Use of the Partitioned Emulation Programming (PEP) extension of ACF/NCP Version 2 for the IBM 3725 requires the additional installa-

**ACF/NCP V2 for the 3725 (cont'd)**

tion of the Emulation Program for the IBM 3725 (EP/3725) licensed program (5735-XXB).

ACF/NCP Version 2 for the IBM 3725 supports the following releases of ACF/TCAM and ACF/VTAM, at the functional level of the access method:

- ACF/TCAM Version 2 Release 4.
- ACF/VTAM Version 1 Release 3 (MVS only, with appropriate PTF).
- ACF/VTAM Version 2.

**MIGRATION and PLANNING CONSIDERATIONS**

ACF/NCP Version 2 for the 3725 is designed to operate in the 3725 Communication Controller. It supports and can communicate with:

**Host-resident Programs:**

- ACF/SSP Version 2 Release 1.1
- ACF/TCAM Version 2 Release 4
- ACF/VTAM V1 Release 3 (MVS only)
- ACF/VTAM Version 2
  - MVS
  - VS/1
  - VSE
- EREP 1.5
  - MVS/VS1
  - VSE/VM
- NPA-Host, FDP Number 5798-CZR
- NPDA Version 2
- NCCF Release 2
- NLDM

**Controller-resident Programs:**

- ACF/NCP Version 2 for the 3725
- EP for the 3725 (EP/3725) PEP
- NTO Release 2
- X.25 NPSI Release 4
- ACF/NCP for the 3705 (current releases)

Stage 1 program generation source decks for ACF/NCP Version 1 Release 3 and ACF/NCP Version 2 for the 3705 will generate ACF/NCP Version 2 for the 3725 with slight modifications. These modifications are not extensive and are relatively simple to implement. They include the addition and deletion of certain macros and macro operands. See *ACF/NCP and SSP, Installation and Resource Definition* (SC30-3167) for details.

**ACF/NCP for the 3705:** 3705 Communication Controller customers can continue to order ACF/NCP Version 2 for the 3705 after the availability of ACF/NCP Version 2 for the 3725. ACF/NCP Version 1 Release 3 and Release 2.1 can also be ordered for the 3705.

**DATA SECURITY, AUDITABILITY and CONTROL**

ACF/NCP Version 2 for the 3725 enables the installation to establish and maintain the integrity of the data communication network. The installation can control sessions between programs and terminals.

In OS/VS environments, the ACF/VTAM Encrypt/Decrypt feature, and the Encrypt/Decrypt facility of ACF/TCAM, can provide increased facilities to safeguard the information transmitted between logical units in the network.

User management is responsible for the selection, application, adequacy, and implementation of these facilities and for appropriate application and administrative controls.

**PERFORMANCE and STORAGE CONSIDERATIONS**

Path lengths for ACF/NCP Version 2 for the 3725 should closely approximate those for ACF/NCP V2 for the 3705. This, in combination with the performance improvements of the 3725 communication controller, should result in a substantial gain in performance. Storage requirements will increase over previous releases of ACF/NCP for the 3705 due to the elimination of conditional assemblies. The net increase in NCP storage will be smaller for the user who previously selected more options, than for the user who previously selected fewer options.

The actual performance impact (if any) to a customer will vary depending on particular hardware and network configuration.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Advanced Communications Function for the Network Control Program Version 2 for the IBM 3725, Advanced Communications Function for the System Support Programs Version 2, and Emulation Program for the IBM 3725, General Information* (GC30-3071) ... *Advanced Communications Function for NCP (ACF/NCP) Version 2 for the IBM 3725 Licensed Program Design Objectives* (GC30-9558) ... *ACF/System Support Programs Version 2 Release 1.1 Licensed Program Design Objectives* (GC30-9559) ... *NCP Packet Switching Interface, Release 4, Licensed Program Design Objectives* (GC30-9561).

**RPOs ACCEPTED: No**

PROGRAM PRODUCTS

**DOS PL/I RESIDENT LIBRARY  
5736-LM4**

**PURPOSE**

This program product is used in conjunction with the *DOS PL/I Optimizing Compiler* (5736-PL1). For the complete compilation and execution of a PL/I program, the following additional program products are required:

- DOS PL/I Resident Library - 5736-LM4 (for link-editing)
- DOS PL/I Transient Library - 5736-LM5 (for execution)

**DESCRIPTION**

For a processor in which programs are compiled but not link-edited or executed, only the compiler is required. For a processor in which programs are link-edited but not compiled or executed, only the resident library is required. For a processor in which programs are executed but not compiled or link-edited, only the transient library is required.

The DOS PL/I Resident Library consists of those subroutines which, when link-edited under DOS with the object module produced by the DOS PL/I Optimizing Compiler, form a phase or object program for subsequent execution under DOS. To execute a phase the DOS PL/I Transient Library is required.

The functional areas serviced by subroutines of this library are as follows:

- Mathematical routines (e.g., SIN, COS).
- Data type conversion (e.g., Pictured Character to Float).
- Edit, List and Data-Directed I/O (Stream I/O).

Control program interfaces, including:

- Program Initialization.
- Storage Management.
- Display.
- Timer Facilities.
- Error Handling

but excluding those routines loaded during execution (see "Program Product Specifications" for DOS PL/I Transient Library).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Link Edit: Direct access storage space is required for the Resident Library (approximately 700 blocks of 322 bytes each).

Execution: The main storage requirements of the object program are a function of the PL/I facilities used. The decimal and floating point instruction sets are required. The timer feature is required if use is made of the TIME built-in function or the DELAY statement.

The object program can utilize the following IBM input/output devices if they are supported by the release of the DOS or SSX/VSE system used:

**Using SAM Support:**

- Magnetic Tape Units - 2400, 3420, 3410, 3411
- Diskette Unit - 3540
- Card Units - 1442, 2501, 2520, 2540, 3504, 3505, 3525, 2560, 5425
- Optical Mark Reader - 3881
- Printers - 1403, 1404, 1443, 1445, 3203, 3211, 3262, 4245, 5203
- Direct Access Storage - Fixed block disk devices

**Using SAM and DAM Support:**

- Direct Access Storage - 2311, 2314, 2321, 3330-1, 3340, 3330-11, 3350

**Using ISAM Support:**

- Direct Access Storage - 2311, 2314, 2321, 3330-1, 3340, 3344, 3330-11, 3350 in 3330-1 compatibility mode

**Using VSAM Support:**

- Direct Access Storage - 2314, 3330-1, 3340, 3330-11, 3344, 3350 and fixed block disk devices

Under CMS, the object program can utilize those I/O devices which are supported by VM/370. For a list of the devices supported by VM/370, see the *IBM S/370: Planning and System Generation Guide* (GC20-1801).

**SOFTWARE REQUIREMENTS**

Release 5.1 of the resident library is supported on DOS Release 26 through DOS/VS Release 34, DOS/VSE with VSE/Advanced Functions Releases 1 and 2 and the CMS component of Releases 3 through 6 of VM/370, until March 31, 1982. After March 31, 1982, Release 5.1 of the resident library is no longer current.

Release 6.0 of the resident library is supported on DOS/VSE with VSE/Advanced Functions Release 2 or SSX/VSE, and on the CMS component of Release 6 of VM/370, and subsequent versions, releases and modifications, unless otherwise stated in a modification of the specifications.

Object programs must be executed under the Disk Operating System or SSX/VSE or under the Conversational Monitor System (CMS) component of VM/370. The timer system generation option is required if use is made of the TIME built-in function or the DELAY statement.

Object programs may also be executed as application programs in the CICS environment.

A subset of Library modules may, on installation option, be placed in CICS/NUCLEUS at PL/I installation time, with the intent of improving performance under a CICS/DOS/VS System.

**COMPATIBILITY**

A specific release of the DOS PL/I Resident Library can be used with any DOS PL/I Optimizing Compiler released prior to or on the same date as the Resident Library.

**DOCUMENTATION**  
(available from Mechanicsburg)

Title	Order Number
DOS/PL/I Resident Library Specifications	GC26-3996
DOS/PL/I Optimizing Compiler General Information Manual	GC33-0004

RPOs ACCEPTED: No

**NOTE:** The SSX/VSE version of the DOS/PL1 Compiler and Libraries is based on Release 5.1. For SSX/VSE, the DOS/PL1 resident library will only be available together with the DOS PL/I transient library and the DOS/PL1 Optimizing Compiler as one package with a specific order number.

PROGRAM PRODUCTS

**CONSOLIDATED FUNCTIONS ORDINARY II  
CFO II (5736-N13)**

**PURPOSE**

The Consolidated Functions Ordinary II System represents a proven systems approach to maintaining, processing and servicing individual life insurance contracts. CFO II takes advantage of the experience and knowledge gained from the IBM '62 CFO system (1401-IL-02X). Although CFO II is a new system, the successfully-proven logic structure of the '62 CFO Daily Cycle and Periodic Update programs has been maintained and enhanced in this CFO II system.

**DESCRIPTION**

CFO II processes both scheduled and non-scheduled transactions, updates policies with cash values, dividends and other forms of participation and updates policies with renewable term premiums. Capabilities provide for policy status on loan, surrenders and mode premium values.

The CFO II system functions under the control of the Operating System, Disk Operating System, mdl 20 Tape Programming System, or mdl 20 Disk Programming System. It is programmed using a subset of the Assembler languages for these controlling programs. The insurance logic programming has been fully commented and documented to enable the user to better understand and modify the system. The CFO II system satisfies the major processing requirements for ordinary life insurance from the point in time immediately following policy issue through maturity, expiration or termination of the contract. The logic for certain accident and health processing is also contained in CFO II.

**HIGHLIGHTS**

Wide range of scheduled and non-scheduled transaction processing ... fully automatic APLs ... powerful status reporting, quoting or processing of cash surrenders, conversions, and loans ... handles standard billing forms ... contains insurance improvements developed through experience gained with '62 CFO. Examples are single line name and address processing ... loan processing contains cash value of term riders ... terminated policy master records remain on file for ease in reinstatement ... flexible policy master record allows for two user trailers ... available for small companies with 24K Model 20 systems with upward compatibility provided for DOS and OS users.

**USE**

The policy master record file and unscheduled transactions are input to the CFO II system and are processed by the 16 daily cycle programs. Scheduled transactions are initiated by information contained on the policy master record. In addition to the updated policy master records, output from the CFO II system daily cycle is in the form of policy and general accounting journals, transaction and error registers, and status reports.

Programs which update policy master records with cash values, dividends or other forms of participation and renewable term premiums are run periodically.

**CUSTOMER RESPONSIBILITIES**

Before the CFO II System may be successfully implemented, the user must --

- Acquire thorough knowledge and understanding of the Consolidated Functions Ordinary System.
- Design and implement procedures that will convert present policy master records to a form acceptable to the Consolidated Functions Ordinary II System.
- Generate participation, renewable term, cash value, rate files.
- Develop adequate procedures and programs to generate policy master records for all new business, exchange, conversion, and reinstatement contracts.
- Write programs to print all premium, anniversary, and loan activity notices.
- Write programs to prepare commission statements and agency accounting statements from system-generated output.
- Develop procedures to balance against external controls all assets and liabilities which are related to a specific policy.
- Develop procedures and programs to provide for Valuation and Policy Exhibit.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

CFO II is designed to operate in either a S/360 mdl 20 environment or on mdl 25 and larger systems. The minimum machine configuration is provided for the basic mdl 20 system and the mdl 25 system. In addition, the Decimal Arithmetic feature is required for mdl 30 and 40 systems.

Model 20 minimum configuration requires at least 20K bytes available for program, data and access method storage with the following devices:

Product	Model	Feature	Description
2020	DC5		Processing Unit
		4460	1442 mdl 5 Attachment
		8090	2501 Attachment
		8082	2203 mdl A1 Attachment
		4658	I/O Channel
1442	5		Card Punch
2501	A1		Card Reader
2203	A1		Printer
2415	2		(4) Magnetic Tape Units

Model 25 minimum configuration operating under DOS requires at least 22K bytes available for program, data and access method storage with the following devices:

Product	Model	Feature	Description
2025	E		Processing Unit
		4598	Integrated 2311 Attachment
		6960	Selector Channel
1052	7		Printer/Keyboard
1442	N1		Card Read Punch
1443	N1		Printer
2311	1		Disk Storage Drive
2415	2		(4) Magnetic Tape Units

For Operating System, in addition to the OS requirements, CFO II requires a region size of 30K for MFT and MVT along with space in auxiliary storage for the following data sets: System input and output (print and punch) -- selectable with Job Control Language ... up to four input and output sequential data sets used for such things as policy master records, external transactions, mortality tables, rate tables, activity records, and sort work files.

**SOFTWARE REQUIREMENTS**

CFO II operates under mdl 20 TPS or DPS, DOS, and OS and is written in a subset of the Assembler languages for these controlling systems. All file processing is sequential. The Sort/Merge programs for either TPS, DPS, DOS, or OS are also used with the CFO II System.

**DOCUMENTATION** (available from Mechanicsburg)

*Application Description Manual* (GH20-0883) ... *Promotional Flyer* (G520-2411).



PROGRAM PRODUCTS

**ALPHA SEARCH INQUIRY SYSTEM  
5736-N14**

**PURPOSE**

Alpha Search Inquiry System is a terminal-oriented system for the retrieval of name records through phonetic techniques.

The Alpha Search Inquiry System consists of a set of routines that create, maintain, reorganize and provide terminal access to a file containing customer names and customer numbers which reference other user files. Depending on the environment in which the Alpha Search Inquiry System is used, customer numbers may be synonymous with one or more of the following terms: Account numbers ... policy numbers ... contract numbers ... certificate numbers ... subscriber numbers ... document numbers ... license numbers ... part numbers ... invoice numbers.

Phonetic encoding increases the user's ability to access the alpha search record even though the exact spelling is not known. Thus, the effects of transcription errors, partially illegible signatures on correspondence and sound-alike names can be reduced.

**DESCRIPTION**

Of the five routines that make up Alpha Search Inquiry System, four create and maintain the alpha search file, while the fifth (inquiry program) provides terminal access to the alpha search file. The alpha search file is intended to contain only one alpha search record per customer, pointing to one or more records on the user data file(s).

To create the file, the user extracts from his user file(s), name (which may be unformatted), secondary identifiers (1 to 9), user data (if applicable) and customer number(s). The Alpha Search Inquiry System then strips superfluous information from the name, generates a record key and formats the record for loading onto an ISAM or VSAM file. For personal names, the record key is generated through a phonetic encoding technique to reduce the problem of sound-alike and misspelled names. For commercial names, an alphameric technique is employed to generate the record key. If multiple records exist for a single customer, the customer numbers are combined into a single record.

The inquiry portion of this program product, which runs under control of CICS, retrieves one or more names from the alpha search file for display on the 3270 Display Station. The terminal operator may reduce the number of names displayed through secondary identification (for example, birth date, social security number, partial address) and a *degree of likeness* on name. All customer numbers pertaining to a name are displayed.

CICS/DOS/VS (5746-XX3), CICS/OS/VS (5740-XX1), CICS/DOS-Entry (5736-XX6), CICS/DOS-Standard (5736-XX7) or CICS/OS-Standard (5734-XX7) is a prerequisite. The inquiry portion of the program runs as an application program under CICS and is capable of being multi-tasked along with other CICS application programs. The 3270 Information Display System (local or remote) is supported. This program product is written in Assembler language using macros to tailor the system to user requirements and provide operating system compatibility. The program can be assembled and executed under either DOS/VS or OS/VS on a S/370 with virtual storage capabilities or under DOS/VS or OS/VS operating under VM/370.

**HIGHLIGHTS**

- A single Alpha Search file record can contain any number of customer numbers pointing to customer records in multiple files.
- Programs are provided to aid the user in creating and maintaining the alpha search file.
- The system provides for user-defined information in the alpha search record.
- Parameters are provided to tailor system and screen formats to user requirements.
- The system provides a file browse functions to allow partial input of last name.
- The system can search for a record with as many as nine secondary identifier fields (for example, birth date, social security number, partial address). The identifiers may be varied from transaction to transaction. Portions of each identifier may be entered when the terminal operator does not know all the information of the secondary identifier.
- Secondary identifiers and *degree of likeness* on the entered name reduce retrievals to common surnames.
- Separate encoding routines are provided to handle the differing characteristics of personal names and commercial names.
- A program exit in the alpha search inquiry program allows the user to pass control from the inquiry program to user application programs for referencing other customer files.
- The system utilizes features offered by the 3270 Information Display System; dual density screen, protected data fields, read

modified data only, selector light-pen, program tab and large 1920 character screen.

- The system utilizes the capabilities of CICS to provide: File management support ... multi-tasking environment ... terminal management ... storage management ... data management ... program management services ... time management (optional).
- The system is compatible between DOS/VS and OS/VS.

**USE**

The terminal operator enters a CICS transaction code, name and additional search information. The alpha search inquiry program queries the alpha search file and returns to the operator those names which are similar or identical to the name entered by the terminal operator along with their respective customer numbers.

**CUSTOMER RESPONSIBILITIES**

Before the Alpha Search Inquiry System may be successfully implemented, the user must:

- Acquire thorough knowledge and understanding of the Alpha Search Inquiry System, using the *Operations Guide* and *Program Reference Manual* written for the system.
- Prepare parameters for tailoring the input/output records and terminal formats to meet user requirements.
- Write programs to extract names, secondary identifiers, user data (if applicable) and customer numbers from existing files for use in establishing the alpha search file.
- Generate transactions for the update program (normally the user would modify his existing file maintenance programs to generate these transactions).
- Secure and generate the Customer Information Control System, and be knowledgeable in its operational and functional characteristics.
- Train terminal operators in the operation of the 3270 Display Station.
- Be knowledgeable in the characteristics of the applicable operating system environment and its data management facilities, including the Indexed Sequential Access Method or Virtual Storage Access Method.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum machine requirement is an IBM S/370 processor operating with OS/VS1, OS/VS2, DOS/VS or with these operating systems operating under VM/370. A virtual partition or region size of at least 64K bytes (excluding access methods) is required for the Alpha Search Inquiry System batch programs. The online (inquiry) program minimum requirement is a virtual partition or region which will contain 24.5K bytes. This does not include the CICS and access method requirements. The 24.5K byte requirement is divided as follows:

	Bytes
I/O areas and work areas	2.0K
Transaction work area (per terminal)	0.5K
Main application area	20.0K
Reserved for maintenance	1.0K
Reserved for customer modifications	1.0K
<b>Total</b>	<b>24.5K</b>

DASD space is required for the alpha search file, the program libraries and the system control program requirements. An 80-column card reader, 132 character/line printer and two sequential data sets (tape or DASD) are required for the batch programs.

For OS/VS, two sequential data sets (tape or DASD) are required for batch program execution.

For DOS/VS, two 9-track tape drives are required for batch program execution.

When operating in a Virtual = Real environment, the availability of 44K bytes of real core will ensure maximum performance of the batch programs. The inquiry program can operate in as little as 12K bytes, consisting of the two longest program phases.

Also required is the IBM 3270 Information Display System with appropriate control units (local or remote). The display stations must include a 1920 position display screen and one of the following Keyboards: 66-Key EBCDIC Typewriter Keyboard (#4630) ... 66-Key EBCDIC Data Entry Keyboard (#4631) ... 78-Key EBCDIC Typewriter Keyboard (#4633) ... 66-Key ASCII Typewriter Keyboard (#4634) ... 78 Key-ASCII Typewriter Keyboard (#4635). The Selector Light-Pen is optional.



PROGRAM PRODUCTS

**Alpha Search Inquiry (cont'd)**

**SOFTWARE REQUIREMENTS**

This program product runs under either a Disk Operating System (DOS/VS) or Operating System (OS/VS) environment on S/370 with virtual storage capabilities or under DOS/VS or OS/VS operating under VM/370. The program is written in S/370 Assembler language. Communication with the Customer Information Control System (CICS) is via CICS macro instructions.

The namecode, file load, update and reorg routines operate as single tasks within a partition. The inquiry portion operates as a single task under control of CICS.

The alpha search inquiry portion of the program product requires the following CICS management facilities: Task management ... storage management ... program management ... terminal management ... file management ... temporary storage management ... time management (optional).

In addition to DOS/VS components and options specified for CICS (see "Programming Systems" section in the *CICS General Information Manual*, GH20-1028), the following components are required:

ISAM or VSAM  
Sort/Merge, 5743-SM1 or 5746-SM1

In addition to OS/VS components and options specified for CICS (see "Programming Systems" section in the *CICS General Information Manual*, the following components are required:

ISAM or VSAM  
Sort/Merge, 5734-SM1 or 5740-SM1

**General Documentation:** (available from Mechanicsburg)

General Information Manual	GH20-1188
Design Objectives	GH20-4235
Sales Flyer	G520-2629

PROGRAM PRODUCTS

**DOS PL/I OPTIMIZING COMPILER  
5736-PL1**

**PURPOSE**

The DOS PL/I Optimizing Compiler is designed specifically for generation of fast object programs. It provides a growth path for the users of Model 20 PL/I and the PL/I D (Version 4) compiler. Performance is achieved through the incorporation of the best design features of a number of well-proven compilers.

**Subroutine Libraries:** A subroutine library is required during link-editing of a compiler output module. A second library is required for execution of the object program. Each library is available as an IBM program product:

DOS PL/I Resident Library 5736-LM4 (for link-editing).

DOS PL/I Transient Library 5736-LM5 (for execution).

For a processor in which programs are compiled but not link-edited or executed, only the compiler is required. For a processor in which programs are link-edited but not compiled or executed, only the resident library is required. For a processor in which programs are executed but not compiled or link-edited, only the transient library is required. The three products are available packaged together (as program number 5736-PL3) or individually.

**HIGHLIGHTS**

- Extensive Optimization - Object code can be highly optimized so that programs generally require less execution time than those compiled by the PL/I D compiler.
- Advanced Level of PL/I - A powerful implementation of PL/I with language extensions and developments beyond the PL/I D (Version 4) level. Features include Compile-time Preprocessing, Arrays of Structures, DEFAULT Statement, File variables, Data-Directed Input/Output and Structured programming statements.
- VSAM Support - Support for the use of data sets created with or converted to VSAM. In most cases VSAM will be used directly; where this is not possible the ISAM interface will be used.
- Extensive Debugging Aids - The time and effort required for program checking are minimized by extensive implementation of on-units, support of the CHECK condition, facilities for dynamic dumping, data-directed input/output, a comprehensive range of options and clear and precise diagnostic messages at compilation and execution times.
- ASCII Support - ASCII data sets on magnetic tape can be created and accessed using SAM.
- Communication with FORTRAN, COBOL, RPG II and Assembler - This compiler facilitates communication between PL/I object modules and FORTRAN, COBOL, RPG II or Assembler object modules. (For details refer to *DOS PL/I Optimizing Compiler: Language Reference Manual* (GC33-0005) and *DOS PL/I Optimizing Compiler: Programmer's Guide* (GC33-0008).
- CMS Support - The compiler can be used with the CMS component of VM/370. The compiler can be invoked from a remote terminal.
- Extended Graphic Character Set Support - New functions (available on Release 6 only, not available under SSX/VSE), improve the usability of PL/I for applications requiring large character sets. This is accomplished by defining a new data set type, GRAPHIC, which defines two-byte string data (graphic string data). For detailed information see *OS and DOS PL/I Optimizing Compiler: Extended Graphic Character Set Support Supplement* (SC26-3971).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Compilation:** In DOS, the compiler itself requires at least 50K bytes of main storage, exclusive of the storage required for the operating system control program.

In DOS/VS, DOS/VSE and SSX/VSE the compiler will run in the minimum virtual partition, which is 64K exclusive of the storage required for the operating system control program. It is possible to compile with less real storage than the 50K design point of the compiler but performance will be degraded.

Additional storage, either real or virtual, can be used to reduce compilation time by reducing the use of auxiliary storage (SYS001 and SYS002) used by the compiler.

The IBM machine must include the floating-point and decimal instruction sets. The timer feature is required if the time taken for compilation or the time of compilation are to be recorded.

Direct-access storage space is required for Compiler residence - approximately 630 blocks of 1,728 bytes for 2311, 659 blocks of 1,688 bytes for 2314, 736 blocks of 1,504 bytes for 3330 or 736 blocks of 1,540 bytes for 3340. For Release 29 and later, the requirement is for approximately 1,200 blocks of 1,024 bytes, regardless of device.

**Execution:** The storage requirements of the object program are a function of the PL/I facilities used. The decimal and floating point instruction sets are required. The timer feature is required if use is made of the TIME built-in function or the DELAY statement.

The object program can utilize the following IBM input/output devices if they are supported by the release of the DOS or SSX/VSE system used:

**Using SAM support:**

- Magnetic tape units - 2400, 3420, 3410, 3411
- Card units - 1442, 2501, 2520, 2540, 3504, 3505, 3525, 2560, 5425
- Optical Mark Reader - 3881
- Diskette Unit - 3540
- Printers - 1403, 1404, 1443, 1445, 3203, 3211, 3262, 4245, 5203
- Direct Access Storage - fixed block disk devices

**Using SAM and DAM support:**

- Direct Access Storage - 2311, 2314, 2321, 3330-1, 3330-11, 3340, 3344, 3350

**Using ISAM Support:**

- Direct Access Storage - 2311, 2314, 2321, 3330-1, 3340, 3344, 3350 in 3330-1 compatibility mode

**Using VSAM Support:**

- Direct Access Storage - 2314, 3330-1, 3330-11, 3340, 3344, 3350 and fixed block disk devices.

**Compilation and Execution Under CMS:** To operate the compiler under CMS, the minimum CMS virtual machine size of 320K bytes is required.

When executing a PL/I program under CMS, the same processor features are required as are used when executing under the IBM Disk Operating System. Under CMS, the PL/I Optimizing Compiler and library support those I/O devices which are supported under the IBM Disk Operating System provided they are supported by VM/370. For a list of the devices supported by VM/370, see the *IBM VM/370: Planning and System Generation Guide* (GC20-1801).

**SOFTWARE REQUIREMENTS**

Release 5.1 of the compiler is supported on DOS Release 26 through DOS/VS Release 34, DOS/VSE with VSE Advanced Functions Releases 1 and 2 and the CMS component of Releases 3 through 6 of VM/370, until March 31, 1982. After March 31, 1982, Release 5.1 of the compiler is no longer current.

Release 5.1 of the DOS/PL1 Optimizing Compiler together with the libraries is also available as Prompter-supported program product on SSX/VSE with a specific order number.

Release 6.0 of the compiler is supported on DOS/VSE with VSE/Advanced Functions Release 2, and on the CMS component of Release 6 of VM/370, and subsequent versions, releases and modifications, unless otherwise stated in a modification of the specifications.

**Compilation:** SAM is used directly by the compiler. The DOS or SSX/VSE system level which supports a specific device is required for the compiler to use that device. The timer system generation option is required if the time taken for compilation or the time of compilation are to be recorded.

**Execution:** Object programs must be executed under the Disk Operating System or SSX/VSE or the Conversational Monitor System (CMS) component of VM/370. All object programs require SAM modules in the generated operating system.

Programs using the PL/I ENVIRONMENT option INDEXED to access ISAM data sets require ISAM modules. Programs using the REGIONAL environment option to access DAM data sets require DAM modules. Programs using the INDEXED or VSAM ENVIRONMENT options to access VSAM data sets require VSAM modules. VSAM can be used directly if the VSAM ENVIRONMENT option is specified.

Object programs may also be executed as application programs in the CICS environment.

**Compilation and Execution under CMS:** There are no restrictions on the language accepted by the compiler under CMS. Programs compiled under CMS will execute under the IBM Disk Operating System but the following features are not available when executed under CMS:

- Multipartition.
- ENVIRONMENT attribute options ASSOCFLE and FUNC.
- REGIONAL files.
- INDEXED file support.
- PL/I Sort facilities.

**DOS PL/I Optimizing Compiler (cont'd)**

- PL/I Checkpoint/Restart facilities.
- ASCII data sets.
- BACKWARDS attribute with magnetic tapes.

For additional information about the object time restrictions under CMS, refer to the publication *DOS PL/I Optimizing Compiler: CMS Users Guide* (SC33-0051).

**COMPATIBILITY**

- (a) Compatibility between different releases of the DOS PL/I Optimizing Compiler and the DOS PL/I Resident and Transient Libraries.

For the successful link-editing of object modules, the resident library must be from a release corresponding to, or later than the Compiler used. Object modules from different releases of the Compiler can be link-edited together - provided that the release of the resident library is at least as recent as the latest compiler used.

- (b) Compatibility with the DOS PL/I D Compiler:

The compiler is compatible with the PL/I D (Version 4) compiler in the following respects:

Source language	Yes
Data sets	Yes
Compiler restrictions	Yes
Object code	No

Detailed information on the minor incompatibilities arising from implementation differences, and from language extensions and changes, is given in the *DOS PL/I Optimizing Compiler Programmer's Guide* (SC33-0008).

A source program written for compilation by the Disk Operating System PL/I D (Version 4) compiler, in general, produces identical results when compiled by this compiler. However, users of the PL/I D (Version 4) compiler should be aware of the differences in the language and implementation characteristics between these compilers.

- (c) Compatibility with the OS PL/I Optimizing Compiler.

The OS PL/I Optimizing Compiler implements a superset of the DOS language and the high degree of compatibility between these two compilers provides a convenient migration path from DOS, DOS/VS or DOS/VSE to OS or OS/VS.

**Features**

**Extensive Optimization:** Object code can be optimized to a much greater extent than has previously been possible with PL/I compilers. Optimization is optional, the options available to the programmer being:

**OPT(TIME)** Object code optimized to minimize the time required for execution of the object program. The secondary effect may be a reduction in object program size.

**NOPT** No optional optimization, permitting fastest compilation. This is the standard default setting.

**Advanced Level of PL/I:** The level of PL/I is considerably more extensive than the language level supported by the DOS PL/I D (Version 4) compiler. The features offered to DOS PL/I users include:

- **Compile-Time Preprocessing** - The full range of PL/I compile-time preprocessing facilities is supported, thus providing a convenient method of modifying and completing a PL/I source program at compile-time. Additional built-in functions, **COUNTER**, **COMPILETIME** and **PARMSET**, are available. Statements **%NOTE**, **%PRINT** and **%NOPRINT** are introduced. Arguments to preprocessor procedures may be specified by keyword reference as well as positionally.
- **Arrays of Structures** - Manipulation of data aggregates is improved by the facility for using arrays of structures. Arrays and arrays of structures may have bounds specified by expressions or, if they are parameters, by an asterisk.
- **DEFAULT Statement** - The Default statement provides the programmer with a method of overriding the standard language default attributes for all identifiers and descriptors. This statement can also be used for subsequent revision to the standard defaults.
- **Improved Record I/O** - The record oriented input/output facilities are more flexible than those of the PL/I D (Version 4) compiler. The implicit **OPEN** capability is provided for **RECORD I/O** statements, together with implementation of the **EVENT** option. This permits processing to overlap input/output operations when using direct access methods, thus reducing execution time for object programs.
- **File Variables** - File names may now be variables, thus permitting increased flexibility in file handling.
- **Dynamic Extents for Strings and Arrays** - Bit strings, character strings and arrays can have their lengths or bounds respectively specified by expressions or, if they are parameters, by an asterisk. String manipulation is also improved by the implementation of the **VARYING** attribute for bit and character strings.

- **LIKE Attribute** - The Like attribute can be used in the declaration of structures, thus simplifying the coding of large structure declarations.

- **Dynamic Variables in the ENVIRONMENT Option** - Expressions such as maximum record length, blocksize, etc., for record I/O may be specified by variables in the ENVIRONMENT option, which are accessed at the time the file is opened.

- **Structured Programming Statements** - The ease with which Structured Programming Techniques can be utilized is increased in Release 5 of the compiler by the addition of the **SELECT** group, and the **LEAVE**, **DO UNTIL** and **DO REPEAT** statements.

- **VSAM support** - Current **RECORD I/O** language in existing programs, written for use with ISAM data sets, automatically runs on VSAM. New environment options allow PL/I Support for more VSAM features in new programs, compiled on Release 5 of the compiler.

- **ASCII Support** - Support for the ASCII character set is provided for compiler object code by SAM. As a result the following rules apply:

Object time: Object programs can create or access data sets in ASCII provided the data sets are on magnetic tape with formats **U**, **F**, **FB**, **D** or **DB**. These data sets will be supported by **STREAM** files and by **RECORD SEQUENTIAL BUFFERED FILES** using the **CONSECUTIVE** environment option. Only character data may be written onto an ASCII data set. This feature is not available under CMS at object time.

- Numerous other additions or extensions to the PL/I language beyond that supported by the PL/I D (Version 4) compiler include the **COMPLEX** attribute for arithmetic, the use of scale factors for **FIXED BINARY** data, additional built-in functions (such as **POLY**, **ASIN** and **ACOS**) and pseudo variables, the **REFER** option, the **ENTRY** and **RETURNS** attributes in calling routines, the **ORDER** and **REORDER** options for optimization, use of expressions in format lists, the **CONTROLLED** attribute in storage allocation, use of **AREA**, **ALLOCATE**, and **ON AREA** in list processing, the **ISUB** facility in array definitions and the **GENERIC** attribute for automatic selection of entry points.

**Extensive Debugging Aids:** The time and effort required for program checking are minimized by the following debugging aids:

- **OnUnits** - Improvements in exceptional condition handling are provided by increased implementation of onunits. Onunits can be specified for conditions such as **SUBSCRIPTRANGE**, **STRINGRANGE**, **STRINGSIZE**, **ERROR**, **FINISH** and **CHECK**, in addition to those conditions implemented by the PL/I D (Version 4) compiler. Programmer-defined conditions may also be specified. Much greater flexibility in the contents of onunits is permitted. Built-in functions such as **ONSOURCE**, **ONCHAR**, **ONLOC** and **DATAFIELD** are also available to users.
- **Data-Directed Input/Output** - The implementation of data-directed input/output permits values to be placed in particular named variables on input and prints the names of variables on output.
- **Diagnostics** - Extensive diagnostics are provided at compilation and execution times. Where it is appropriate, the compiler will make an assumption as to the intended meaning of an erroneous statement. Diagnostic messages produced by the compiler will be in the categories of termination error, severe and other errors and warnings. Messages for each category will be listed in statement number order, each message indicating:
  - The number of the erroneous statement, and the portion of the statement involved.
  - The nature of the error.
  - Any assumptions made, or actions taken by the compiler.

Other aids to program debugging include:

- Control over interrupt and error handling. Error handling functions may be built-in or programmer-defined.
- Powerful flow-tracing (including statement number trace), statement counting facilities and dynamic dumping facilities.
- Communication with the program during execution by use of the **DISPLAY** statement.
- The compiler **SYNTAX** option to allow the programmer to check only the syntax of his programs. This avoids the burden of complete compilation when serious errors are found.

**Compiler Options:** In addition to the option for object code optimization, the wide range of options provides control over:

- Main storage allocation for compilation.
- Preprocessing and processing characteristics.
- Input/Output features including:



PROGRAM PRODUCTS

**DOS PL/I Optimizing Compiler (cont'd)**

- Source program listings.
- Attribute and cross-reference tables.
- Object program listings in Assembler code.
- Storage maps.
- Use of terminal for all compiler listings with CMS.
- Object program output on punched cards, magnetic tape or disk.

**Additional Facilities:** Provision is made for:

Accessing the system CHECKPOINT/RESTART facility, thus providing recovery facilities in the event of system or machine failure during long production runs.

Accessing the sort routines of the system Sort/Merge program directly from a PL/I object program.

**DOCUMENTATION**  
(available from Mechanicsburg)

Title	Order Number
DOS PL/I Optimizing Compiler General Information Manual	GC33-0004
DOS PL/I Optimizing Compiler Specifications	GC26-3994
DOS Resident Library Specifications	GC26-3996
DOS Transient Library Specifications	GC26-3995

**RPQs ACCEPTED:** No

**NOTE:** Please note that the SSX/VSE version of the DOS/PL1 Optimizing Compiler is based on Release 5.1 and will only be available together with the PL/1 resident and transient libraries.



PROGRAM PRODUCTS

**DOS RPG II (5736-RG1)**

**PURPOSE**

RPG II is a programming language that performs a wide variety of commercial data processing jobs. The RPG II language is an expanded version of the present RPG language operating under the Disk Operating System. Compared with the previous DOS RPG, RPG II offers performance improvement in two areas:

- Improved core efficiency for object programs.
- Improved throughput performance for process bound programs.

In addition to the performance improvements, many new functions have been added to the RPG II language. These functions make RPG II:

- Easier to use than the current DOS RPG.
- More flexible, so that the programmer can choose the method of coding which is most suited to his needs.
- More powerful, so that many programs can be coded using RPG II which in the past were difficult or impossible to code using RPG.

**HIGHLIGHTS**

These new functions include:

**Edit Codes** - provide the facility to format output fields by specifying a single character code rather than an edit mask.

**Closed Subroutines** - provide for executing closed subroutines within the RPG II program from any number of points within the calculations with an automatic return to the calculation line following the statement which asked for execution of the routine.

**CHAIN Operation Code** - provides user control of direct processing by key or record ID through the calculation specifications.

**Spanned Record Format** - permits processing of variable length logical records that can span multiple physical records.

**EXCPT Operation Code** - provides the ability to cause output to be written during either total or detail calculations. After the output is completed, calculations resume where interrupted.

**Fetch Overflow** - provides the ability to control when overflow processing is to occur.

**DSPLY Operation Code** - provides the ability to display messages on and accept data from a console device.

**File Translation** - provides character by character translation for specific files through the use of a translation table.

**\*PLACE** - provides the facility to print invoices or labels (of identical content) side-by-side (2 up, 3 up, etc.) without redefining the individual fields on the output specifications.

**Look Ahead** - provides the facility to look ahead at the contents of fields in other records awaiting processing for calculations, testing, comparison or for output.

**Compile Time Tables** - provides the ability to load tables at compile time.

**Single Dimension Arrays** - provides the ability to define, point to (index to) and look up fields within an array or like fields. An XFOOT operation is provided which sums the elements of an array.

**SQRT Operation Code** - provides a means of extracting the square root of the value in a given field.

**FORCE** - provides the ability to determine and control which file/record is to be processed during the next RPG II program cycle.

**AND/OR Calculations** - provides the ability to use AND/OR relationships on calculation specifications.

**ASCII Support** - allows the user to accept or create ASCII tape files.

**Sign Control Option** - provides the ability to suppress the forcing of signs on Input and/or Output to achieve performance improvements.

**File Error Option** - provides user options for the handling of file errors.

**SPECIAL Device Support** - provides linkage to Assembler language subroutines for unsupported devices.

**Cylinder Index in Core** - provides the capability to specify that all or part of the cylinder index of an ISAM file is to be in core during processing of the file.

**Bit Operations** - provides the ability to test and set bit switches in a one byte alphanumeric field.

**\*ERROR Byte** - provides the programmer with the ability to test a one byte field named \*ERROR to determine why the HO ERROR indicator has been set on.

**Alternate Sign Position** - provides the ability to specify that the size of a numeric field is contained in a separate character either immediately to the left or right of the field.

**Binary Fields** - provides the ability to input or output external fields stored in binary format. The fields are converted to packed decimal for internal processing.

**Console as an Output File** - provides the ability to use the 1052 Console as an output device.

**File Conditioning** - provides the ability to conditionally specify whether a file is to be present in a program via use of a User Indicator. (U1-U8 corresponding to the bits in the UPSI byte.)

**Unpacked Numeric Keys** - provides the ability to randomly access an ISAM file using either packed or unpacked numeric keys.

**READ/Demand Files** - the READ operation is used to call for immediate input from a demand file during calculation time of the RPG II logic cycle. A demand file is a new file type that can be processed only by the READ operation code.

**1P Forms Control** - First page forms alignment allows an option to repetitively print the first output line conditioned by the first page (1P) indicator until the operator is satisfied that the forms are in alignment.

**Header/Trailer Records** - Header/Trailer support provides a means of processing a spread card record as though it were several records. A spread card contains a fixed portion (header), which applies to all records in the spread card, and groups of fields (trailers). Each trailer with the header is processed as one logical record.

**Card Printing** - provides the ability to print the contents of fields in a specified location on a card in the 64-print positions and 25 rows (lines) available on a card. Card printing is allowed only on the 3525 Card Punch.

**\*PRINT** - provides the ability to print the contents of punched fields, on the same card, in print positions that correspond to the punched positions of the field. \*PRINT is allowed only on the 3525 Card Punch.

**Dual I/O in ISAM** - This extension allows the ability to specify two I/O areas for sequentially processed ISAM files in DOS RPG II. The use of this extension will allow the user of DOS RPG II to improve his performance.

**MOVEA** - This new operation code provides the ability to move a field to an array or an array to a field. The move is left-justified and can begin at any element of the array. This extension gives the DOS RPG II user the ability to process a byte within a field on a byte-by-byte basis.

For a complete list of these new functions along with a brief description of their use, see the *DOS RPG II General Information Manual (GC21-5021)*.

For additional information on the use of ASCII tape files, see the publication, *IBM S/360 Planning for the Use of Information Interchange Standards: OS, DOS, TSS (GC28-6756)*.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The DOS RPG II Compiler operates with a DOS system configuration which provides the RPG II compiler with a minimum 14K partition when disk work files are being used. If tape work files are required in addition to the disk files, a minimum 16K partition is required. In the minimum size partition, the source program being compiled may contain 20 files. For each additional 10 files, 2K of storage is required by the compiler. The maximum number of files allowed for any source program is 50. The RPG II compiler can operate in the background partition of the DOS Release 24 or subsequent release. The compiler can also operate in batched-job foreground partitions with DOS Release 25 or subsequent release. The Standard Instruction Set and the Decimal Arithmetic Feature (#3237) are required in order to use the RPG II compiler or generated programs.

For IBM S/370 devices, the DOS/VS system and hardware supporting them is required.

**Device Support:** Programs compiled using the RPG II compiler may interface with the following IBM devices:

- 2540 Card Read/Punch
- 1403 Printer
- 1404 Printer (continuous forms only)
- 1442 N1 and N2 Card Devices
- 1443, 1445, 3203, 3211, 3262, 4245, 5203 Printers
- 2501 Card Reader
- 2520 B1, B2 and B3 Card Devices
- 2400/3400 Tape
- 2311, 2314, 2319 Disks
- 2321 Data Cell
- 1052 Console  
(as an Output File)  
(Display and Accept with DSPLY operation code)
- 3330/3333 DASD
- 3340 Disk

**DOS RPG II AUTO REPORT FEATURE**  
Feature #6017-#6020, #6035-#6036

**DOS RPG II (cont'd)**

3410 Tape  
3411 Tape  
3420 Tape  
3504/3505 Card Reader  
3525 Card Punch  
3540 Diskette I/O Unit  
2560 MFCM  
5425 MFCU

**SOFTWARE REQUIREMENTS**

The compiler and its object programs execute under the Disk Operating System or DOS/VS. Object programs which have been compiled to process ISAM data files can process VSAM data files using VSAM Compatibility Interface.

**Formatted Dump Facility:** The RPG II formatted dump program performs an error analysis function and formats all important RPG II logic sections, relating them to the source program. There are three types of errors which the dump will handle - (1) RPG II recognized, (2) program checks and (3) device errors. The dump analyzes the error and isolates the pertinent data (the record being processed, the indicators, fields and I/O areas). Pertinent addresses are also labeled. The DOS system PDUMP may be requested instead of the formatted dump by making an entry in a column of the control card.

**Program Testing Facilities:** In addition to the core map provided with the listing and the write-up in the SRL on how to use a core dump, RPG II provides the DEBUG operation code to assist in testing programs. With the DEBUG operation code, fields and/or indicators can be displayed during the execution of the object program. By changing a column in the control card and recompiling, all code produced by the DEBUG operation codes may be deleted from the object program.

**COMPATIBILITY**

DOS RPG II is functionally compatible with DOS RPG. Some changes may be required in the source statements of a DOS RPG II program to produce results identical to the same program compiled by DOS RPG.

These differences result from an effort to provide a DOS compiler at the RPG II level, to obtain greater function and to make the language easier to learn. The *DOS RPG to DOS RPG II Conversion Reference Manual* (SC21-5033) should be reviewed for further details.

Transition from S/360 mdl 20 to DOS can be eased by DOS RPG II due to performance improvements and availability of new functions.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Specifications* (GC21-5028) ... *General Information Manual* (GC21-5021).

The **RPG II Auto Report Feature** enhances the RPG II language by providing functions which eliminate much of the preparation and coding work normally done by the user when producing an application program in RPG II. It is specifically designed to facilitate report preparation.

The Auto Report program executes as a preprocessor to the RPG II compiler (Version 1 Modification Level 2 or later), which is a prerequisite for this feature. The input to the program is RPG II source statements and new Auto Report statements. Auto Report produces a diagnostic listing, replaces the Auto Report statements with generated or copies RPG II source statements and calls for RPG II compiler for execution. If a Sort operation were requested, an object-time exit routine is produced which will interface with the DOS Tape and Disk Sort/Merge program (5736-SM1 or 360N-SM-483), the DOS Sort/Merge program (5743-SM1) or an equivalent Sort program.

**Features:** Coding of applications in RPG II is made easier by the following Auto Report functions:

**Page Headings** - The user need supply only the report title. Auto Report will generate skipping, spacing, horizontal alignment and date and page number constants. Page overflow is considered and the heading conditioned to print on the top of each page.

**Simplified Output Specifications** - A single output field specification can result in Auto Report generated statements to:

- Indicate printing with editing.
- Place column heading over the data fields.
- Control spacing.
- Control horizontal alignment of data.
- Define total fields and calculation specifications to accumulate totals by control levels (total rolling).
- Flag total lines with asterisk indication.

**COPY** - The COPY statement provides the ability to copy RPG II source statements from a disk library into the RPG II source program. Some values on the copied specifications may be modified for the resulting compilation.

**Source Program** - The Auto Report program will pass control directly to the RPG II compiler to cause compilation of the expanded source program. In addition, the user may elect to punch a card deck containing the source program so that he can make modifications which tailor the program more closely to his requirements.

**Select/Sort** - User may specify with RPG-II Source Program that:

- Only certain type records should be selected and processed, or
- All records should be sorted prior to processing, or
- Only certain records should be selected and then sorted prior to processing.

This function requires the RPG II compiler function Read Exit which is available with Version 1 Modification Level 2 (Release 3 or later), of the DOS RPG II compiler. The Sort function requires that the IBM DOS Tape and Disk Sort/Merge program (5736-SM1 or 360N-SM-483) or an equivalent program be available on the system at the time the object program is executed.

The Auto Report functions may be specified for one printer file in any RPG II program. Any RPG II specifications not related to the selected printer file and any RPG II statements for the printer file but not requesting Auto Report functions, are passed to the RPG II compiler as a part of the source program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Core** - The Auto Report programs require the same minimum core storage as does the DOS RPG II compiler.

**Disk** - Approximately 52K bytes are required in the system library for the Auto Report program.

**Devices** - Processor, Disk, Reader-Punch, Printer requirements are identical to the RPG II compiler requirements.

Other devices supported are also identical to those supported by RPG-II.

**COMPATIBILITY**

The DOS RPG II Auto Report Feature is functionally compatible with the S/3 RPG II Auto Report Feature, but contains the additional feature, Select/Sort.



PROGRAM PRODUCTS

**FARE QUOTE/TICKETING  
5736-T11**

**PURPOSE**

The Fare Quote/Ticketing program is an enhancement in capability of the IBM Programmed Airline Reservation System (PARS). Operating in the PARS environment, it enables airlines to rapidly, accurately and automatically price and print, on demand, standard airline tickets based on Passenger Name Record (PNR) information.

**DESCRIPTION**

This program product increases the efficiency of airline passengers at ticket counters/desks by increasing the accuracy and speed with which the fare quote and ticketing functions are performed ... reduces ticket agent occupied time in performance of these functions ... reduces the general sales agent's average telephone call time by mechanizing the fare quote functions for inquiries.

The capability to quote/ticket any given percentage of itineraries is dictated primarily by the file space allotted for the necessary fare quote records. The types of fares that can be quoted are full fare, family plan and excursion. Connecting service is restricted to two segments allowing for any valid connecting point between the origin and destination. Fares are based on each specific connecting point and the carriers providing the connecting service.

**Features:** The FQ/TK system was specifically designed to require no modifications to any existing Passenger Name Record (PNR) data base. Minimal program changes to the input program (to accept the new FQ/TK primary action codes) are required to initiate the FQ/TK system. As the system for ticket issue uses preprinted ticketing stock, the automatic retry feature for transmission error must be suppressed only for output ticketing messages. The unique FQ/TK data record IDs must be added to the system utility program (e.g., FACE, RECOUP, etc.).

The special feature, Tariff Maintenance or its equivalent, is required to create and maintain the on-line tariff data base for the Fare Quote/Ticketing program. The Tariff Maintenance feature may be discontinued, separate from the Fare Quote/Ticketing program.

**CUSTOMER RESPONSIBILITIES**

It is the customer's responsibility to determine the extent of the fares he wishes to quote and to provide the input data required by the maintenance portion of the system to generate the necessary on-line data records to achieve this desired capability. The Tariff Maintenance feature or its equivalent, is required to create and maintain the on-line tariff data base. The customer must also provide (by core reallocation) the room for core resident programs and data records. A detailed definition may be found in (A1-09) Implementation Plan for FQ/TK.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Typical PARS configuration. The program supports the printing of standard tickets on the 1977 and 1980-24 typewriter terminals and the display of a ticket on the 2915 or the IBM 4505 CRT terminals.

**SOFTWARE REQUIREMENTS**

This program is written in Assembler language. It is compiled under DOS and executed under the Airlines Control Program (ACP).

**DOCUMENTATION:** (available from Mechanicsburg)

*Application Description Manual (GH20-0873) ... Promotional Brochure.*



## DATA BASE ORGANIZATION and MAINTENANCE PROCESSOR (5736-XX4)

### PURPOSE

The Data Base Organization and Maintenance Processor establishes the framework for implementation of a data based information system. This series of programs provides a flexibility of data organization that enables:

- Elimination of redundant data and implied redundant file update.
- Reduction in application implementation costs, storage costs, and processing costs.
- Improved accuracy through single manual recording of data at point of origin.
- Availability of centralized, consistent data to all organizational units on a timely, accurate basis.

The CICS Feature and the DBOMP-CICS/DASF Feature permit online access and update of the data base from programs using CICS or CICS/VS to control the data communications environment.

### DESCRIPTION

The Data Base Organization and Maintenance Processor is based on a direct access, file-oriented concept that separates data into recurring and nonrecurring classes.

*Master files* contain nonrecurring data. The records of a master file are organized and kept in logical sequence, by record identifiers (keys). They can be accessed in logical sequence, by identifier through an index, by disk location, or by consecutive location sequence. Two physical organization alternatives are provided, one is especially suited to volatile files.

*Chain files* contain recurring data, organized in variable-length lists of related fixed-length records. Each list is associated with a record in a master file. A chain record may belong to more than one list, thereby constituting a list intersection which in effect cross-referenced master records. User data which are unique to the intersection are stored in the chain record.

### HIGHLIGHTS

Content, format and logical relationship of data files are user-specified.

Data Base Organization and Maintenance Processor modules control the creation, update, reorganization, and access of data files on 2311, 2314, 2319, 3330 or 3340 (3348 - mdls 35, 70, and 70F) disk. *Note:* For 3348 mdls 70 and 70F, cylinders 1-511 of each module are supported for data file residence.

Cross-referencing of related data is managed by the system.

Modular in design, the system can be tailored to the requirements of the user in a systems generation procedure during which the user chooses only those options and features that apply. Multiple generations of various program modules may be generated to effect different options for different parts of the total data base.

**Features:** Functions include the addition, physical deletion, logical deletion, and change of master file records as well as the chain file functions of addition of a single record to an existing list, addition of a new list, physical deletion of a single record, physical deletion of an entire list, change to an existing record, replacement of one record by another within a list, the linking or unlinking of an existing record to or from an associated master record, list duplication (same-as-except), and replacement of one master record by another wherever the first is encountered in association with a chain file (mass replacement).

Disk file chaining is used to link logically related data ... related records are chained together to form lists ... any record may be incorporated in up to five lists, eliminating the need to keep the same information in multiple files or extract information by lengthy file scans ... variable-length lists of fixed length records approximate variable-length record capability and eliminate the need to reserve space in each record for the maximum of information that could exist ... disk file space resulting from record deletions is reusable ... program modules can be generated and combined so that multiple functions can be performed against multiple files during the same program run ... bi-directed chains greatly enhance the performance of chain file record deletion ... reverse chaining also makes certain record lists accessible in descending sequence ... a run activity control number aids failure recovery and facilitates special data retrieval functions ... record counts are kept for audit and control of direct access chains ... a macro is furnished to provide retrieval of a list of chain file records and their associated master records ... input/output modules are self-relocating.

The CICS Feature and the DBOMP-CICS/DASF Feature provide online retrieval of data and the following online functions: Addition, physical deletion, logical deletion, and change of master file records, as well as the chain file functions of addition, physical deletion, or change of a single record, and linking and unlinking of an existing record to or from an associated master record.

The DBOMP-CICS/DASF Feature includes all functions contained in the CICS Feature as well as support for the 3340 Direct Access Storage Facility and Rotational Position Sensing under DOS/VS. Use of the 3340 requires CICS/DOS/VS.

Neither of the CICS features requires file conversion ... a director module queues files and provides exclusive record control within the CICS partition ... the recovery function provides quick recovery of file integrity in certain instances.

### USE

The Data Base Organization and Maintenance Processor is a set of programs designed for disk file organization and access to be used in conjunction with user-written application programs.

Online pointer and record updating are recommended only under one of the two CICS features. Updating should not be performed by more than one partition concurrently.

### CUSTOMER RESPONSIBILITIES

The initial approach to an information system should include a broad view of the information processing requirements of all areas of the organization involved.

Design file structure.

Design external systems to cover activity beyond the boundaries of the data processing department.

Transform the file structure design into specific parameters for generating a custom-tailored Data Base Organization and Maintenance Processor system.

Generate a Data Base Organization and Maintenance Processor system.

Write and test application programs.

Firm operating procedures.

Prepare data for initial files.

Load files.

Cutover. (A conversion period where the new system is operating in parallel to the old system is recommended).

Operate.

Before installing one of the two CICS features, the customer must have fulfilled all the necessary responsibilities for installing CICS/DOS or CICS/DOS/VS and the basic Data Base Organization and Maintenance Processor. Use of the 3340 requires CICS/DOS/VS. To install either CICS feature the user must:

Prepare parameters for the feature modules

Generate a feature system

Write and test application programs

Develop open/close procedures

Develop recovery procedures

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The minimum machine requirements for the Data Base Organization and Maintenance Processor include a S/360 or a S/370 processing unit with printer, card read punch, console, and direct access storage devices (see notes 1 and 2).

Operating under DOS Version 4 or a previous version requires a partition size of at least 24K bytes. Operating under DOS/VS (Version 5) requires a virtual partition size of 64K bytes.

The CICS features require a S/360 or a S/370 processor with sufficient main storage to accommodate a CICS partition with CICS or CICS/VS, user programs and main storage required by either of the CICS features. In addition, the configuration must meet the minimum requirements of the Data Base Organization and Maintenance Processor and those of CICS or CICS/VS.

For either CICS feature operating under DOS/VS, the virtual partition size is 64K or more bytes as required to accommodate CICS or CICS/VS user programs and the CICS feature or DBOMP-CICS/DASF Feature.

When operating in virtual mode, the amount of actual core storage used by an application program is difficult to predict. Factors which affect the actual core storage requirements not only vary with the particular phase (set of modules) of the application program being executed, but with the mix and priorities of the other application programs concurrently operating in the multiprogramming environment.

If CICS/DOS-ENTRY is used, either CICS feature requires that the following be in subpool 0:

**Data Base Organization and Maintenance Processor (cont'd)**

	Approximate Size in K Bytes
File Directory	.1
File Description Modules	2.3 (see note 3)
File Maintenance List (if recovery function is specified)	.1
In addition to the user requirements, subpool 1 must be sufficient to accommodate the following feature requirements:	
Transaction Control Area Extension	.2
Dynamic Buffers	.9 (see note 4)
The greater of:	
Director - I/O Process (no file pointer update)	7.0
Fileorg (pointer update)	11.0
If CICS/DOS-STANDARD or CICS/DOS/VS is used, both CICS features require the following basic functions in the CICS partition:	
Director - I/O Process	7.0
File Description Modules	2.3 (see note 3)
File Directory	.2
Transaction Work Area Extension	1.3 (see note 6)
File Maintenance List (if recovery function is specified)	.1
At open/close time, the following are additional requirements to the basic functions:	
I/O Open/Close	2.0
Dynamic Buffer	.5 (see note 4)
If retrieval is being performed, the following is required in addition to the basic functions:	
Dynamic Buffer	4.5 (see note 4)
If pointer update is to be performed, the following requirement is added to the basic functions and the retrieval requirement:	
Fileorg	11.0

The above requirements are estimates provided for planning purposes only. They represent the core requirements for the CICS Feature or the DBOMP-CICS/DASF Feature of the Data Base Organization and Maintenance Processor. To arrive at the partition size required, the user must add the feature estimates to the core required by CICS or CICS/VS and by the user for his program modules (note 7).

**Notes:**

1. A card punch is required for system preparatory procedures. In an operational system, user application programs control unit record input/output where required. The application mainline program included in the package for the four specific manufacturing files provides options of 2540, 1442, or 2520 and 1403 or 1443. The sample problem is generated for a 1403 and 2540.
2. Direct access storage capacity is required to contain DOS system residence and user data files. Two drives are minimum. Chain file reorganization requires enough capacity for twice the size of the chain file itself plus one associated master file. To customize the system or to execute the sample problem on 2311, the Data Base Organization and Maintenance Processor requires one full pack exclusive of DOS system residence, DOS system work files, and private libraries. To customize the system or to execute the sample problem, the Data Base Organization and Maintenance Processor requires the first 103 cylinders of a 2314 or 2319, the first 65 cylinders of a 3330/3333, or the first 160 cylinders of a 3340, exclusive of DOS system residence, DOS system work files, and private libraries.
3. 2.3K bytes assumes two master files; one ISAM, one CSAM, and two chain files.
4. Dynamic buffers, consisting of mode to perform input/output functions, and space for input blocks are allocated to each task as required. The .9K estimates for CICS/DOS-ENTRY assumes a single task is accessing two files. The .5K estimate for open/close in CICS/DOS-STANDARD or CICS/DOS/VS assumes one buffer of .5K satisfies the largest block to be read. The 4.5K estimate for retrieval in CICS/DOS-STANDARD or CICS/DOS/VS assumes five active I/O buffers.
5. Fileorg is a program module containing the logic to perform file pointer update and addition or deletion of records. The 11K estimate assumes all functions are present for both master files and chain files. The user can reduce the 11K figure by excluding functions. Not included in the 11K estimate is the optional recovery function which requires an additional 1.2K.
6. The transaction control area extension estimate is approximately 250 bytes per task. The example assumes five tasks.
7. If the user programs are written in PL/1 or COBOL, each program that accesses a Data Base Organization and Maintenance Proc-

essor file must add approximately 600 bytes to its core requirement. Also, in CICS/DOS-STANDARD or CICS/DOS/VS, the user of PL/1 or COBOL must add 1K to his requirements if issuing requests to a Data Base Organization and Maintenance Processor file other than a CHASE request, and .6K if performing a CHASE.

**SOFTWARE REQUIREMENTS**

DOS or DOS/VS is used as the control system for the Data Base Organization and Maintenance Processor. The following components of DOS are used: System Control and Basic IOCS (360N-CL-453), Direct Access Method IOCS Macros (360N-IO-454), Assembler D (360N-AS-465) or Assembler F (360N-AS-466), Unit Record and Disk Utilities, Group 1 (360N-UT-461), and Disk/Tape Sort/Merge (360N-SM-483) or Sort/Merge - DOS (5743-SM1). Operating under DOS/VS, equivalent components of DOS/VS (5745-010) are used, and DOS/VS Sort Merge (5746-SM1) may be used. In addition, this program product also operates in a VM/370 environment under the control of DOS or DOS/VS.

In addition to the above DOS components, the following modules may be employed appropriate to the user's environment at the user's option: Full ANS COBOL V3 Compiler (5736-CB2), ANS Subset COBOL Compiler and Library (5736-CB1), COBOL (360N-CB-452 - for use with the basic system only), PL/1 Optimizing Compiler (5736-PL1), Basic PL/1 (360N-PL-464 - for use with the basic system only), and consecutive Tape Input/Output Control System Macros (360N-IO-456).

The Data Base Organization and Maintenance Processor itself is written in Assembler language. User application programs may be written in Assembler language, COBOL or PL/1.

The Data Base Organization and Maintenance Processor and the two CICS features are available for operation under DOS/VS both in the virtual and real modes. When running under CICS/DOS/VS, execution is in virtual mode.

**DOCUMENTATION** (available from Mechanicsburg)

*Application Description Manual*, (GH20-0771).

**Reference Materials:** See *Requirements Planning Interface* (5736-M13).

**MVS INFORMATION DISTRIBUTION  
WORKSTATION SUPPORT  
VERSION 1 RELEASE 1  
5740-AMA**

**PURPOSE**

The MVS/Information Distribution Workstation Support program product provides batch-oriented remote communication functions for the 6670 Information Distributor with the systems network architecture (SNA) feature. The product provides transmission, routing, scheduling, command and message functions that are specifically tailored to the features and communication protocols of the 6670 and that support all data streams and media of the 6770.

**HIGHLIGHTS**

- Provides OS/VS2 MVS host support for the SNA version of the 6670 Information Distributor.
  - Allows 6670 users to access MVS application programs, such as the Document Composition Facility and the Document Library Facility for document processing and archiving.
  - Allows MVS application program users to utilize the 6670 for output.
  - Allows users to combine variable data from an MVS data base with a standard document on the 6670 to obtain personalized, repetitive letters in one operation.
- Extends MVS support to the 6670 by interfacing with JES2, NJE for JES2 or JES3.
  - Allows 6670 users to utilize MVS facilities for work entry (OS JOB) and output processing (SYSOUT).
  - Provides 6670 users with document distribution capabilities through the routing facilities of the job entry subsystems.
- Provides exits for customer-developed programming.

**DESCRIPTION**

Using the MVS/Information Distribution Workstation Support program, 6670 users can submit jobs and data to a S/370 OS/VS2 MVS host processor for formatting and processing. It may also be used to receive documents, letters, and variable data generated at the MVS host processor or extracted from MVS data bases for processing and output at the 6670. Access is provided over synchronous data link control (SDLC) communication lines connected to a 3705 Communications Controller containing a resident network control program (ACF/NCP). The MVS/Information Distribution Workstation Support program accesses the communications network via the Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM) and the Advanced Communications Function/ Telecommunications Access Method (ACF/TCAM). Systems network architecture (SNA) protocols are used. Other applications and terminals can use the same SDLC line simultaneously for SNA communications.

The MVS/Information Distribution Workstation Support program extends MVS remote job entry (RJE) support to the 6670 by interfacing with the MVS job entry subsystem for job input and output processing. The program can operate in any JES2 or NJE for JES2 processor and in a JES3 local processor or the JES3 global processor.

A session between the MVS/Information Distribution Workstation Support program and a 6670 can be established either manually or automatically. Manual session initiation and termination typically are controlled by the 6670 user through LOGON/LOGOFF commands. Automatic session initiation can occur when the MVS/Information Distribution Workstation Support program detects output to be transmitted to a 6670 not in session with it. Automatic session termination can occur when there is no more output to be transmitted. Terminal and data owner identifications are provided through LOGON passwords and a command associating specific owner keys with jobs. Keyed job output will not be transmitted to a 6670 until the owner is present to receive it. Thus, both data security and access can be controlled.

Users can enter data for transmission to the MVS/Information Distribution Workstation Support program through the 6670 magnetic card reader. Input can be an OS job, a command that causes the generation of an OS job, or a command to control or determine the status of the session or accumulated output. Also provided are commands to:

- Inquire about the status of output
- Expedite the delivery of output
- Hold, release, stop, or cancel output
- Control the session.

Output from jobs or commands submitted from a 6670 user usually will be routed back to that 6670, along with any logs. Using the MVS/Information Distribution Workstation Support and NJE for JES2 and/or ACF/VTAM or ACF/TCAM, ACF/NCP, and the Multi-System Networking Facility for ACF/VTAM or ACF/TCAM, the 6670 user can have the submitted job executed at another location or the output printed at another location or terminal. Further, through the use of

system output classes or destination names, application program jobs not submitted from a 6670 can route their output through the MVS/Information Distribution Workstation Support to a 6670. All output for transmission must be created as SYSOUT data sets.

Additional flexibility is provided with exits through which users may develop programming to access data other than job entry data, modify input and output data streams, or control the selection and disposition of documents in input and output queues.

Through the MVS/Information Distribution Workstation Support program, users with MVS applications such as the Document Composition Facility and the Document Library Facility can use 6670 as a remote communications printer, often without changes to existing application programs. Composed and formatted output that is currently produced on system printers can be transmitted to the 6670 for printing. In environments where events recorded in the data processing system also necessitate personalized correspondence, users can send data captured by their application program to be merged with a standard letter at the 6670.

The MVS/Information Distribution Workstation Support remote communication functions used in conjunction with the 6670 or MVS application program word processing functions provide 6670 users with an office device upon which they can receive letter-size output, bypassing several operations previously required. The 6670 offers:

- Text format printing -- Printing with the appearance of a typewritten page.
- Condensed format printing -- Printing that allows computer output typically printed on 279.40 x 335.60mm (11x14 inch) fanfold paper to be printed across the long side of 215.90 x 279.40mm (8-1/2 x 11 inch) paper, with up to 66 lines per page and 132 columns per line.
- High quality printing -- Characters formed by a dot pattern of up to 240 x 240 pel, depending on the type style and line spacing.
- Duplex printing -- Printing on both sides of a page.
- Choice of print media -- Plain or letterhead precut paper, offset masters and transparencies for overhead projection.
- Magnetic card recording -- Special word processing control codes can be recorded along with the text.

In addition, users can select the various word processing options of the 6670 for their output.

**CUSTOMER RESPONSIBILITIES**

To install the MVS/Information Distribution Workstation Support product, the customer must provide:

- Installation-unique JCL parameters for jobs generated internally by the product, such as JOB card accounting fields and job class.
- ACF/VTAM or ACF/TCAM, ACF/NCP, and JES Route Code definitions for the 6670 terminals.
- Terminal operator IDs and password and profile information in a protected VSAM data set.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The MVS/Information Distribution Workstation Support program product requires at least one IBM 6670 Information Distributor with the systems network architecture (SNA) feature. Configurations of up to 255 IBM 6670 Information Distributors can be supported.

Other machine-related requirements for the IBM S/370 Processor and the IBM 3705 Communications Controller are those imposed by the operating system, program products, and system control programs with which the MVS/Information Distribution Workstation Support program operates.

**SOFTWARE REQUIREMENTS**

The MVS/Information Distribution Workstation Support licensed program operates under OS/VS2 Release 3.8 and subsequent releases and modifications unless otherwise stated. The MVS/Information Distribution Workstation Support program executes with the following required programs and their subsequent releases and modifications unless otherwise stated:

- Advanced Communication Function for the Network Control Program/VS (ACF/NCP/VS) Release 1 (5735-XX1).
- One of the following:
  - Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM) Release 1 (5735-RC2).



## PROGRAM PRODUCTS

**MVS Information Distribution Workstation Supt. (cont'd)**

- Advanced Communications Function/Telecommunications Access Method V2 R2 (ACF/TCAM) (5735-RC3).
- One of the following:
  - Job Entry subsystem 2 (JES2), Release 4.1
  - Network Job Entry Facility (NJE) for JES2, Release 3, program number (5740-XR8)
  - Job Entry Subsystem 3 (JES3), Release 3.
- System Modification Program (SMP) for installation.

The MVS/Information Distribution Workstation Support source code is in S/370 Assembler language and is distributed as optional licensed microfiche.

**SECURITY/INTEGRITY**

As part of an integral approach to security in the MVS/Information Distribution Workstation Support product, the Resource Access Control Facility (RACF, 5740-XXH), can be used to provide users access to RACF protected resources in an MVS environment. In addition, facilities are provided for controlling access to SYSOUT data sets destined for the supported devices. These facilities are effective only within the context of the MVS/Information Distribution Workstation Support program itself. IBM will accept APARs describing any situation where the installation of this program causes an exposure to the system integrity of MVS.

**PERFORMANCE CONSIDERATIONS**

MVS/Information Distribution Workstation Support performance is configuration-dependent and load-dependent. It is affected by the number of SYSOUT transmitters available to access SYSOUT data sets and by the number of job entry subsystem internal readers available to accept job stream data.

The MVS/Information Distribution Workstation Support program uses a pool of SYSOUT transmitter address spaces to access SYSOUT data sets concurrently. The number of SYSOUT transmitters available to it can be set by the MVS/Information Distribution Workstation Support SET XWTR command. This number should not exceed, but can be less than, the maximum number of 6670 Information Distributors in session with MVS/Information Distribution Workstation Support at any one time.

The MVS/Information Distribution Workstation Support program uses a pool of internal readers to submit jobs entered from the 6670 Information Distributors. The number of JES internal readers available to accept job stream data can be set by the MVS/Information Distribution Workstation Support SET INTRDR command. This number should not exceed, but can be less than, the maximum number of IBM 6670 Information Distributors in session with MVS/Information Distribution Workstation Support at any one time.

**DOCUMENTATION**  
(available from Mechanicsburg)

*MVS/Information Distribution Workstation Support Design Objectives (GC23-0036) ... MVS/Information Distribution Workstation Support General Information Manual (GC23-0031) ... MVS/Information Distribution Workstation Support System Programming Library (SC23-0032) ... MVS/Information Distribution Workstation Support Commands and Messages (SC23-0033) ... MVS/Information Distribution Workstation Support Program Product Specifications (GC23-0035).*

**SEQUENTIAL ACCESS METHOD-EXTENDED (SAM-E)  
5740-AM3****PURPOSE**

Sequential Access Method-Extended (SAM-E) uses improved buffer scheduling for QSAM, and EXCPVR instead of EXCP for all BSAM and QSAM direct access and VIO operations, except BDAM WRITE/LOAD. In the exception case, the current implementation is used.

Measurements of MVS batch test environments have shown that SAM-E can increase batch throughput by up to 5% for either MVS or MVS/SE Systems. Users with batch workloads characterized by heavy QSAM DASD usage and DASD contention can achieve greater improvements. Measurements of such workloads have shown improvements in the range of 9 to 14%.

**HIGHLIGHTS**

SAM-E enables improved DASD data access performance by:

- Reducing channel program interpretation and translation.
- Reducing fixing and freeing of pages.
- Reducing the path length for the SAM I/O operations per block.
- Decreasing DASD contention.
- Increasing the number of QSAM buffers transferred per I/O operation.

**CUSTOMER RESPONSIBILITIES**

Customers installing SAM-E Release 1 on OS/VS2 Release 3.7 should begin once their system is at a 77-08 PUT Service Level or higher. This recommended Service Level is a higher Service Level than the MVS 3.7E Release. The MVS 3.7E Release is updated to a 77-06 service level. Additional service for a specific SU environment is required. See the SAM-E Release 1 Program Directory for additional information.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Each licensed program is designed to operate on one or more IBM machine types and, in most instances, in conjunction with other IBM equipment and programs.

**System Configuration:** SAM-E Release 1 is applicable to OS/VS2 Release 3.7 with the Supervisor 2 (SU 7) and Data Management (SU 8) Selectable Units, and as such has the same system constraints, executes on the same processors and supports the same configurations as the base operating system.

The amount of DASD storage required to use SAM-E is less than if the SCP direct access support for ESAM and QSAM is used. Exact savings figures are highly dependent on the type of DASD residence volume used, and upon individual installation parameters. One observed system (on a 3330-11) saved 30,000 bytes of DASD library storage, and 9,000 bytes of virtual storage (pageable LPA). For each DCB opened for BSAM, QSAM or BPAM DASD data sets, an additional 936 bytes of Fixed LSQA space is required over and above the space used on a system without SAM-E installed.

**SOFTWARE REQUIREMENTS**

SAM-E Release 1 is released to work with OS/VS2 Release 3.7 and subsequent releases of that system unless otherwise stated. Prerequisite for SAM-E on OS/VS2 Release 3.7 are the Supervisor 2 (SU 7) and Data Management (SU 8) Selectable Units applied. The SAM-E Release 1 source code is distributed in Assembler language as optional material.

SAM-E Release 1 is supported via the System Modification Program (SMP).

**COMPATIBILITY**

Existing OS/VS SAM data sets and programs which access them can be used with SAM-E Release 1 without conversion. The SAM data sets written using SAM-E Release 1 are compatible with existing OS/VS SAM.

**DOCUMENTATION:** (available from Mechanicsburg)

*Licensed Program Design Objectives (GH20-9121) ... OS/VS2 MVS Sequential Access Method-Extended (SAM-E): General Information Manual (GH20-9122).*



PROGRAM PRODUCTS

**INTERACTIVE PERSONNEL SYSTEM  
Release 1 Modification Level 2  
IMS/VS and CICS/OS/VS (5740-AM4)**

**DESCRIPTION**

The IBM Interactive Personnel System is designed to assist personnel functions in performing their required tasks efficiently and competently. Online inquiry, online update, as well as batch processing capabilities are offered. The data organization methods of the IBM Information Management System/Virtual Storage (IMS/VS) are used for data storage and retrieval. The online capability is made possible through the use of either the Data Communication (DC) Feature of IMS/VS or the IBM Customer Information Control System/Virtual Storage (CICS/OS/VS).

The Interactive Personnel System maintains three data bases:

- The personnel data base, which contains data related to employees.
- The positions data base, which holds data reflecting the organizational structure of a company, including reporting paths.
- The jobs data base, which contains data describing the jobs to be performed in a company and the skills required for these jobs.

These data bases are designed to meet a variety of administration and information requirements of the personnel functions of a company. If additional or different data is needed, the data bases can be customized. Facilities are available in the Interactive Personnel System to add, change or delete fields, segments or data bases. Also new data base layouts can be defined.

A wide range of personnel administration and management is supported by the applications offered as part of the Interactive Personnel System. Some applications run in online mode and some in batch mode. The applications can be used without any modifications; however, they can be modified if necessary. Changes to the data bases or to the applications can be made easily using two system capabilities:

- Customizing of the data bases as mentioned above.
- Procedure definition language for the definition and modification of applications.

The procedure definition language is end-user-oriented and therefore easy to use. There are various procedure types, for example, a conversational inquiry or an online update, that define the skeleton of processing. A set of language keywords allows the specification of processing details such as input/output definitions, security specifications, editing options or user exit processing. This tool enables the user to define or modify applications with little effort. As part of the Interactive Personnel System, facilities for data security are offered in addition to the security facilities contained in the prerequisite data base/data communication systems. Security rules may be established for each user of the Interactive Personnel System. A hierarchy of security checks can be defined:

- Authorization to define or modify applications.
- Authorization to execute applications.
- Authorization to gain access to the application data bases.
- Authorization to use specific data within a record.
- Authorization to process the logging data base.

As part of the procedure definition language, editing features are included in the Interactive Personnel System to verify that the data entered into the data bases is correct. Editing can also be done on data that is to be displayed or printed. This includes, for example, code conversion.

Checking is done against user-defined tables that can be altered without program changes.

A set of government reporting and benefits tracking applications are offered as a separately-priced feature covering the following areas:

- Equal Employment Opportunity (EEO) Processing
- Occupational Safety and Health Act (OSHA) Processing
- Health Maintenance Organization (HMO) Tracking
- Benefits Tracking

These applications expand the personnel tracking capabilities of the Interactive Personnel System for private industry, providing the basis for the entry, update and processing of much of the information needed to comply with government reporting requirements.

The government reporting and benefits tracking applications use both online and batch mode processing. Sample data base segments are supplied for inclusion in the existing system data bases, and for the creation of an establishment data base to contain pertinent EEO data. Edit tables are also included for support of the establishment data base.

These applications use the data base customization and procedure definition language capabilities of the Interactive Personnel System, and require no additional resources, beyond the added data base segments, the establishment data base, and the table storage areas.

The system allows basic calculations. Complex calculations and complex data handling can be implemented in user exit routines supplied as Assembler, PL/I or COBOL programs.

**HIGHLIGHTS**

- A set of three data bases for personnel, positions and job data.
- Personnel applications are offered to support many tasks in personnel administration and management. The applications are written using the procedure definition language.
- The system supports both online and batch processing.
- The Interactive Personnel System procedure definition language allows easy implementation of additional applications and modification of existing applications by the user.
- Customizing facilities are provided to adapt the system to the user's environment. Data bases, segments and fields can be added or changed.
- Data security facilities and logging facilities are available.
- Data editing functions assist in data checking, data conversion and migration.
- Basic calculations are supported.
- User exit modules within the applications can be written in PL/I, COBOL or Assembler language.
- Provisions are made for the translation of messages, commands and screen data into the customer's desired terminology.
- An optional feature is the logging of data base updates in a logging data base. The contents of the logging data base can be processed using Interactive Personnel System applications.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the availability of the prerequisite machines and programming systems as listed in the "Specified Operating Environment".

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM machines: IBM S/370 mdl 148 to 168, IBM 303X and IBM 43XX. The following environment is required for execution of the program:

- Processors: One IBM processor supported by OS/VS and IMS/VS or CICS/OS/VS.
- Virtual address space requirements (figures do not include the partition-related parts of OS/VS, VSAM, IMS/VS or CICS/OS/VS):
  - 300K for programs running in a batch environment.
  - 275K for programs running under IMS/VS.
  - 240K for programs running under CICS/OS/VS, plus 35K for each active task.

The figures can increase if complex applications are executed, or if program functions such as security, edit or user exits are extensively used.

- Direct access storage devices: One IBM direct access storage device as supported by IMS/VS. In addition, optionally, one or more IBM direct access storage devices as supported by OS/VS for sequential input and output data sets.
- Unit-record devices: One card read/punch device and one print device as supported by OS/VS.
- Sequential access storage devices: One 9-track tape device for installation and support; and one or more 9-track tape device(s) for optional input and/or output.
- Telecommunication facilities: One IBM 3275 Display Station mdl 2 (with or without RPQ X81191: Arabic Left to Right) or mdl 12, or one IBM 3277 Display Station mdl 2 (with or without RPQ X81191).

The Interactive Personnel System can also be used with the IBM 3274/3276 subsystem in compatibility mode, with or without RPQ 7H0306 (Arabic Display Control).

The system is designed to support additional disk storage, tape units, processor storage and terminals.

**SOFTWARE REQUIREMENTS**

The Interactive Personnel System is designed to operate under the IBM Operating System/Virtual Storage (see Note 1).

It uses the data base facilities of the IBM Information Management System/Virtual Storage (see Note 2) and the data communication



## PROGRAM PRODUCTS

**Interactive Personnel System  
IMS/VS and CICS/OS/VS (cont'd)**

facilities of either the Data Communication (DC) feature of IMS/VS or the IBM Customer Information Control System/Virtual Storage (see Notes 2 and 3).

**Notes:**

1. OS/VS1 Release 6.7, OS/VS2 SVS Release 1.7 and OS/VS2 MVS Release 3.8 or subsequent releases unless otherwise identified.
2. IMS/VS Version 1, Program Number 5740-XX2, optionally including the Data Communication (DC) feature, Release 1.5 or subsequent releases unless otherwise identified.
3. CICS/VS Version 1, Program Number 5740-XX1, Release 4 or subsequent releases unless otherwise identified.

The IBM Interactive Personnel System is written in the IBM S/370 PL/I language and in the IBM S/370 Assembler language. Supplied user exit routines are written in the IBM S/370 PL/I language, the IBM S/370 Assembler language or IBM S/370 COBOL language.

Both source code and load modules are distributed. Normally, the user will run the load modules as distributed and, therefore, only require the OS PL/I Optimizing Compiler Transient Library, Program Number 5734-LM5, Release 3.0 or a subsequent release unless otherwise specified.

In addition, an OS/VS Sort/Merge program product is required.

Modifications to the source code including application of source fixes, require the use of either: PL/I Optimising Compiler and Libraries (5734-PL3) or, PL/I Optimising Compiler (5734-PL1) with PL/I Optimising Compiler Resident Library (5734-LM4).

**DOCUMENTATION:** (available from Mechanicsburg)

Title	Order Number
General Information Manual	GH12-5125
Licensed Program Specifications	GH12-5236
User's Guide	SH12-5321
Applications Guide	SH12-5326
System Programmer's Guide (CICS/VS)	SH12-5428
System Programmer's Guide (IMS/VS)	SH12-5432
Logic Manual	LY12-5025

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No

**DATA FACILITY DEVICE SUPPORT (DFDS)  
OS/VS1 (5740-AM6)  
OS/VS2 MVS (5740-AM7)**

**PURPOSE**

Data Facility Device Support (DFDS) provides data management support for the 4245 Line Printer, the 3430 Magnetic Tape Subsystem, the 3380 and 3375 Direct Access Storage Devices, the 3880 Storage Control mdls 1, 2, 3, 11 and 13, the Data Streaming feature (#4850), The Speed Matching Buffer for 3380 feature (#6550), the Speed Matching Buffer for 3375 feature (#6560), and compatibility mode support for the 3800 Printing Subsystem mdl 3. Additionally, access to a DASD volume table of contents (VTOC) that contains a large number of entries is improved via an optional index to the VTOC. Installation management of DASD space is improved by providing installation exits in the direct access device space management (DADSM) routines.

**HIGHLIGHTS**

- Provides data management support for the 3430 Magnetic Tape Subsystem.
- Provides data management support for the 4245 Line Printer.
- Provides support for the 3800 mdl 3 for printing 3800 mdl 1 applications.
- Provides data management support for the 3380 Direct Access Storage and 3880 Storage Control mdls 2 and 3.
- Provides data management support for the 3375 Direct Access Storage.
- Improves VTOC access via an index to the VTOC.
- Improves installation management of DASD space by providing installation exits in the DADSM routines.
- Improves OS/VS2 MVS system availability by providing the capability to IPL using an alternate master catalog.
- Provides support for the 3880 Storage Control mdl 11 (MVS only) and mdl 13.
- Provides an installation exit when opening a data control block (DCB).
- Provides support for Extended Real Addressing (MVS only).
- Data Facility Device Support Release 1 Modification 1 for OS/VS1 provides the 4K PAGE support.

**DESCRIPTION**

**3430 Magnetic Tape Subsystem:** OS/VS1 data management support is provided by Release 1.2 for the 3430, enabling the device to be used as an input/output device for user data.

**4245 Line Printer:** OS/VS1 data management support is provided by Release 1.2 for the 4245, enabling the device to be used as a system or directly-attached printer, with program control of printing at either 6 or 8 lines-per-inch.

**3380 Direct Access Storage Support:** OS/VS2 MVS and OS/VS1 data management support is provided for the 3380, enabling the device to be used for user data sets, as a system residence device and as a system paging device.

**3375 Direct Access Storage Support:** Data management support is provided for the 3375, enabling the device to be used for user data sets, as a system residence device, and as a system paging device.

**3880 Model 11 and Model 13 Support:** OS/VS2 MVS support is provided by 5740-AM7 Release 1.5. This modification level is an optional enhancement for accounts installing the 3880 mdl 11 or 13. OS/VS1 support is provided by 5740-AM6 Release 1.2.

**New Access Method Services Command (3880 mdl 11 and mdl 13)**

**LISTDATA** The 3880 mdl 11 and mdl 13 keep data in subsystem counters for each device attached, recording the number of I/O operations that have been performed. They also keep status information for the cache, recording the amount of storage configured, available, unavailable and, for the 3880 mdl 13 only, the amount of storage bound for caching. The LISTDATA command provides a means to list the subsystem counters and subsystem status information.

**3880 Model 11 Support Detail:** DFDS 1.5 identifies to the system that a 3350 is attached via a 3880 mdl 11. This enables the multiple addressing capabilities of the 3880 mdl 11 to be utilized by supplying the 3350P device type at system generation (full SYSGEN or IOGEN). Specify unit = 3350P on the IODEVICE SYSGEN macro to provide four 3350 UCBs for each unit generated. A maximum of eight 3350P devices may be generated per IODEVICE invocation. The IODEVICE macro default value is two devices.

**3880 Model 13 Support Detail:** DFDS 1.5 also identifies to the system that a 3880 mdl 13 is attached to the system. The management of the cache is exploited by the following modes of operation:

- 'Sequential' allows the staging of data into the cache before access to that data is requested from the host.
- 'Normal' results in management of the data in the cache to be handled by the 3880 Storage Control mdl 13. This is the default mode of operation.

The following caching modes of operation are implemented:

- **BDAM**  
'Normal' for all functions
- **ISAM**  
'Sequential' for load mode  
'Normal' for all other functions
- **QISAM**  
'Normal' for overflow record accesses  
'Sequential' for all other functions
- **PAM**  
'Normal' for directory accesses  
'Sequential' for all other functions
- **SAM**  
'Sequential' for all functions
- **VSAM**  
'Sequential' format writes  
'Sequential' sequential accesses to ESDS  
'Normal' for all other functions
- **Media Manager**  
'Sequential' pre-format  
'Sequential' format writes  
'Normal' default for user read/write  
'Sequential' user-specified for sequential read/writes
- **Utilities**  
'Sequential' IEBCOPY  
'Normal' all other utilities

Provide Error Recovery procedures for error conditions and expected recovery actions associated with the 3880 mdl 13.

**New Access Method Services Commands (3880 mdl 13 only)**

**BINDDATA** For certain critical tracks, such as indexes, it may be necessary to specify that tracks are 'bound' to the cache. That is, the tracks are promoted to the cache and are not eligible for demotion. The BINDDATA command is used for that purpose. The tracks are specified by means of low and high cylinder and head addresses. Specified data will remain bound in the cache until released or a subsystem error occurs.

**SETCACHE ON/OFF** In certain cases it may be desirable to set a 3380 device offline for caching - for example, where a high proportion of writes are performed to the data sets on one device. The purpose of the SETCACHE command is to allow or inhibit caching for a 3380 device or for the entire 3880 mdl 13 subsystem. The default is SETCACHE ON for all attached 3380s.

**Improved VTOC Access via an Index to the VTOC:** The VTOC is composed of unblocked records with DASD keys and is accessed primarily in two ways: Via DADSM routines to perform global DASD space management functions such as allocating and scratching data sets, and via EXCP and the sequential access method (SAM) for reading and writing DSCBs, or portions of the VTOC.

Without Data Facility Device Support, VTOC access almost always involves a channel search for a specific DASD key. Therefore, channel time increases as the number of data sets on a volume increases (e.g., as the contents of the VTOC increases).

With Data Facility Device Support, VTOC access is improved by using an index structure for the current VTOC, and by providing a Common VTOC Access Facility (CVAF) to support the index structure. This new structure includes space maps which replace the Format 5 DSCBs of the current VTOC and are used to manage VTOC and VTOC index space.

Following are some key characteristics of volumes with a VTOC index:

- The VTOC index is optional on any DASD that is supported by the base operating system:
  1. It is not supported on any volume whose VTOC does not begin on record 1Z of a track.

## Data Facility Device Support (cont'd)

2. It is not supported on the 2314.
- Volumes with and without the VTOC index can coexist on the same system and are supported by the DADSM routines in a manner transparent to the user.
- The Device Support Facilities may be used to create a VTOC with or without an index when a volume is initialized. Building of an index over existing volume VTOCs may be done.
- The VTOC can still be accessed via EXCP and SAM, except that data identifying a volume's available space has been moved from the Format 5 DSCB to space maps in the index. Programs which are dependent on the information in a Format 5 DSCB must use one of the new CVAF functions provided to obtain available space information from the index. However, users are encouraged to use CVAF for all access to the VTOC on volumes both with and without the VTOC index.
- If CVAF detects an error in the index structure, CVAF marks the index as invalid, and existing DADSM routines restore the VTOC to non-indexed format so that the volume can be used while the index error is being analyzed. Device Support Facilities can be used to rebuild the index as desired.

**DADSM Installation Exits:** Optional pre- and post-processing installation exits are provided for the allocate, extend, scratch, partial release and rename functions of DADSM. These exits provide an installation with the ability to reject, limit or simply monitor DADSM requests involving DASD space utilization.

**OS/VS2 MVS Alternate Master Catalog IPL Capability:** A message is added at IPL time prompting the system operator for the name of an alternate master catalog, enabling the system to be operated in the event that the regular, or default, master catalog is unavailable.

**3800 Printing Subsystem Model 3 Support:** For users of the 3800 mdl 3, support is provided as follows:

- 3800 mdl 1 applications can be printed on the 3800 mdl 3 in compatibility mode. Few if any changes to the application program or the JCL are required.
- An additional line spacing of 10 lines per inch.
- 3800 character sets and graphmods in the required 240 x 240 pel density.
- Character arrangement tables.
- Selected 6670 character sets converted for use with the 3800 mdl 3.
- IEBIMAGE Utility is enhanced to support 240 x 240 pel density and 10 lines per inch.
- Improved copy separation for single page data sets.
- Identifies to the host operating system that a 3800 mdl 3 is attached.
- Improved error recovery procedures.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

**OS/VS1:** OS/VS1 Data Facility Device Support (5740-AM6) is designed to operate on any IBM processor supported by OS/VS1 Basic Programming Extensions (5662-257).

**OS/VS2:** OS/VS2 Data Facility Device Support (5740-AM7) is designed to operate on any IBM processor supported by either MVS/System Product-JES2 Version 1 (5740-XYX) or MVS/System Product-JES3 Version 1 (5740-XYN).

#### SOFTWARE REQUIREMENTS

**OS/VS1:** OS/VS1 Data Facility Device Support Releases 1.0 and 1.1 require the functions provided by OS/VS1 Basic Programming Extensions Release 1 (5662-257) and subsequent releases and modifications unless otherwise stated by IBM.

OS/VS1 Data Facility Device Support Release 1.2 requires the functions provided by OS/VS1 Basic Programming Extensions Release 4 (5662-257) and subsequent releases and modifications unless otherwise stated by IBM.

OS/VS1 users of the following devices require the functions provided by OS/VS1 DFDS Release 1.2 and OS/VS1 Basic Programming Extensions Release 4 (5662-257) and subsequent releases and modifications unless otherwise stated by IBM:

- IBM 3380 Direct Access Storage
- IBM 3880 Storage Control mdls 2 and 3 with Speed Matching Buffer for 3380 feature
- IBM 3880 Storage Control mdl 13
- IBM 3430 Magnetic Tape Subsystem
- IBM 4245 Line Printer

To provide direct access storage device dump and restore functions, the user may need to order and install the latest release of Data Facility Data Set Services (DFDSS, 5740-UT3) or a functional equivalent. If the user is planning to install DFDSS, it is recommended that this be done well before OS/VS1 Data Facility Device Support is installed, to backup disk files to tape using the format acceptable to DFDSS for restoration.

**OS/VS2 MVS:** OS/VS2 Data Facility Device Support Release 1.4 requires the functions provided by one of the following:

1. MVS/System Product-JES2 Version 1 Release 1 (5740-XYX)
2. MVS/System Product-JES3 Version 1 Release 1 (5740-XYN)
3. MVS 3.8 3380/3375 PRPQ (5799-BFF)

Subsequent releases and modifications may be used unless otherwise stated.

OS/VS2 users of the IBM 3880 Storage Control mdls 11 and 13 require the functions provided by OS/VS2 DFDS R1.5, its prerequisite OS/VS2 DFDS R1.4, and either MVS/SystemProduct-JES2 Version 1 Release 3.1 (5740-XYX) or MVS/System Product-JES3 Version 1 Release 3.1 (5740-XYN) and subsequent releases and modifications, unless otherwise stated.

Users of the IBM 3800 Printing Subsystem mdl 3 require the functions provided by OS/VS2 DFDS R1.6, and its prerequisite OS/VS2 DFDS R1.4. OS/VS2 DFDS R1.6 does not require R1.5. However, either or both may be applied to R1.4. Neither OS/VS2 MVS DFDS R1.5 nor R1.6 may be installed with the MVS 3.8 3380/3375 PRPQ (5799-BFF).

OS/VS2 MVS DFDS R1.5 and R1.6 are separately orderable, will not be shipped automatically to current users of OS/VS2 MVS DFDS, and must be ordered by new users and current users of OS/VS2 MVS DFDS planning to install the devices.

The 3380 and 3375 must be initialized by the current release of the Device Support Facilities utility of either the applicable operating system or the stand-alone Device Support Facilities program (5747-DS1).

**Storage Usage:** The approximate real and virtual storage changes for Data Facility/Device Support Release 1 operating in an OS/VS2 MVS environment are:

Nucleus (Real)	22K
PLPA (Virtual)	120K

The specified operating environment may change and will be restated at availability.

### COMPATIBILITY

Programs that currently access the VTOC through documented DADSM interfaces will continue to operate without change on volumes with a VTOC index. Programs that access the VTOC via EXCP or SAM will continue to operate without change on volumes with a VTOC index with one exception: Those programs that obtain information from the Format 5 DSCB(s) must be modified to use a new CVAF function to obtain the same information from the VTOC index. CVAF sets an indicator in the Format 4 DSCB, that is already defined for this purpose to indicate when the data in the Format 5 DSCB is invalid. CVAF sets a new indicator when a VTOC Index exists.

### MIGRATION/CONVERSION

Coexistence with systems that do not support the VTOC index is a major feature of the VTOC index design.

- Any volume that is currently usable on OS/VS2 MVS, MVS/XA or OS/VS1 may be moved from another operating system and used as-is on a system with VTOC index support.
- Device Support Facilities can be used to initialize a VTOC index on these volumes whenever desired, with the exception of the 2314 and volumes whose VTOC does not begin on record 1 of a track (for example, a DOS 'stacked pack').
- A volume with a VTOC index can be moved to and from the following systems which do not support the VTOC index:
  - OS Release 21.8
  - OS/VS2 SVS
  - VSE/Advanced Functions
  - OS/VS1, without DFDS (5740-AM6) installed
  - OS/VS2 MVS, without either MVS/370 DFP (5665-295) or DFDS (5740-AM7) installed

In general, if the VTOC is modified on any of these systems, the VTOC index will be invalidated and the VTOC converted to the non-indexed format either via existing facilities on these systems or upon return to a system that supports the VTOC index. The user must then re-initialize the index with Device Support Facilities. Certain usage on OS Release 21.8 and OS/VS2 SVS may require that the VTOC index be converted to non-indexed format prior to use on these systems. See the *Data Facility/Device Support General Information* manual for a description of conditions which will require conversion.

**Data Facility Device Support (cont'd)**

In an environment where an Indexed VTOC is shared by multiple host systems, Data Facility Device Support, MVS/XA Data Facility Product, or MVS/370 Data Facility Product must be installed on all systems that can access the shared VTOC.

- Volumes with the VTOC index that must be used on systems other than those listed above should be converted to the non-indexed VTOC format via Device Support Facilities prior to use on the other system.
- The VTOC index is designed for easy user migration. User job streams, including JCL and IEHPROGM control cards, are fully compatible with indexed and non-indexed volumes. EXCP programs that are converted to use CVAF will operate on both types of volumes. Thus the installation may gradually convert volumes to the indexed format.

The Direct Access Storage Device Migration Aid licensed program is available to assist the user in moving data to the 3375 or the 3380.

**3380 Model 11 (MVS only):** 3350 devices formatted as paging volumes must be reformatted as the 3880 mdl 11 does not support track overflow. The format of swap data sets remains unchanged. Paging data sets created on 3350 prior to installation of the 3880 mdl 11 cannot be used.

**3380 Model 13 (MVS only):** User applications which currently use IBM-supported access methods will not need to be re-written or re-compiled.

**Note:** An application using the read back check command will not have the same data integrity check when used with the IBM Storage Control mdl 13. Due to the method of writing, data will be written first to the cache and then copied to the 3380. A subsequent read will be from the data in the cache and not the data on the 3880. For applications using read back check, consideration should be given to bypassing the cache using the access method services command SETCACHE OFF.

**AVAILABILITY**

In the event an error causes invalidation of the VTOC index, the next DADSM allocate or extend operation will restore the non-indexed format. The user's programs will not be aware of the error, and the volume continues to be available for use.

**SECURITY**

The VTOC index can be either RACF-protected (MVS only) or password-protected, in which case a user must be RACF authorized or must supply a password if the index is to be scratched, renamed or opened for output. The VTOC can be RACF-protected, in which case the user must be RACF-authorized to open the VTOC for output.

**AUDITABILITY**

The pre- and post-processing DADSM installation exits may be used by an installation for auditing DADSM requests.

**PERFORMANCE CONSIDERATIONS**

The indexed VTOC facility contained within Data Facility Device Support Release 1 offers performance improvements in data set allocation and the DADSM functions. This facility is optimized for large DASD volumes where the VTOC exceeds two tracks.

This is especially significant in a Time Sharing Option (TSO) environment, where a large number of data sets are typically found on a single DASD volume.

These improvements will be multiplied by the reduced channel interference in a multi-programming system. The existing VTOC access requires search commands which make a channel and control unit busy during the entire search. The Indexed VTOC will reduce channel and control unit busy time.

In multiple host, shared DASD configurations, the savings will be even more evident. The reduction in RESERVE/RELEASE interference will benefit all systems which need the shared volumes.

Improvements in allocation time were observed in the following environment:

Processor	3033
Main Storage	4.0 Megabytes
Operating System	OS/VS2 MVS
Device Type	3330-11

Observation 1: 500 data sets	
Elapsed time savings	62 percent
Observation 2: 1900 data sets	
Elapsed time savings	85 percent

The indexed VTOC support can save more than 700 microseconds per DSCB in the VTOC for an ALLOCATE. For 500 data sets, the savings may be more than .35 seconds, and for 1900 data sets, the savings may be more than 1.33 seconds for each allocation of a new data set. The larger the number of entries in the VTOC, the greater will be the overall improvement in DADSM performance.

Generally, 3800 mdl 1 jobs printed on the 3800 mdl 3 in compatibility mode using OS/VS2 MVS DFDS R1.6 will have equivalent throughput.

These observations are only examples. The actual improvement experienced by any user, or any specific environment, is dependent on many factors. IBM does not represent or warrant that all users will experience the same change in performance for all environments.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information (GC26-3954) ... Summary OS/VS1 (GC26-3955) ... Summary OS/VS2 MVS (GC26-3956) ... Licensed Program Specifications OS/VS2 MVS (GC26-3951) ... Licensed Program Specifications OS/VS1 (GC26-3950).*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where the installation of this program causes an exposure to the system integrity of MVS. This program is intended to run authorized.

RPQs ACCEPTED: No



PROGRAM PRODUCTS

**ACCESS METHOD SERVICES  
CRYPTOGRAPHIC OPTION  
RELEASE 1 MODIFICATION LEVEL 0  
5740 - AM8**

**PURPOSE**

The Access Method Services Cryptographic Option for OS/VS2 MVS and OS/VS1 extends the Access Method Services REPRO function to give the user the ability to encrypt and decrypt data using a software or hardware version of the National Bureau of Standards Data Encryption Standard (DES). To encipher and decipher the data and provide "key" management functions, the access method services REPRO command uses the services of either the Programmed Cryptographic Facility licensed program (5740-XY5) using software for OS/VS2 MVS and OS/VS1, or the Cryptographic Unit Support licensed program (5740-XY6) using hardware for OS/VS2 MVS utilizing the 3848 Cryptographic Unit.

**HIGHLIGHTS**

- Enciphering and deciphering is based on a binary value, called a "key".
- Supports all data set organizations currently supported by Access Method Services REPRO command, (except VSAM and Integrated Catalog Facility catalogs).
- After encryption, the data set remains unintelligible until it is deciphered with the correct key.
- Provides users with an aid for securing data while offline for:
  - transportation to a different location.
  - long term storage at a different location.
  - or normal offline storage at the location where used.

**CUSTOMER RESPONSIBILITIES**

The customer responsibilities relating to use of the Access Method Services Cryptographic Option involve the system security and the physical security of keys, the cryptographic key data set and the encrypted data. The customer must realize that the loss of a key used to encrypt a data set means the loss of the encrypted data; that is, the encrypted data cannot be decrypted. Therefore, the customer must provide adequate measures for maintaining secure duplicate copies of keys used. For further information on this subject, see the Programmed Cryptographic Facility licensed program (5740-XY5) and the Cryptographic Unit Support licensed program (5740-XY6).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Access Method Services Cryptographic Option is designed to have the same constraints, execute on the same processors and support the same configurations as the respective base operating system. This product increases the amount of storage required by Access Method Services. Approximately 14,000 additional bytes of virtual storage and 12,000 additional bytes of DASD library storage (SYS1.LINKLIB) are used.

**SOFTWARE REQUIREMENTS**

The Access Method Services Cryptographic Option is designed to operate with OS/VS2 Release 3.8 and OS/VS1 Release 7 and subsequent releases and modification levels unless otherwise stated. Additionally, the Programmed Cryptographic Facility licensed program (5740-XY5) is utilized by this option for software encryption/decryption on OS/VS2 MVS or OS/VS1, and Cryptographic Unit Support licensed program (5740-XY6) is utilized for hardware encryption/decryption on OS/VS2 MVS.

Access Method Services Cryptographic Option source code is distributed in assembler language as optional material and is supported via the System Modification Program (SMP).

**COMPATIBILITY**

All data set organizations supported for input by the Access Method Services REPRO command are supported as input for REPRO ENCIIPHER (with the exception of VSAM and Integrated Catalog Facility catalogs). All data set organizations supported for output by REPRO are supported for output from REPRO DECIPHER (except VSAM and Integrated Catalog Facility catalogs). Enciphered data sets are always sequentially organized, and are unintelligible to any system without either the Programmed Cryptographic Facility licensed program or the Cryptographic Unit Support licensed program installed, and without knowledge of the correct key. Enciphered data sets cannot be deciphered by DOS/VS systems. Therefore, customers should consider their cross system portability requirements in evaluating this OS/VS facility.

**PERFORMANCE**

No performance cost is incurred by an installation when the Access Method Services Cryptographic Option is not in use. When this option is in use, the performance cost depends directly upon the length of the

data records being encrypted or decrypted. At the user's option, performance may be improved by specifying the number of logical records (up to a maximum of 255) to be encrypted or decrypted as a unit.

**DOCUMENTATION: (available from Mechanicsburg)**

Title	Order Number
OS/VS1 and OS/VS2 MVS Programmed Cryptography Facility General Information Manual	GC28-0942
Licensed Program Design Objectives	GC26-3917
Data Security Through Cryptography	GC22-9062

**SYSTEM INTEGRITY**

IBM will accept APARs describing situations where the Access Method Services Cryptographic Option causes an exposure to the system integrity of OS/VS2 MVS.

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**OS/VS COBOL COMPILER AND LIBRARY (5740-CB1)  
OS/VS COBOL LIBRARY ONLY (5740-LM1)**

**DESCRIPTION**

The OS/VS COBOL Compiler and Library operates in a virtual storage environment under control of OS/VS1, OS/VS2; OS/VS1, OS/VS2 under VM/370; or the Conversational Monitor System (CMS) of VM/370. The Library is required for execution of compiled programs. The compiler and library support American National Standard COBOL X3.23-1968\* and X3.23-1974\* and add several new features to those contained in previous IBM OS Full ANS COBOL Compilers.

OS/VS COBOL features are:

- VSAM Support** -- The high performance access method. \*\*\*\*
- Lister** -- A facility that produces a new source listing with standard indentation and alignment, embedded cross-references, footnotes, and other features.
- Verb Profiles** -- A facility to identify and locate verbs in a source program.
- Execution Statistics** -- A facility that counts executions of source verbs.
- WHEN-COMPILED Special Register** -- A means of associating a compilation with its execution.
- Merge** -- A facility for merging files. \*\*
- Multiple Sort Inputs** -- An extension of the sort facility to permit specification of more than one data set as input. \*\*
- Support of 3886 Optical Character Reader**. \*\*\*
- S/370 instructions generated automatically.**
- FIPS Flagger** -- An installation management tool which helps enforce conformance to the Federal Information Processing Standard for COBOL as defined by FIPS Pub. 21, March 15, 1972.

Source language, data set, and object program compatibility with previous versions of OS Full ANS COBOL.

**HIGHLIGHTS**

- VSAM (Virtual Storage Access Method) Support** ... VSAM is a high-performance access method, equally adapted to online and batch processing, with a high degree of data security. Through COBOL, access can be sequential, random through an index, or physical sequential.
- Lister** ... A facility for reformatted source listings with expanded, embedded cross-referencing information. Features of this new source listing include: Standard indentation for all DATA DIVISION level numbers to show group structure, and for all IFs, etc., in the PROCEDURE DIVISION to facilitate tracing program logic. Alignment of PICTURE and VALUE clauses to highlight OCCURS and REDEFINES. Two-way, embedded cross-references to eliminate indirect 'lookups' (via a separate SXREF listing in a conventional COBOL Compiler). Reference-letters to show type of reference indicate overall usage of a program item, and reduce the need to look up each reference. Footnotes on PROCEDURE pages to show the definition of referenced data items, eliminating more 'lookups'. Two-column PROCEDURE DIVISION pages to compact the listing and further reduce page-turning. Cross-reference summary to show how, and how much, FDs and PROCEDURE DIVISION SECTIONS reference each other. Optional reformatted and renumbered source deck for manual use or for updating the BASIS library.
- Verb Profiles** ... A facility which eases identification of verbs used in the source program, and of finding where the verbs are located. This facility is composed of two options: A verb summary feature and a verb cross-reference feature. Both the verb cross-reference and summary features use the format of the XREF and SXREF listings.
- Execution Statistics** ... A facility which is both a debugging and an optimization aid. It consists of a summary of how often each COBOL source program verb is executed; all statistics are for an individual program execution and are printed at a program termination. This is useful for knowing which sections of a program are heavily used and should be evaluated for efficient coding; it is of further use in monitoring whether all portions of a program have been executed during a debugging run.
- WHEN-COMPILED Special Register** ... The WHEN-COMPILED special register makes available to the object program the date-and-time-

\* Formerly known as USA Standard COBOL, compatible with and identical to the international standard of the language, ISO Recommendation 1989-1972 -- Information Processing -- Programming Language COBOL.

\*\* Not available under CMS at object time.

\*\*\* Not available under VM/370 at object time.

\*\*\*\* Available under CMS at object time as of VM/370 Release 3, except that no ISAM interface is provided.

compiled constant carried in the object module. WHEN-COMPILED provides a means of associating a compilation listing with both the object program and the output produced at execution time.

**Merge Facility** ... Allows the user to combine two or more identically sequenced files according to the ascending/descending order of embedded key(s) in each record. Use of this facility requires the OS/VS Sort/Merge program product (5740-SM1).

**Multiple Input Sort Data Sets** ... Allows the user to specify more than one data set as input to the sort facility.

**3886 Optical Character Reader** ... OS/VS COBOL supports the 3886 through appropriate statements to control and accept input from the device. A new library subroutine can be invoked through CALL statements. Functions include: Opening and closing the file; reading and checking the file; loading a new format record; and special control operations.

**Automatic Generation of S/370 Instructions**

**FIPS Flagger** ... This feature identifies non-standard COBOL statements in a source program. It ensures that COBOL source programs can be written to conform to specifications defined by the Federal Information Processing Standard for COBOL.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Operation of the IBM OS/VS COBOL Compiler with TSO requires the minimum TSO configuration. Information on OS/VS2 TSO system requirements can be found in the *IBM OS/VS2 TSO Guide* (GC28-0644).

When running under CMS, the minimum CMS configuration is required. Information about VM/370 and CMS can be found in *IBM VM/370: Planning and System Generation Guide, Release 2 PLC1* (GC20-1801).

For operation of the OS/VS COBOL Compiler without TSO or TCAM, an IBM S/370 and 108K bytes of virtual storage are required, as well as a configuration sufficient to run the selected IBM Operating System.

Executing object programs in a communications environment requires a minimum TCAM systems configuration and TCAM Modification Level 2. A description of TCAM is in the *Operating System: TCAM Concepts and Facilities* (GC30-2022) and in *Operating System: Telecommunications Access (TCAM) Programmer's Guide and Reference Manual* (GC30-2024).

Use of the FIPS Flagger requires an additional data set -- SYSUT6.

**SOFTWARE REQUIREMENTS**

The OS/VS COBOL Compiler and Library operates in a virtual storage environment under control of the following:

- OS/VS1
- OS/VS2, with or without the Time Sharing Option (TSO)
- The above VS Operating Systems under VM/370
- CMS of VM/370

**OS/VS Release Requirements:**

Object programs compiled from source programs that contain the language features listed below will require at least the following OS/VS releases for execution:

	OS/VS1	OS/VS2
Merge	2.6	1.6
VSAM Support	2.0	1.6
3886 Support	3.0	2.0

Operating with TSO, the OS/VS COBOL Compiler can be invoked most conveniently by the TSO COBOL Prompter (5734-CP1), which conversationally interacts with the terminal user to obtain the necessary compilation. The OS/VS COBOL Compiler requires at least Release 1 Modification 2 of the Prompter. The compiler can also be invoked in the Time Shared region by using the TSO 'CALL' command; however, it is necessary to allocate each data set required prior to compilation.

Under TSO, potentially significant gains in COBOL programmer productivity can be obtained by using OS/VS COBOL in conjunction with COBOL Interactive Debug (5734-CB4). The OS/VS COBOL Compiler requires at least Release 1 Modification 3 of COBOL Interactive Debug.

Under control of CMS of VM/370 the OS/VS COBOL Compiler may be invoked by the CMS command COBOL, and OS/VS COBOL object programs may be tested using COBOL Interactive Debug.

The separate program product IBM OS or OS/VS Sort/Merge programs are designed to be used with COBOL object programs that use the verb, or that sort ASCII or separately-signed numeric data. IBM OS/VS Sort/Merge (5740-SM1) is specifically designed to run under OS/VS, and is required if the Merge verb is used.



## PROGRAM PRODUCTS

## OS/VS COBOL Compiler/Library (cont'd)

## COMPATIBILITY

**ANS COBOL:** This section addresses the compatibility between OS/VS COBOL (5740-CB1) and Release 1 and previous versions of the IBM OS Full American National Standard COBOL Compiler and Library: OS Version 2 COBOL (360S-CB-545, 360S-LM-546) ... OS Version 3 COBOL (5734-CB1) ... OS Version 4 COBOL (5734-CB2, 5734-LM2).

Source Level ... COBOL programs coded correctly for Versions 2, 3 or 4 are compatible and will compile without modification, provided that OS/VS COBOL reserved words were not used as user-specified names.

Object Module Level (Pre-Link Edit) ... At availability of the OS/VS COBOL Library, it will operate with object programs (a) compiled on Version 2, 3 or 4 and (b) operating with the most recent release-modification levels of their libraries that are then available. Present levels most recently available are:

Version 2; Release 21.X

Version 3; Release 3.1

Version 4; Release 1.2

Programs meeting the conditions of (a) and (b) above, must be re-link edited, but do not require compilation.

Load Module Level (Link-edited) ... No compatibility claimed; however, there may be instances in which load modules from earlier versions will run.

Data Set Compatibility ... Data sets created by programs compiled on any of the previous versions of ANS COBOL or by COBOL E or F programs can be processed by OS/VS COBOL programs.

**COBOL, E, F:** Source programs written for the COBOL E and F Compilers must be converted before compiling them on the OS/VS COBOL Compiler. The Language Conversion Program described in the *IBM System/360 Conversion Aids: COBOL-to-American National Standard COBOL Language Conversion Program* (GC28-6400) facilitates such conversions to the 1968 COBOL Standard.

**CMS:** Under CMS, the Compiler can accept and compile any COBOL source program that it can accept and compile under the control of OS/VS1 or OS/VS2. The object code generated by the OS/VS COBOL Compiler under CMS can be executed without restriction under the control of OS/VS1 or OS/VS2, with or without TSO. The object code generated under CMS can also be executed under CMS with the object time restrictions in the following areas:

ISAM, VSAM\*

SORT

Segmentation (Removed by OS/VS COBOL Rel 2)

CALL ... on overflow

TCAM

Various I/O-related restrictions

\* The restriction against VSAM is removed as of VM/370 Release 3.

For more detailed information about the above restrictions under CMS, refer to the *IBM OS/VS COBOL Compiler and Library General Information* (GC28-6470).

As of VM/370 Release 3, VSAM data sets are compatible between CMS and OS/VS1 or OS/VS2. The disk formats of all other CMS files are not compatible with data sets of OS/VS, although CMS is able to read OS/VS BSAM, QSAM and BPAM data sets. Data sets are also transferrable through utilities or card and tape.

**CICS:** Programs written for use in a CICS environment that are to take advantage of the Object Code Optimizer feature must include a special compiler control statement at appropriate places within the source. New features other than the FIPS Flagger, Lister, Verb Profiles, and WHEN-COMPILED special register are not available for use in a CICS environment.

*Note: The structure of object programs compiled with the OS/VS COBOL Compiler may differ from the structure of object programs compiled with previous versions of the ANS COBOL Compilers. Before installing the OS/VS COBOL Compiler, all application packages having dependencies on the structure of the object code must thus be updated to include support for the OS/VS COBOL Compiler.*

## PERFORMANCE

When run with the same options in a virtual environment, the OS/VS COBOL Compiler will compile the same program in approximately the same time as Version 4.

Compilation time may be increased slightly by selecting options for the Lister, Verb Profiles and FIPS Flagger.

**DOCUMENTATION:** (available from Mechanicsburg)

*OS/VS COBOL Compiler and Library General Information* (GC28-6470) ... *Specifications* (GC28-6472) ... *OS Full American National Standard OS/VS COBOL Compiler and Library* (GC28-6396) ... *IBM VS COBOL for OS/VS* (GC25-3857).

**3650 PROGRAMMABLE STORE SYSTEM  
PSS COBOL COMPILER  
DOS/VS (5746-CB2) OS/VS (5740-CB2)****PURPOSE**

The 3650 Programmable Store System COBOL Compiler program product is a derivation of the base S/370 DOS/VS and OS/VS COBOL compilers which is designed for use with the IBM 3650 Programmable Store Systems. It allows users of Programmable Store Systems to write batch type programs in COBOL. It executes in a S/370 and compiles the programs into SPPS II code. These SPPS II programs are then processed according to normal procedures for execution in the 3651 store controllers.

**DOCUMENTATION**

The *General Information Manual* (GC30-3059) and the *Licensed Program Design Objectives for PSS COBOL Compiler* are available from Mechanicsburg as unlicensed documentation at no charge. Availability of other licensed and unlicensed documentation will be announced prior to program availability.

**HIGHLIGHTS**

- This COBOL compiler program product consists of one component which replaces a single phase of the standard S/370 COBOL compilers. This phase normally generates the S/370 executable object deck. This replacement component will cause an SPPS II program deck to be punched. This SPPS II deck will then be processed according to standard user SPPS programming procedures.
- This COBOL is a proper subset of the American National Standards Institute (ANSI) COBOL as implemented by the S/370 COBOL compilers. The specifications are:
  - ANS/X3.23-1968 for DOS/VS
  - ANS/X3.23-1974 for OS/VS
- This COBOL compiler will allow the user to write programs in COBOL to do batch type processing in the 3650 Programmable Store System controllers. Since this COBOL is a subset of the S/370 COBOL, a program written for this compiler should also be able to compile under the standard S/370 compilers. Because of this, a user should be able to compile, to execute and to debug PSS application programs on the S/370 before transmission to the controller.

**CUSTOMER RESPONSIBILITIES**

The customer will be instructed to install the prerequisite COBOL/VS Compiler program product and its associated updates. After COBOL installation, the libraries which contain the various components of the base COBOL compiler are to be left intact. Instructions with this COBOL licensed program will then instruct the customer to execute the job control language (JCL) which is provided. This JCL will combine the proper components from the COBOL component libraries with the 3650 Programmable Store System COBOL component. The output will be the 3650 Programmable Store System COBOL Compiler. Hence, the customer will have on the host system both the standard COBOL compiler and the 3650 Programmable Store System COBOL Compiler. The compilers will be physically separate and distinct for ease in usage and maintenance.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum system required is an IBM S/370 that will support the COBOL/VS compiler and the SPPS II program product under DOS/VS, OS/VS1 and OS/VS2 (MVS).

**SOFTWARE REQUIREMENTS**

This COBOL is designed to operate with DOS/VS, OS/VS1 and OS/VS2 (MVS). The prerequisite DOS/VS COBOL compiler program product or the OS/VS COBOL compiler program product and the SPPS II program product must also be installed. Specific release levels are detailed in the product availability notices.

**COMPATIBILITY**

Some language functions required by the ANS specifications for this product are not supported by 3650 Programmable Store System COBOL. The facilities required for support of these statements are not provided in the 3651 controller. These deviations will be detailed in the *Licensed Program Specifications*.

**PERFORMANCE CONSIDERATIONS**

Compile time performance factors for this COBOL compiler and the S/370 COBOL compilers are essentially the same. Compile time performance between the compilers may, therefore, be assumed to be equivalent. Execution time performance of the object code in the controller is, however, governed by how the COBOL program is coded. The three major influences in performance are:

- Arithmetic definition of data fields.
- Usage of bit flags.
- Program structure.

Maximum efficiency will be achieved by use of half-word, binary data fields, minimal usage of bit flags and minimal usage of PERFORMs and indexing.



**Change Management Tracking (CM/T) (5740-DC1)  
Change Tracker (CT) (5740-DC4)  
DP Accounting for IMS/VS (DPA) (5740-DC2)**

**DESCRIPTION**

Change Management/Tracking, Change Tracker, and DP Accounting for IMS/VS, together constitute an information system that covers three important aspects of data processing management:

- Change Management/Tracking (CM/T) keeps an orderly record of changes made to the installation's production libraries. Use of this record can reduce problem determination time and improve availability. The change tracking function of CM/T is also available as a separate program product – the Change Tracker (CT) – which can be licensed separately for each additional processor in a multiple-processor installation.
- DP Accounting for IMS/VS (DPA) provides IMS/VS DB/DC installations with an equitable and consistent charge-back system based on IMS transaction usage.

The above programs all use source information from the logs of the OS/VS System Management Facilities (SMF) and/or the Information Management System/VS (IMS/VS). Therefore, although they are available as separate program products, they are built on a common data base structure and share similar data base input, modification, and reporting functions.

The above program products run under OS/VS1 and OS/VS2 (SVS and MVS). On OS/VS2 systems, they can (with the exception of the Change Tracker) be executed online under TSO.

**HIGHLIGHTS**

**Change Management/Tracking:** CM/T provides the following functions:

- Tracks all changes made to user-specified libraries and stores information regarding the changes in a central data base for later use in problem and change management procedures. CM/T obtains this information from the SMF log where it is placed by the system SMF facilities and the Change Tracker subcomponent. Changes made to libraries by the following utility programs can be tracked at a member level by invoking of a tracker: Linkage Editor, IEBCOPY, IEBUGDTE, and IEHPROGM. Volume Dump/Restores made by IEHDASDR can be tracked. Data set changes that result in an SMF record type 15 can also be tracked.
- Takes backup copies of modules changed in user-specified libraries, ensuring the uniform backup of production libraries and reducing the frequency with which full backup must be taken.
- Permits reconstruction of a library when a system "crash" or some other crisis forces the use of a previous version of a library or application. CM/T produces a jobstream that, when executed and modified updates the last normal backup copy of a library with any changes that have been made between the backup and the "crash".
- Provides reports useful in determining unauthorized changes and in managing software problems and changes, particularly problem determination. If TSO is available, this information can be obtained online using a CM/T query command.

The error causing a software failure very frequently lies in a recently changed module. CM/T can help to reduce the time in locating such a module by providing a time-stamped history of changed modules – an important consideration when the module belongs to a critical application and end users are awaiting the resolution of the error.

The facilities of CM/T and the systematic use of CM/T provided information in problem and change management techniques offer an installation the opportunity for improvements in two different areas:

- *Systems availability* – reduced problem determination time and the rapid reconstruction of libraries can lessen the time an application is unavailable to the end user.
- *Programmer productivity* – improved documentation and faster problem determination can decrease the amount of time programmers devote to programming maintenance and release them to more productive work.

Both CM/T and CT are licensed for use on a per processor basis. However, in an installation with multiple processors, the full package of CM/T components need not be ordered for each processor to achieve the full capabilities of CM/T across all systems. Only the Change Tracker (5740-DC4) must be ordered for each additional processor. The tracker places linkage editor and system utility information onto the SMF log of each separate processor. The tracker also places backup copies of changed modules in a library on each processor. The SMF logs from the additional processors are processed later by the full CM/T (5740-DC1) on the processor to which it is licensed.

**DP Accounting for IMS/VS:** DPA functions permit a new method of accounting and planning for DP management responsible for IMS/VS DB/DC systems, and for users of IMS/VS featuring:

- *Transaction-based accounting* – billing information in terms of IMS/VS transactions – not in terms of processor seconds, EXCPs and SIOs – easing considerably the end user's task of estimating and justifying resource requirements for current and proposed applications.
- *Consistent billing* – DPA allows the billing of users at a fixed price by type of transaction over a given accounting period as opposed to other types of billings that often appear inconsistent and erratic to the end user.
- *Equitable billing* – DPA establishes a price for transaction types based on the average use of system resources.
- *Improved usage information* – using estimates from end users, DPA projects future workload trends, which can be used by DP management in calculating future resource requirements.

DPA has no impact on IMS/VS online performance; it can be run as a normal OS/VS batch job off prime shift or at any other time desired by the installation. To obtain complete information in DPA, IMS transactions should be defined with either INQ=NO or INQ=(YES, RECOVER).

DPA calculates from the IMS/VS system logs the average resource consumption per transaction type over a user-specified past period and establishes proportionate transaction weights. To determine a cost for each transaction type, DPA distributes the total IMS/VS cost (provided by the installation) over the estimated transaction volumes in proportion to the transaction weights. The installation can then determine equitable transaction prices based on the DPA-computed costs. At the end of each billing period, DPA produces a consolidated list of billings based on the transaction prices and number of transactions recorded in the IMS/VS logs over the period.

The data base system selects required data from the SMF and IMS/VS logs, summarizes it, and stores it in the data base. In an OS/VS installation with multiple processors, the logs from all systems can be used using TSO-like commands, the user can then access the data and obtain the Using TSO-like commands, the user can then access the data and obtain the reports he requires as tables, bar charts, or graphs through batch or TSO.

**CUSTOMER RESPONSIBILITIES**

Installation should be carried out by an experienced systems programmer with knowledge of SMF and/or IMS/VS (depending on the products to be installed).

Introductory education to the products is provided by supporting publications. For CM/T and CT, basic education in handling the product is needed by programmers updating production libraries, and by personnel responsible for problem determination and change coordination. For DPA, the person or persons responsible for billing of IMS/VS services need education in the product.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

CM/T, CT, and DPA will run on any machine configuration supported by the above system control programs and VSAM. If they are to be used under TSO, an IBM 3277 Display Station mdl 2 (or equivalent) must be available. Hardware floating-point capability is also needed.

CM/T and DPA, will each require a minimum virtual address space, or partition, of 512K bytes. CT will require a minimum of 256K bytes.

For installation, one IBM 2400- or 3400-series tape unit is required.

The disk space needed will vary with the amount of data processed.

**SOFTWARE REQUIREMENTS**

CM/T, CT, and DPA require the following system control programs:

- OS/VS1 Release 5.0, 6.0, 7.0, or
- OS/VS2 Release 1.7 or
- OS/VS2 Release 3.7, or 3.8.

The following must also be installed:

VSAM for data base access

An IBM sort/merge program (5740-SM1 or 5734-SM1) or equivalent (optional, if the SORT command is to be used).

TSO (optional, if reports are to be accessed from a terminal).

To achieve full value from CM/T and CT, the OS/VS system should have been generated in such a way that SMF records type 4, 5, 15, 17 and 18 are collected (a sample SMF program exit shipped with CM/T and CT allows records of these types not needed by the products to be eliminated from the SMF log).



PROGRAM PRODUCTS

**Installation Management (cont'd)**

DPA is released to work with:

IMS/VS Version 1 R0.1, or

IMS/VS Version 1 R1.3, R1.4, R1.5 and R1.6.

To obtain full information in DPA, IMS transactions should be defined with either INQ=NO or INQ=(YES, RECOVER).

**DOCUMENTATION:** (available from Mechanicsburg)

*Change Management/Tracking (CM/T) ... Change Tracker (GH19-6200) ... DP Accounting for IMS/VS (DPA) (GH19-6021) ... General Information Manual (GH19-6028).*

PROGRAM PRODUCTS

**SERVICE LEVEL REPORTER (SLR)  
RELEASE 2 (5740-DC3)**

**PURPOSE**

SLR provides DP management with information to help manage the DP installation. Many areas are covered by this single product - VS1, MVS, TSO, CICS/VS, IMS/VS. SLR is a post-processor of system log data, and information is collected in one data base and presented in readily understandable format. Graphics and color can be used to present information, thereby giving a versatile, easily-used, pictorial display capability for use by DP professionals at all levels. An SLR objective is to minimize the number of printed reports presented to management, by presenting the 'right' information in the 'right' format, and supplementing printed reports with online inquiries to the SLR data base when necessary.

**DESCRIPTION**

Items SLR addresses are:

**Service Levels** - SLR can be used to monitor the level of service provided to users of data processing. It enables the DP department to continuously monitor the service it provides, and thereby help ensure that commitments on the service to be provided can be given and adhered to. Deviations from commitments can be detected and their causes determined and rectified.

**System Utilization** - SLR can provide a comprehensive picture of system utilization, showing how the different system components are used, and relate this to the service levels described above. These two elements together help optimize the use of system resources.

**Capacity Planning** - SLR includes a capacity planning application which helps you measure the system load, categorize it into application areas, forecast the growth in each, and estimate hardware requirements for forthcoming years.

**Accounting** - SLR can provide the basis for DP accounting for batch, TSO, CICS/VS and IMS/VS systems. For online systems, SLR can base chargeout on a transaction basis, billing users in terms they understand and can influence.

SLR is easy to install and operate. Results are immediate. After installation, which in an MVS TSO environment normally takes less than one day, immediate access to several hundred SLR reports is available.

SLR has many powerful functions based on a data base containing historic data - online inquiry through CLIST menus under TSO, multi-processor and multi-system support, and an easy-to-use language to define additional reports, or customize the SLR data base. Two key considerations in developing SLR have been ease-of-use combined with flexibility.

SLR also supports the additional SMF records in MVS/SE Release 2 and MVS/SP.

**RELEASE 2 HIGHLIGHTS**

SLR Release 2 provides:

- Processing of the records from the CICS/VS Release 1.5 Monitoring Facility. CICS/VS 1.5 contains a new monitoring facility which produces records on a sequential file. Four log tables for CICS/VS have been added to SLR:
  - CICSACCTLOG which contains data for CICS/VS accounting.
  - CICSYSLOG which contains detailed transaction data for performance monitoring.
  - CICSTRANSLOG which contains further detailed transaction data complementing that in the CICSYSLOG.
  - CICSXLOG which contains data for CICS/VS exception reporting.
- Sample summary tables and reports are provided.
- SLR can process CICS/VS logs from both DOS/VS and OS/VS systems, although an OS/VS system is required to run SLR.
- Support of color/graphics on IBM 3279 Color Display Stations, graphics on IBM 3278 Display Stations and graphics/color on the IBM 3287 Printers, via the Presentation Graphics Feature (PGF, feature #6048) of the program product Graphical Data Display Manager (GDDM, 5748-XXH). This support is provided by a PGF/NOPGF option added to the PRINT GRAPH command, and through an additional command, PRINT CHART.
- The PRINT CHART command allows you to have any column as the X-coordinate in a graph, and also allows you to present data in 'pie-chart' form.
- The System Modification Program Release 4 (SMF4) is used to install and maintain SLR.
- A facility to route each output type from SLR (commands, reports, messages) to several different files. This permits:
  - Hardcopy of reports when running under TSO.
  - Suppress printing of commands between reports.

- Support of IMS/VS V1 Release 1.6 log data.
- Support for MVS/SP.
- Improved performance for IMS/VS Collect.
- The SLR log tape TAPELOG (based on SMF record type 21) is added.
- Additional data is provided in the IMSTLOG, JOBLOG, TSOSELOG, WACTLOG, PAGINGLOG, and DEVLOG log tables. For example, an additional third response time measurement is available in the IMSTLOG, giving transaction processing time (time between message arrival and placement on output queue).

**CUSTOMER RESPONSIBILITIES**

Installation of SLR, and tailoring, updating and maintenance of the SLR data base are customer responsibilities.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM machines: S/370 Mdl's 148, 155II, 158, 165II, 168, 30XX, 4341, 4361, or 4381 Processor.

If SLR is to be used under TSO without color or graphics, a suitable terminal must be available, either one of the following or equivalent:

- IBM 3276 Control Unit Display Station mdl's 2, 3, 4, 12, 13 or 14.
- IBM 3277 Display Station mdl 2.
- IBM 3278 Display Station mdl's 2, 3, 4 or 5.
- IBM 3279 Color Display Station mdl's 2A or 3A.

Graphics and/or color are available (via the program GDDM and its feature PGF) on the following display terminals and printers, or equivalent devices:

- IBM 3278 Display Station mdl's 2 or 3, with the ECSA, PS-2 and PS-4 features (monochrome)
- IBM 3279 Color Display Station mdl's 2B or 3B, with the PS-2 and PS-4 features (color).
- IBM 3287 Printer mdl's 1 or 2 (monochrome).
- IBM 3287 Printer mdl's 1C or 2C (color).

**Features for Color or Graphics Devices:** Features are required as follows:

Feature	D E V I C E			
	3278	3279	3287 1, 2	3287 1C, 2C
ECSA	3610		3610	3610
EPB			3680	3680
PS-2	5781	5781	5781	
PS-4	5782	5782	5782	
PS-4A				5782

The terminals for color or graphics must be attached to an IBM 3274 Control Unit mdl 1A, 1C, 1D or 51C.

SLR requires hardware floating-point capability.

SLR requires a minimum of 1M of virtual storage. When using the COLLECT command, it is advisable to request a large buffer pool and use up to 2M bytes of virtual storage.

Additional virtual storage is also required by Sort/Merge and GDDM/PGF.

**SOFTWARE REQUIREMENTS**

This licensed program requires the functions provided by the following IBM programs:

- OS/VS1 Release 6.7 and 7.0 and subsequent releases, unless otherwise identified.
- OS/VS2 (MVS) Release 3.8 and subsequent releases, unless otherwise identified.
- VSAM for data base access.
- IBM OS/VS Sort/Merge Program Product (5740-SM1), or equivalent (required if the SORT command is to be used).
- System Modification Program Release 4 (SMP4) for installation.
- TSO is required if the SLR data base is to be accessed from a TSO terminal.

## PROGRAM PRODUCTS

**Service Level Reporter (SLR) (cont'd)**

- The Program Product OS/VS2 MVS TSO Command Package (5740-XT6) is required if SLR is to be run as a TSO Command Processor in *batch*.
- The Program Product Graphical Data Display Manager (GDDM, 5748-XXH) and its feature PGF (Presentation Graphics Feature, feature #6048) are required for the utilization of 3278/3279 color and graphics features with SLR. Hence, TSO ACF/TCAM Version 2 Release 1, or TSO ACF/VTAM Version 1 Release 2 is required to use color or graphics terminals.

**Input Logs Supported:** SLR will process log data sets produced by the following programs and subsequent releases and modifications unless otherwise stated:

- IMS/VS.
- IMS/VS Version 1 Release 1.3, 1.4, 1.5, 1.6 and 2.0.  
IMS/VS Fast Path transaction records are not supported by SLR. Records from IMS/VS systems with the Multiple Systems Coupling feature are not supported for IMS/VS Version 1, Release 1.3 and 1.4. From Release 1.5 and following releases, SLR will process such records but without using the MSC information.
- SMF, RMF, MF/I.  
SMF, RMF and MF/I records from OS/VS1 Release 5.0, 6.0, 6.7, 7.0 and OS/VS2 Release 1.7, 3.7 and 3.8, including the additional SMF records in MVS/SE Release 2, MVS/SP - JES2 Releases 1, 2 and 3 and MVS/SP - JES3 Releases 1, 2 and 3.
- CICS/VS.  
CICS/VS Monitoring Facility records produced by CICS/VS Release 1.5. SLR accepts both native CICS/VS logs written under OS/VS or DOS/VS, or records written via the SMF writer under MVS/SE2 or MVS/SP.

**CONVERSION**

Users of SLR R1.3 can continue to use their existing data base after migrating their current data base to R2.0 format. This is achieved using conversion facilities available in both R1.3 and R2.0.

**COMPATIBILITY**

SLR can coexist in the same system with DP Accounting for IMS/VS (DPA) and Change Management Tracking (CM/T), but due to changes in the installation and maintenance procedures (with SMP4), SLR cannot share OS data sets, VSAM data base, or functions with these products. Separate collect runs will be required if two or more products are installed.

**DOCUMENTATION**

(available from Mechanicsburg)

*Service Level Reporter General Information Manual (GH19-6169) ...  
Service Level Reporter Licensed Program Specifications (GH19-6190)  
... Service Level Reporter - a brochure (G510-0783).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** Yes

PROGRAM PRODUCTS

**PROGRAM CUSTOMIZER for the IBM  
3600 FINANCE COMMUNICATION SYSTEM  
(PC/3600)  
DOS/VS (5746-F11)  
OS/VS (5740-F11)**

**DESCRIPTION**

Program Customizer for the IBM Finance Communication System (PC/3600) generates a program for the IBM 3601 Financial Communication Controller from specifications prepared by users. Specification sheets from users request their requirements for the transactions to be executed in the IBM 3601. These specifications cover the key aspects of the program to be generated:

- The input which makes up the transactions.
- The processing to be done.
- The information to be retained in the IBM 3601 when the transactions are executed.
- The telecommunications desired between the IBM 3601 and an IBM System /370 computer.
- The output to be printed or displayed on terminal devices of the IBM 3600 Finance Communication System.

The specifications are entered into an IBM System/370 and processed by PC/3600 to create a Transaction Processor which resides in the 3601 communication controller. Master copies of the specification sheets will be provided by IBM in the PC/3600 Program Customizer Guide for duplication by the user.

The program produced by PC/3600 contains facilities for identification and sign-on of operators, for restriction in the use of transactions and terminals, and for recognition and support of trainees. PC/3600 also provides for continuous operation through user-specified processing of off-line transactions when telecommunications facilities are not available. Other facilities available are the capability to write on the controller diskette an electronic journal of transactions executed and the capability to perform desk calculator operations at the terminals.

**HIGHLIGHTS**

PC/3600 provides the user with the following advantages:

- Capability to utilize the flexibility of the 3600 Finance Communication System Features
- Simplified installation of the 3600 Finance Communication System
- Ease of handling processing variations within the institution
- Reduction of programmer time
- Capability to include off-line operations in case of a communication breakdown with the host computer
- Better customer service through improved transaction handling and inquiry facilities
- Relative ease of changing programs to meet changing requirements
- Personnel training capabilities
- File security control through sign-on identification
- Audit and control enhanced by an electronic and/or a printed journal
- Free-form sequence of data entry
- Operator identification card capability
- Cash box control
- Capability to obtain operator or station statistics
- Station-to-station message facility within a 3601 controller
- Provision for user-added code at specified exit points
- Telecommunication management for the IBM 3601 controller

**CUSTOMER RESPONSIBILITIES**

For successful installation of the IBM 3600 Finance Communication System through PC/3600, the user must:

- Understand the IBM 3600 Finance Communication System and its components, including the relationships of loops, devices and workstations.
- Study and understand the functions and architecture of PC/3600, and become familiar with the specification sheets for customizing PC/3600 to the user environment.
- Analyze the user environment to determine how the 3600 System work stations will be configured and used to satisfy transaction requirements.
- Document all transactions sufficiently to determine input specification requirements. Included here are the requirements for data input (field by field) and output printing for:

1. Validation of documents
2. Printing of receipts
3. Journal printing
4. Passbook or ledger card printing

- Determine and document off-line processing for each transaction specified.
- Determine how the IBM 3600 FCS will interface with the host S/370 for total system control.
- Prepare PC/3600 specifications to develop a unique user Transaction Processor.
- Identify and program special routines for user exits if required.
- Generate the Transaction Processor.
- Test the Transaction Processor for proper off-line operation in the user installation environment.
- Develop the host S/370 application programs.
- Test generated programs on-line with host applications.
- Verify system integrity, balancing and control techniques designed into the system.
- Optimize performance for the operating environment.
- Educate terminal users.
- Provide financial controls to ensure system integrity.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

DOS/VS requires no S/370 facilities other than those needed to support the programming systems listed above, with a virtual partition or region of 256K bytes. S/370 mdl 125 through 158 are supported.

OS/VS requires no S/370 facilities other than those needed to support the programming systems listed above. S/370 mdl 135 through 168 are supported.

Minimum configuration is one IBM 3601 Finance Communication Controller and one IBM 3604 Keyboard Display (any model).

Typical resources would be one or more IBM 3601 Finance Communication Controllers, one IBM 3604 Keyboard Display for each workstation, and optionally a printer for each station or pair of stations (the IBM 3610 Document Printer, the IBM 3611 mdl 1 Passbook Printer, the IBM 3612 Passbook and Document Printer or the IBM 3618 Administrative Line Printer, in any combination). One or more stations may have an IBM 3614 or 3624 Consumer Transaction Facility in place of the keyboard display.

PC/3600 supports the IBM 3614 or 3624 to the extent that messages can be transferred to and from the host processor without data being processed in the 3601. The IBM 3618 may be substituted for the 3610 for journal printing or for report printing under control of the host processor.

The controller will require one or more units of the Additional Storage Feature #1005 (Specify #9582) and may require the additional central storage for device attachment (Specify #9581) depending on the user configuration. To demonstrate the wide range of function available, the sample problem distributed with PC/3600 requires four units of additional user storage. The number of workstations which can be supported with a given amount of user programmable storage is highly variable, depending on the number and complexity of the transactions specified by the user.

**SOFTWARE REQUIREMENTS**

PC/3600 is written in S/370 and 3600 FCS Assembler Language. To create a program with PC/3600 and load the program into the IBM 3601, the user must have the Disk Operating System (DOS/VS) or the Operating System (OS/VS1) or the Operating System (OS/VS2) in a Virtual IBM S/370 computer as follows:

With DOS/VS, the user must have:

- DOS/VS Release 31 (5745-010) and subsequent releases
- DOS/VS Assembler (5745-SC-ASM)
- DOS/VS Sort/Merge (5746-SM1)
- 3704/3705 Network Control Program (5747-AJ2)
- Virtual Telecommunication Access Method (5745-SC-VTM)
- Virtual Storage Access Method (5745-SC-VSM)
- 3600 Host Support Independent Release (IR) 1 (5747-BR1)



PROGRAM PRODUCTS

PC/3600 (cont'd)

- Subsystem Support Services (5745-SC-SSS)
- Customer Information Control System (CICS/DOS/VS) (5746-XX3) or a user-provided equivalent interface to PC/3600

With OS/VS, the user must have:

- OS/VS1 Release 4.0 (5741-VS1) or OS/VS2 Release 3.0 (5752-VS2), and subsequent releases
- OS/VS Assembler (5741-SC1-03) for OS/VS1 or (5752-SC1-03) for OS/VS2
- OS/VS Sort/Merge (5740-SM1)
- 3704/3705 Network Control Program (5744-BA2)
- Virtual Telecommunications Access Method (5741-SC1-23 for OS/VS1 or 5752-SC1-23 for OS/VS2) or Telecommunication Access Method
- Virtual Storage Access Method (5741-SC1-DE for OS/VS1 or 5252-SC1-DE for OS/VS2) or Telecommunication Access Method
- 3600 Host Support Independent Release (IR) 1 (5744-CA2 for OS/VS1 or 5744-CA1 for OS/VS2)
- Subsystem Support Services (5741-SC1-SS for OS/VS1 or 5752-SC1-SS for OS/VS2)
- Customer Information Control System (CICS/OS/VS) (5740-XX1) or Information Management System (IMS/VS) (5740-XX2) or a user-provided equivalent interface to PC/3600

The user must prepare application programming for the Virtual IBM S/370 computer to interface with the program generated by PC/3600.

DOCUMENTATION: (available from Mechanicsburg)

Title	Order Number
General Information Manual	GH20-1587
Promotional Flyer	G520-2954

PROGRAM PRODUCTS

**DIRECT S.W.I.F.T. LINK (DSL)  
RELEASE 2 Modification Level 0  
CICS/DOS/VS (5746-F14)  
CICS/OS/VS (5740-F15)  
IMS/VS (5740-F16)**

**PURPOSE**

Direct S.W.I.F.T. Link is designed to assist the user of CICS/DOS/VS, CICS/OS/VS or IMS/VS, respectively, to directly link to the network of S.W.I.F.T. (Society for Worldwide Interbank Financial Telecommunication s.c.).

**SPECIAL SALES INFORMATION:**

Direct S.W.I.F.T. Link is designed to assist banks that are, or intend to become, members or users of S.W.I.F.T. (Society for Worldwide Interbank Financial Telecommunication s.c.), that is, banks that handle international payment transactions.

Large banks having foreign branches normally need several licenses. Small banks often constitute a pool for common accomplishment of their international activities.

IBM's licensed program Direct S.W.I.F.T. Link is a general application package to be integrated into an international banking environment.

Together with other banking applications that can automatically be initiated by the User Application Interface facility, IBM Direct S.W.I.F.T. Link allows for a full computer-assisted processing of international banking transactions.

VSAM full support is now provided for the 4300 processors, including the IBM support of the 3310 and 3370 disks. This is expected to be a performance improvement in comparison to the S/370 mode or 2314 emulation.

**DESCRIPTION**

The functional description of the subject programs is based on IBM's understanding of S.W.I.F.T.'s specifications including the S.W.I.F.T. message category 4 as of May 18, 1981 as stated in the S.W.I.F.T. User Handbook sections 3, 4 and 5.

Each program is divided into three major functional areas:

- S.W.I.F.T.-oriented functions, which comprise the communication with the S.W.I.F.T. regional processor, the checking, routing and queuing of incoming and outgoing messages, and program control.

The connection with the S.W.I.F.T. regional processor is established by entering the Direct S.W.I.F.T. Link operator command LOGIN. The actions necessary to enable the line are performed and the LOGIN message is sent. After log-in, IBM Direct S.W.I.F.T. Link behaves as a Computer Based Terminal (CBT) according to the S.W.I.F.T. definition.

- End-user-oriented functions, which support display and fetching of messages using terminals or sequential devices.

The terminal user contacts the Direct S.W.I.F.T. Link by typing in a transaction code. Then the user is prompted to enter his user identification and password. Next, the user is prompted to select the processing mode and desired functions.

The processing modes at the terminal are:

INPUT	To enter or display banking messages that are intended to be sent to another bank from the S.W.I.F.T. network.
OUTPUT	To request display and/or disposition of banking messages received from the S.W.I.F.T. network.
CONTROL	To enter or receive S.W.I.F.T. system messages, to receive, under certain, predefined circumstances, S.W.I.F.T. banking messages, or to issue Direct S.W.I.F.T. Link operator commands.

**AUTHENTICATOR  
KEY FILE**

**MAINTENANCE** To update the authenticator key file online.

- Message formatting and routing services used to control the message flow from function to function within the IBM Direct S.W.I.F.T. Link and to gain access to individual fields within a S.W.I.F.T. message.

The IBM Direct S.W.I.F.T. Link Message Format Service (MFS) maps the various formats of S.W.I.F.T. messages into a common internal format or maps a message from the internal format into a format adequate to the device where it is to appear. MFS facilitates the access to each individual message field for inspection and further processing. The level of detail to which a S.W.I.F.T. message is segmented is determined during IBM Direct S.W.I.F.T. Link generation by facilities provided in the IBM Direct S.W.I.F.T. Link package. Ready-to-use panels for all S.W.I.F.T. message types, control blocks and other related items required to

process S.W.I.F.T. messages are contained in the distributed material.

Routing gives the bank the facility to control the movement of S.W.I.F.T. input and output messages from one IBM Direct S.W.I.F.T. Link function to the next. Routing criteria are either found in the message itself by inspecting the content of a particular message field, or are introduced by actions of the end user handling the message.

**USER MODIFICATIONS:**

The program will be implemented such that users can:

- Modify the layout and the language of the panels used to display a message and/or related data on screens, terminal printers and line printers.
- Modify the layout of a S.W.I.F.T. message and other related data in internal storage.
- Add individual code to the end user function program permitting user-specific message manipulation by use, for example, of information extracted from a data base not belonging to the IBM Direct S.W.I.F.T. Link.

**RESTART/RECOVERY:**

Restart/recovery assistance is supplied for:

- Device failures of IBM 3262 mdl 3 or 13, IBM 3277 and IBM 3284/3286/3288 mdl 2 and their equivalents.
- S.W.I.F.T. line problems.
- Failure of the IBM system covered by the recovery capabilities of CICS/DOS/VS, CICS/OS/VS, IMS/VS, DOS/VSE or OS/VS, respectively.

**AUTHENTICATION:**

Authentication of S.W.I.F.T. messages is normally done automatically using coded versions of the authenticator keys that have been agreed upon between a sending and a receiving bank. Optionally, the end-user can manually enter the authenticator key at the terminal.

The code for the authenticator algorithm is a feature of the IBM direct S.W.I.F.T. Link program package. This feature is available under the terms and conditions of the agreement for IBM licensed programs subject to special provisions which are contained in the new supplement to that agreement entitled "Supplement for IBM Direct S.W.I.F.T. Link Licensed Program". This supplement must be signed by the customer prior to ordering the authenticator module. The code will be distributed separately.

**HIGHLIGHTS of RELEASE 2 MODIFICATION LEVEL 0**

With respect to the current releases of IBM Direct S.W.I.F.T. Link, Release 2 Modification Level 0 provides the following new functions:

- VSAM support:** The user can generate IBM Direct S.W.I.F.T. Link such that VSAM is used as access method for the queue data set and for the authenticator key file.
- Manual addition of the PDE (Possibly Duplicated Emitted) trailer component:** A PDE trailer component can be entered manually.
- Extension of the automatically-inserted PDE trailer component:** The automatically inserted PDE trailer component contains the System Reference Number (SRN) and a time stamp.
- Access to ready queue:** An appropriately authorized end user can display messages stored in the ready queues and if required or appropriate, route them to another queue.
- De-authentication of retrieved output messages:** To satisfy the security requirements of corresponding banks, retrieved output messages will be de-authenticated.
- Improved processing of S.W.I.F.T. Message Type 950:** This allows the user to show several statement lines on one screen or printer panel.
- User application interface:** An interface is provided that allows the user to start a transaction each time a message is written to a queue for which a transaction has been defined.
- Alternate authenticator keys:** Alternate authenticator keys are used in the authentication and de-authentication process.

**CUSTOMER RESPONSIBILITIES**

If the customer is a new IBM Direct S.W.I.F.T. Link user, it is his responsibility:

- To ensure that the operating system is generated as required for the IBM Direct S.W.I.F.T. Link.

**PROGRAM PRODUCTS****Direct S.W.I.F.T. Link R2 (cont'd)**

- To install CICS/DOS/VS (without ELS option), CICS/OS/VS or IMS/VS respectively.
- To install the prerequisite PRPQs for the control unit or the ICA, respectively.
- To perform the S.W.I.F.T. Bank Connection Procedure.
- To replace in the library the dummy authenticator module (contained in the basic material) by the separately ordered authenticator module.
- To define the end users, select and define the end user functions.
- To provide routing modules according to the bank's organizational requirements.

A customer having already installed the IBM Direct S.W.I.F.T. Link might need to consider the last two items.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM Direct S.W.I.F.T. Link licensed programs are designed to operate on the following IBM machines:

**5746-F14:**

IBM S/370 mdls 115 to 158  
IBM 3031  
IBM 43XX

The size of the processor to handle IBM Direct S.W.I.F.T. Link depends on the operating system (DOS/VSE with VSE/Advanced Functions) and the data communication system (CICS/DOS/VS) used to control the operation of IBM Direct S.W.I.F.T. Link.

**5740-F15, 5740-F16:**

IBM S/370 mdls 135 to 168  
IBM 303X  
IBM 43XX

The size of the processor to handle IBM Direct S.W.I.F.T. Link depends on the operating system (OS/VS) and the data communication system (CICS/OS/VS or IMS/VS) used to control the operation of IBM Direct S.W.I.F.T. Link.

**5746-F14, 5740-F15, 5740-F16:**

The direct connection between the system concerned and the S.W.I.F.T. network requires one of the following control units in EP mode:

- IBM 3704, IBM 3705 (scanner 2 only).
- An Integrated Communication Adapter (ICA).

The connection between the ICA or the control unit and the S.W.I.F.T. regional processor is a point-to-point BSC line, switched or non-switched, using non-transparent EBCDIC code.

The system requirements of IBM Direct S.W.I.F.T. Link, in addition to those of the operating system used, are the following:

- At least one IBM 3277 Display Station mdl 2 or its equivalent.
- If printing services are desired, one IBM 3262 Printer mdl 3 or 13, or one 3284 Printer mdl 2, or one IBM 3286 Printer mdl 2, or one IBM 3288 Line Printer mdl 2, or one their equivalents.

Further machine requirements are:

- For IBM S/370 mdls 115 and 125, an ICA with RPQ XA1006. (5746-F14 only).
- For IBM S/370 mdls 135-3 and 138, an ICA with RPQ XA7464.
- For IBM 4331, a Communications Adapter with RPQ XD1603.

The following direct access devices are supported:

IBM 2314 Direct Access Storage Facility  
IBM 3310 Direct Access Storage  
IBM 3330 Disk Storage  
IBM 3340 Direct Access Facility  
IBM 3350 Direct Access Storage  
IBM 3370 Direct Access Storage

**SOFTWARE REQUIREMENTS**

The programs that constitute the IBM Direct S.W.I.F.T. Link program are written in IBM S/370 Assembler language.

The programs are available for operation under the following operating systems and data communication systems:

**5746-F14:**

- IBM Disk Operating System/Virtual Storage Extended (DOS/VSE), Program Number 5745-020, Release 1.0, together with VSE/Advanced Functions, Program Number 5746-XE8, Release 1.0, or subsequent releases.

- Customer Information Control System/ Virtual Storage (CICS/DOS/VS) Version 1, Program Number 5746-XX3, Release 4.1 or 5.0, or subsequent releases.

**5740-F15:**

- IBM Operating System/Virtual Storage 1 (OS/VS1), Release 7.0 or subsequent releases, or
- IBM Operating System/Virtual Storage 2 (OS/VS2), Release 3.8 (MVS) or subsequent releases.
- Customer Information Control System/ Virtual Storage (CICS/OS/VS) Version 1, Program Number 5740-XX1, Release 4.0, 4.1 or 5.0, or subsequent releases.

**5740-F16:**

- IBM Operating System/Virtual Storage 1 (OS/VS1), Release 7.0 or subsequent releases, or
- IBM Operating System/Virtual Storage 2 (OS/VS2), Release 3.8 (MVS), or subsequent releases.
- Information Management System/Virtual Storage (IMS/VS) Version 1, Program Number 5740-XX2, Release 1.5 or 1.6, or subsequent releases.

**5746-F14, 5740-F15, 5740-F16:**

In order for the user to be able to communicate with the S.W.I.F.T. network, the S.W.I.F.T. BSC Procedure (PRPQ Y96612, Program Number 5799-AQT) must be installed on the IBM 3704 or IBM 3705.

If ACF/NCP/VS Release 2 (Program Number 5735-XX1), SSP (Program Number 5735-XX3), and SCP (Program Number 5747-CH1, with EP feature #6004) are installed, an IBM Direct S.W.I.F.T. Link installation requires the Compatibility for OS/VS or DOS/VSE EP Program (PRPQ Y96614), Program Number 5799-WRF.

Since the IBM Direct S.W.I.F.T. Link uses the Basic Telecommunications Access Method (BTAM) for the message traffic to and from the S.W.I.F.T. NETWORK, BTAM/ES, Program Number 5746-RC5, Release 1.0 must be available for DOS/VSE. For OS/VS, BTAM is a component of the OS/VS System Control Program.

If VSAM is selected as access method for the IBM Direct S.W.I.F.T. Line queue data set and the authenticator key file, VSE/VSAM, Program Number 5746-AM2, must be available for DOS/VSE. VSE/VSAM is part of DOS/VSE SIPO. For OS/VS VSAM is a component of the OS/VS System Control Program.

**COMPATIBILITY**

Release 2 Modification Level 0 of the IBM Direct S.W.I.F.T. Link programs is a compatible extension of the current releases of the respective programs.

However, a customer migrating from a current release of these programs to Release 2 Modification Level 0 of the IBM Direct S.W.I.F.T. Link must follow the same installation procedure as a customer who installs IBM Direct S.W.I.F.T. Link for the first time.

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Direct S.W.I.F.T. Link Licensed Program Specifications (GH12-5244) ... IBM Direct S.W.I.F.T. Link General Information Manual (GH12-5133) ... IBM Direct S.W.I.F.T. Link Program Reference Manual (SH12-5436) ... IBM Direct S.W.I.F.T. Link System and Application Programmer's Guide (SH12-5437) ... IBM Direct S.W.I.F.T. Link Operations Guide SH12-5522) ... IBM Direct S.W.I.F.T. Link Program Logic Manual (LY12-5035) ... Direct S.W.I.F.T. Link Program Listings Microfiche (LYA2-5224, LYA2-5225, LYA2-5226).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No

**PROGRAM PRODUCTS****3614/3624 CONSUMER ONLINE  
TRANSACTION SYSTEM  
RELEASE 2, MOD. LEVEL 0  
OS/VS (5740-F51) DOS/VS (5746-F57)****PURPOSE**

The 3614/3624 Consumer Online Transaction System (COLTS) provides a comprehensive level of support for the 3614/3624 Consumer Transaction Facility (CTF).

This program product consists of two major components: Host programs which are written in Assembler Language and a 3600 Finance Communication Controller (FCC) application program written in the Finance Communication Language. The host program is designed as a Virtual Telecommunications Access Method (VTAM) application testing vehicle. It is provided so that a user can perform a basic validation of the online capabilities of the COLTS 3600 controller application program. For 3602 customers, a batch program is provided to generate keys for customer account number entries which will comprise the 3602 disk-resident authorization file. The 3600 application program is designed to support CTFs attached to a 3600 Finance Communication controller during periods of host availability or unavailability.

**HIGHLIGHTS**

The 3600 application program will provide the following functions:

- Support the following 3624 standard functions:
  - Operator/host-system communication at the 3624 operator panel for such things as transmission of cartridge numbers when new cartridges are installed.
  - Consumer performance of multiple transactions with only one card insertion (transaction chaining).
  - Expansion of the Financial Institution Table in the 3624 to allow shared usage of the CTFs by more institutions and/or the acceptance of more consumer card types.
  - Use of special transaction, e.g., signon and signoff, codes of variable lengths.
  - Use of from/to other account numbers of variable lengths up to 19 digits.
  - The ability to display messages in multiple languages, thus giving the consumer the language of his choice.
  - The ability to suspend the operation of a CTF for a short period of time without having to close it.
- Provide a wide range of CTF operator network commands to:
  - Enter system control parameters
  - Perform 3600 disk or diskette authorization file service
  - Maintain the CTF network
  - Perform signon and CTF settlement.
- Support on one 3600 Finance Communication Controller the 3624 machine and the 3614 machine supporting Data Encryption Standard (DES) and the 3614 machine supporting the Alternate Encryption Technique (AET).
- Support for both single and dual denomination CTFs.
- Support CTF transaction chaining, journal printing and check cashing.
- Access a 3600 disk or diskette-resident authorization file during periods of offhost operations.
- Support for sharing CTFs between several financial institutions.
- Maintain a comprehensive cash total record at the 3600 Controller for each CTF.
- Support offhost transaction processing and accept or reject consumer cash requests based upon user-specified dollar and usage limits.
- Support a 3600 FCC polling workstation to be activated periodically to monitor the availability of the CTF network.
- Support the 3600 FCC Hard Error Recovery Facility.

The host testing application program is designed to provide the following functions:

- Host operator control of the CTF network.
- Transmission of an authorization file from the host to the 3600 application program.
- Maintenance of a journal to record all on host activity.

In addition to the support provided by the currently available release of this program product, Release 2 will provide the additional support required for the financial institution to implement:

- Six display lines of 40 characters each which will provide for more information and instructive messages than is possible with the present single line.
- User interactive functions which expand the means for communication between the consumer and the system.

- New transaction facility, such as fast cash (single key cash withdrawal) and split deposits (deposit with cash back).
- Expanded financial institution table (FIT) to allow the keys and processing options to be defined for individual institutions and/or card types in a sharing environment.
- Multiple transactions per statement when transactions are chained.
- Separate assemblies of sections of the 3600 application program.

A sample Personal Identification Number generation program will also be provided.

**SECURITY FEATURES**

Security controls help to protect against fraudulent attempts to obtain cash from the 3614/3624. The 3614/3624 Consumer Online Transaction System provides the following security features:

- Use of the IBM-provided encipher and decipher algorithm (DES and/or AET) during data transmission.
- Access of a 3600 disk or diskette-resident authorization file (positive or negative) during periods of offhost operations.
- Maintenance of a comprehensive cash total record for each 3614/3624 attached to a 3600 controller.
- Use of operator control commands to perform 3614/3624 signon, open, close, key reset and settlement.
- Support of a usage file by customer account number in which the user specifies dollar limits and card use limits over a specific time period.
- Support of transaction audit trails both at the 3600 controller and at the host.

**CUSTOMER RESPONSIBILITIES**

For installation of the 3600 Finance Communication System through the use of this program product, the user must:

- Understand the 3600 Finance Communication System and its components, including the relationships of loops, devices and workstations.
- Study and understand the functions and architecture of the provided application programs.
- Prepare input for the host authorization file transmission routine.
- Develop user-written application routines which will access the user's data base and provide authorization of customer disbursements.
- Review the program documentation to understand and to specify the criteria by which the 3600 application program will accept a 3614/3624 offhost entered transaction request.
- Generate Personal Identification Numbers (PINs).
- Define the terminal network for the VTAM application program.
- Test programs onhost with the host testing application program.
- Test programs for proper offhost operation.
- Implement appropriate security procedures through additional programming and physical control methods.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The program product is designed to work on the following host configurations:

- Any S/370, 3031, 3032, 3033 or 4300 processor with at least 512K bytes of virtual storage for DOS/VS or DOS/VSE or 768K bytes of virtual storage for OS/VS.
- Any Direct Access Storage Device supported by DOS/VS or OS/VS, Subsystem Support Services and the host support for 3600 Finance Communication System.
- Any card read/punch and printer supported by DOS/VS, DOS/VSE or OS/VS.
- One magnetic tape drive unit for installation of the program product and transaction logging.
- 3704 or 3705 Communications Controller with storage and features capable of supporting NCP/VS.

The minimum Finance Communication System consists of the following configuration:

- 3601 or 3602 Finance Communications Controller with a minimum of 40K bytes of user programmable storage.



PROGRAM PRODUCTS

**3614/3624 Consumer Online Transaction System (cont'd)**

- 3604 Keyboard Display, any model with a 240 or greater character display.
- 3610 Document Printer, 3615 Administrative Terminal Printer or 3618 Administrative Line Printer.
- 3614 or 3624 (mdl 1, 2, 11 or 12) Consumer Transaction Facility.

The following Consumer Transaction Facility features are supported by this program product:

- 3614 Custom Feature Group RPQ (#MG3758)
- 3614 Expanded Function Feature (#3895)
- 3614 Depository Feature (#3322)
- 3614 Transaction Statement Printer Feature (#7900)
- 3624 Additional Storage Feature (#1301)
- 3624 Transaction Statement Printer Feature (#8201)
- 3624 Depository Features (#3233 and #3234)
- 3624 Multiple Display Feature (#4750)
- 3624 Expansion Feature (#6501)

The 3600 application program is designed to support two 3614/3624 workstations in 40K of 3600 Controller user programmable storage in addition to the required 3604 workstation.

**SOFTWARE REQUIREMENTS**

The 3614/3624 Consumer Online Transaction System requires the programming systems specified below. To execute the host programs and to transmit the application program to the 3600 controller, the user should have installed a current release of one of the following operating systems:

- Disk Operating System (DOS/VS) (5745-010)
- Disk Operating System Extended (DOS/VSE) (5745-020)
- Operating System (OS/VS1) (5741-VS1)
- Operating System (OS/VS2 MVS) (5752-VS2)

In addition, the latest applicable releases of the following components at the time of availability are required.

**DOS/VS or DOS/VSE**

- Assembler (5745-SC-ASM)
- Network Control Program/VS (NCP/VS) (5747-AJ2) or (SCF/NCP/VS) (5735-XX1)
- Virtual Telecommunications Access Method (VTAM) (5745-SGVTM) or (ACF/VTAM) (5746-RC3) or (ACF/VTAME) (5746-RC7)
- Virtual Sequential Access Method (VSAM) (5745-SC-VSM) or (VSE/VSAM) (5746-AM2)
- Host Support for 3600 Finance Communications System (DOS/VS) (5747-BR1)
- Subsystem Support Services (SSS) (5747-CC6)
- Access Method Services (5745-SC-AMS)

**OS/VS or OS/VS2**

- Assembler XF (5741-SC1-03) or (5752-SC1-03)
- Linkage Editor (5741-SC1-04) or (5752-SC1-04)
- Network Control Program/VS (NCP/VS) (5744-BA2) or (ACF/NCP/VS) (5735-XX1)
- Virtual Telecommunications Access Method (VTAM) (5741-SC1-23) or (5752-SC1-23) or (ACF/VTAM) (5735-RC2) or Telecommunications Access Method (ACF/TCAM) (5735-RC3)
- Virtual Sequential Access Method (VSAM) (5741-SC1-DE)
- Host Support for 3600 Finance Communications System (OS/VS) (5744-CA3)
- Subsystem Support Services (SSS) (5741-VS1 or 5752-VS2)
- Access Method Services (5741-SC1-DK) or (5752-SC1-DK)

**DOCUMENTATION:** (available from Mechanicsburg)

Title	Order Number
Design Objectives	GH20-4498
General Information Manual	GH20-2019

**CAPACITY PLANNING AND OPERATION SEQUENCING  
SYSTEM - EXTENDED (CAPOSS E)  
OS/VS RELEASE 1.0 (5740-M41)  
DOS/VS RELEASE 1.0 and 1.1 (5746-M41)**

**PURPOSE**

The Capacity Planning and Operation Sequencing System-Extended (CAPOSS-E) is an extension of the Capacity Planning and Operation Sequencing System (CAPOSS), programming RPQ 5734-M41 (OS) and 5736-M41 (DOS). CAPOSS-E is designed to be used whenever a large number of activities must be allocated to limited capacity resources. Some frequently encountered problems when allocating resources include working within tight schedules, having some resources overloaded and some idle, having too much work in process planning and allocating activities at the shop level according to plans and priorities set at a higher level and integrating the capacity planning system into the existing data processing operations. These problems are interrelated, and any capacity planning system must achieve a compromise between the factors to find the optimum allocation of resources. CAPOSS-E brings computer assistance to capacity planning with processing based on a wide variety of factors defined by the user. Some areas of application for CAPOSS-E are in manufacturing (assembly and repair shops), in project planning for motor manufacturing and the aerospace industry, in process industries, including textile production, in the food industry and in public services.

**HIGHLIGHTS**

- Long-range project scheduling and determination of capacity requirements.
- Controlled release of orders to the shop floor.
- Scheduling controlled by user-specified priorities.
- Short-range simulation of most conditions in a real workshop:
  - Lot splitting with a part of the lot being sent ahead.
  - Grouping of operations, which require the same set up to save set-up time, on a device which processes several operations in parallel, for example a furnace.
  - Loading on alternate work centers or using alternate operations and routings to avoid delays or idle time on resources when a resource is not available.
  - Consideration of time conditions if two or more operations have to be performed within a specific time and involve processing the lot in charges (for example, heating/forging, lacquering/drying and certain chemical processes).
  - One operation requiring two or more facilities simultaneously (for example, a machine plus a special tool).
- Free format order file input and output specified by the user without reassembly.
- Up to nine different reports for order data can be printed with one file processing run.
- Most parameters for controlling the flow of execution are kept on file and changed by the user at execution time. Examples of parameters that can be stored are time ranges for scheduling, substitute values for missing input, priority weighting factors, etc.
- Output of prepunched feedback cards for the Planning System.
- Full compatibility between DOS/VS and OS/VS.
- DL/I data base for resource data.
- DL/I data base for project data with transaction extraction for the Planning System.

**DESCRIPTION**

The system consists of two parts: The CAPOSS-E Planning System and the CAPOSS-E Data Base System.

**CAPOSS-E Planning System:**

- The CAPOSS-E Planning System is a continuation of CAPOSS and contains many enhancements. The Planning System schedules activities (projects, orders and operations) for due dates based on priority rules controlled by the user and on capacity limitations. Work is scheduled for individual resources (work centers and machines) with different levels of detail for different time ranges.

In the long range, the program matches the entire forward load against the available capacity and highlights any resulting overloads (or underloads) in time for additional capacity or overtime to be planned.

In the medium range, based on actual capacity, the program controls the release of orders and determines delays of delivery dates caused by capacity bottlenecks.

In the short range (daily, if required), operations are sequenced taking into account recent operation completions and unplanned, urgent orders. The program considers special handling of

operations such as overlapping, splitting, grouping, forced time-dependent relationships and use of alternative resources and routings. The results are presented in work dispatch lists for every resource on the shop floor.

- New and improved general functions permit control of order and project status, facilitate the link to other planning systems (such as material requirements planning), and provide better control of priorities through the order priority analysis program.
- Fewer restrictions in feedback input allow insertion of partial-completion and completion data in the weekly cycle and actual finish dates for special features.
- Improved handling of input errors for order and work center data is provided.
- Better adaptation to virtual storage facilities through dynamic space allocation for work center tables and a revised link structure is provided.
- Customizing is made easier by improved documentation, fewer parameters, and parameters that do not require the reassembly of the whole system.
- Sample load modules are customized for a typical system rather than a minimum system, which includes the 3330 Disk Storage and is more useful for actual production runs.
- Improved documentation include an index for the *Program Reference Manual* and an additional manual, the *Implementation Guide*, for guidance in planning and installing the system.
- New and extended special functions (mainly for process industry applications) allow operation grouping according to user-specified characteristics, operation grouping with time-dependent relationships, alternate possibilities and related facilities, and long-range grouping on a statistical basis.

**CAPOSS-E Data Base System:**

- The Data Base System provides the user with two DL/I data bases. The project data base includes project and order data, operation data, material data, etc., maintained for the CAPOSS-E Planning System. The resource data base contains the work center file data of the Planning System. This includes references to the operation sequence list for each work center. Both data bases are updated after each scheduling cycle of the Planning System.
- The user may insert into the project data base, by means of user-written programs, feedback from orders in process and input for new orders. Before each scheduling cycle of the Planning System, the Data Base System extracts this data and resubmits it as input to the Planning System.
- The CAPOSS-E Data Base System is the basis for data communication within CAPOSS-E and the link between CAPOSS-E and other DP operations.
- DL/I data base for project data as a basis for online transactions feedback and retrieval is provided.
- DL/I data base for response data including the sequence of work on resources is provided.
- Extraction of feedback and input data from the project data base for use by the Planning System is provided.

**CUSTOMER RESPONSIBILITIES**

**CAPOSS-E Planning System users must:**

- Have the appropriate version of either DOS/VS or DOS/VSE or OS/VS successfully installed.
- Have personnel schooled in CAPOSS-E.
- Specify the program parameters to tailor CAPOSS-E to their needs. Since a large variety of substitute and default values exist, the required data is minimal.
- Describe the activities to be scheduled and the work centers performing them. A year of year-day shop calendar must be available to specify dates.

**CAPOSS-E Data Base System users must have:**

- The CAPOSS-E Planning System successfully installed.
- IMS/VS or DL/I DOS/VS and VSAM successfully installed.

**SPECIFIED OPERATING ENVIRONMENT  
HARDWARE REQUIREMENTS (For 5740-M41)**

**CAPOSS-E can be compiled, executed and maintained on:**

- Any IBM S/370 suited for OS/VS.



PROGRAM PRODUCTS

CAPOSS-E (cont'd)

- An IBM 3031, 3032 or 3033 Processor
- An IBM 4300 Processor (OS/VS1 only).

CAPOSS-E also executes in an OS/VS environment controlled by the IBM Virtual Machine Facility/370 (VM/370).

Main Storage Requirements:

	Virtual address space required	Real address space proposed
CAPOSS-E Planning System	192K*	96K*
CAPOSS-E Data Base System	96K*	32K*

\* These figures do not include the partition-related parts of the operating system, VSAM and IMS/VS.

Additional devices required:

- One IBM 2314/2319, 3330, 3340 or 3350 Direct Access Storage Facility.
- One IBM 2540 Card Reader or an equivalent device supported by the operating system.
- One IBM 1403-N1 Printer or an equivalent device supported by the operating system with at least 132 print positions.

HARDWARE REQUIREMENTS (For 5746-M41)

CAPOSS-E can be compiled, executed and maintained on:

- Any IBM S/370 suited to DOS/VS or DOS/VSE.
- An IBM 3031 Processor.
- An IBM 4300 Processor.

CAPOSS-E also executes in a DOS/VS or DOS/VSE environment controlled by the IBM Virtual Machine Facility (VM/370).

Main Storage Requirements:

	Virtual address space required	Real address space proposed
CAPOSS-E Planning System	192K*	96K*
CAPOSS-E Data Base System	96K*	32K*

\* These figures do not include the partition related parts of the operating system, VSAM, DL/I DOS/VS or DL/I Entry DOS/VS.

Additional Devices required:

- One IBM 2314, IBM 2319, 3330, 3340, 3350, or 3370 Direct Access Storage Facility.
- One IBM 2540 Card Reader, or an equivalent device supported by the operating system.
- One IBM 1403-N1 Printer, or an equivalent device supported by the operating system, with at least 132 print positions.

SOFTWARE REQUIREMENTS

CAPOSS-E is written in the Assembler language and uses the Macro language facility. It operates under OS/VS1 Release 4 and MVS Release 3.0 or DOS/VS Release 34 or DOS/VSE Release 1.0 and subsequent releases, unless otherwise identified. CAPOSS-E uses the access methods SAM and DAM or SAM and VSAM, and is designed to operate with OS/VS Sort/Merge (5740-SM1) or DOS/VS Sort/Merge (5746-SM2).

In addition, the CAPOSS-E Data Base System (OS/VS) uses IMS/VS Version 1 Data Base System (5740-XX2) Release 1.3 and subsequent releases, unless otherwise identified, BDAM (optional), OSAM, VSAM and BPAM access methods and the access method services of VSAM.

or

The CAPOSS-E Data Base System (DOS/VS) uses DL/I DOS/VS (5746-XX1) Version 1 Release 1 and subsequent releases, unless otherwise identified, DAM (optional), SAM and VSAM access methods and the access method services for VSAM.

Note: CAPOSS-E executes on S/370 Virtual Storage configurations running under OS/VS1 or OS/VS2 or DOS/VS in virtual mode. It is also supported under VM/370 in virtual machine mode.

**S/370 AUTOMATICALLY PROGRAMMED TOOL  
 INTERMEDIATE CONTOURING (5740-M52)  
 ADVANCED CONTOURING (5740-M53)  
 VERSION 1 MODIFICATION LEVEL 3**

**PURPOSE**

These program products form a modular, upward compatible family of Numerical Control Processors developed for machining operations from point-to-point through the full three-axis contouring.

**DESCRIPTION**

- APT-IC supports point-to-point and two-dimensional contour machining. A subset of its part-programming language capability is comparable with S/360 AUTOSPOT; however, APT-IC accepts its input in the APT language syntax. APT-IC extends the capabilities of and obsoletes AUTOSPOT with the addition of new processor functions. A subset of the APT-IC part programming language also compares with S/360 AD-APT/AUTOSPOT. APT-IC extends the capabilities of and obsoletes AD-APT/AUTOSPOT with the addition of new processor functions.
- APT-AC contains all of the functions found in APT-IC and extends the machining capability to three-dimensional surface operations. The APT-AC product is the most advanced of the products and is a superset of the internationally accepted S/360 APT. APT-AC extends the capabilities of S/360 APT with the addition of new processor functions.

Each of the program products will process, and has as its input, a numerical control language (part program) written in the APT syntax and will produce a Cutter Location Data Set (CLDATA). The CLDATA is then processed by an installation specified postprocessor.

**APT-IC and APT-AC Capabilities in Version 1 Modification Level 2 over the Type II Programs**

- Design Aid for Postprocessors (DAPP) - An expanded set of modules to facilitate the implementation of selected postprocessors to process the CLDATA.
- FILE and EDIT Functions - Allows the user to edit the part program files, geometric definition files and machinability files. These functions provide the ability to add, replace, delete and change Library entities. The Library functions, together with the PROC capability, permit a user to establish an N/C parts data base.
- Procedure (PROC) Capability - Enables the definition and subsequent repetitive execution of a series of logical instructions. These logical instructions use the N/C language to define a machining operation or event and the calculation algorithm(s) which support that operation or event. Through use of the Library Exit capability, a user may edit any PROC. When executed, PROCs may be part of the user's input program or retrieved from a library or both. A starter set of machinability and point-to-point PROCs are supplied with the processor.
- UNITS Specification - Allows the user to define the units of measurement (that is, inches, millimeters, etc.) for the part program parameter input.
- PRINT Capabilities - Provide options for printing (or the suppression of printing) user definitions, part program listings, symbol cross-reference lists, etc., via the expanded PRINT/OPTION statement.
- Synonym Print - Expands user defined synonyms to the equivalent vocabulary.
- Referencing - Provides the user with a cross-reference list of the user defined (and designated) symbols).
- Library Capability - Allows for the storage and retrieval of user-defined part programs, part program segments, PROCs, tool definitions, and canonical forms of geometric and non-geometric entities.
- User Input-oriented Diagnostics - Provides more comprehensive diagnostic messages from the translation and calculation phases. In addition, three levels of detailed diagnostic information are provided at user option.
- Diagnostic Output File - Optionally provided in addition to the normal output file. By exercising this option, diagnostic information may be more easily reviewed and appropriate corrections made more rapidly.
- Additional Methods of Definition for Geometric Entities.
- TRACUT (transformation of cutter location data) - A new option allows an additional level of TRACUT with and without the COPY feature.
- Flexible System Structure - Provides greater table capacity.
- Upward compatible part program input from APT-IC to APT-AC.
- Language compatibility with existing S/360 APT part programs, CLDATA and postprocessors. (For exceptions, see Appendix E of the *APT-AC Program Reference Manual* (SH20-1423) or the

*APT-IC Program Reference Manual* (SH20-1424) - Many current users of S/360 APT may take advantage of APT-IC.)

- Overall performance improvement for processor utilization can be expected over IBM Type II programs. For more detailed performance information, see the section entitled "Environmental Characteristics" either in the *APT-AC General Information Manual* (GH20-1423) or in the *APT-IC General Information Manual* (GH20-1424).
- Modular System Structure - Program functions are programmed into separate, modular, and easy-to-understand subroutines.
- Pagination and Line Length - Allows two line length formats (80 and 133 line lengths) to be supported under user control. Pagination of printed output now occurs - also, user control over the number of lines per page is available.
- Generic Definition Method - Allows the user to vary the syntax of the geometric definition by means of substitution.
- Extended Library Facilities - Allows macros and procs to be part of the canonical library.
- Syntax Option - Allows the user to execute the processor in the Syntax mode; that is, the part program is executed only by the translation section to check for syntax or geometric definition errors.
- VM/370 CMS Environment Supported - Allows the program products to execute in the VM/370 CMS operating system as well as the OS/VS operating environment.

**Additional Capabilities for APT-IC and APT-AC in Version 1 Modification Level 3**

- Link Feature - Allows user programs to be merged and executed with the N/C processor. N/C processor program functions are available to these programs as calculation or service aids.
- Relational Operators - Operators such as equal, not equal, greater than, etc., can be used to establish whether the relationship between scalar quantities is true or false.
- Logical IF Statements - If the relationship expressed in the logical IF statement is true, an appended APT statement is executed; otherwise, the next APT statement is executed.
- DO Statement - Allows a user-defined group of APT statements to be executed again and again; the extent of the loop and the number of repetitions are stated on the DO statement.
- Subscripted MACRO Names and Complex Macro Variables - Allows an array of macro definitions to be created; each macro is defined and referenced by using the subscript value of the array. A complex macro variable can be assigned an alphanumeric string of characters - when the macro is executed, the character string is translated and the translated value is substituted wherever the macro variable is used in the macro definition.
- Additional methods of definition for geometric entities.
- OMIT Specification in the PRINT or PUNCH Statements - Allows selected entities to be omitted when the ALL mode of printing or punching is specified.
- DATA Definition - Allows the user to define, store and retrieve an array of scalar quantities whose values can be used throughout the part program.
- Computing and Trigonometric Functions Added - Additional angle, distance and trigonometric functions are now available as computing functions.
- CLDATA Postprocessor Commands in Alphameric Format Added - Allows the user to have postprocessor commands output as class 20000 type of data as an option.

**Functions Added to APT-AC in Version 1 Modification Level 2 beyond Type II Programs**

- Formatted PRINT and PUNCH Capability - Allows the user to specify the format of the printed and punched output via a TEXT definition.
- Textual Synonym Facility - Allows the user to abbreviate commonly used part programming expressions.
- TORUS definition.
- Extended generic geometric definition processing.
- Canonical Extract - Allows the user to extract and use the canonical parameters of a previously defined geometric definition in a computing expression.
- Bell shape cutter specification.

**Intermediate and Advanced Contouring (cont'd)**

**Functions Added to APT-AC in Version 1 Modification Level 3 beyond Type II Programs**

- Formatted Alphameric Data for Postprocessor Commands - Allows the data for the PPRINT, PARTNO or INSERT statements to be formatted by conversion of canonical data via a format statement.

**Functions Added to APT-IC in Version 1 Modification Level 3 beyond Type II Programs**

- Special Program CALL - Allows user-defined special programs to be executed, via the CALL statement, in either the translation or the calculation section of the processor.

**Other Functions Implemented in APT-IC (beyond those described above) that are similar to or in addition to those in S/360 AUTOSPOT are:**

- Geometric definitions for points, lines, circles, planes, vectors, matrices and patterns. Also provided are new methods of definition for these entities.
- A reference system (REFSYS) capability.
- A synonym capability.
- A PRINT capability.
- Point-to-point motion commands.
- Contour motion commands for up to five geometric surfaces, including a plane part surface.
- A compute capability.
- A COPY-TRACUT capability.
- System options for CLPRNT, NOPOST, etc.
- A polygon pocket capability.
- Postprocessor commands.
- An auxiliary feed rate capability.

**Other Functions Implemented in APT-IC that are similar to or in addition to those in S/360 AD-APT/AUTOSPOT are:**

- Geometric definitions to include conics, hyperbola, ellipses and tabular cylinders.
- A RESERV and subscripting capability.
- A looping capability (LOOPST-LOOPNS).
- A MACRO capability.
- A READ-PUNCH capability for part programs and canonical forms.
- All motion commands to include new geometric entities and multiple check surface logic (TRANTO).

**Other Functions Implemented in APT-AC (beyond those in APT-IC) that are similar to those in S/360 APT are:**

- Geometric definitions extended to cones, spheres, quadrics, polyconics and ruled surfaces.
- PSTAN and TLAXIS statements.
- The WCORN-VTLAXS statements for four and five axis swarf cutting.
- Full 3-D and multi-axis machining.

**CUSTOMER RESPONSIBILITIES**

A customer using these new N/C processors must take the following steps to achieve the available results and performance:

- Train his part programmers in the use of the program products.
- Educate system programmers to correctly use the facilities and features of the processors and to update the program product with distributed maintenance releases.
- Make a special program run at installation time to initialize the necessary processor work files.
- If the machinability feature of the program product is used, supply the machinability data with respect to materials, machine tools and cutters that reflect the manufacturing environment.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The program products operate on any S/370 CPU model (with the Floating Point feature) where the OS/V5 or the VM/370 CMS operating systems can operate.

The processors are distributed on magnetic tape. If no tape devices are available, the user must make arrangements to have N/C Processor reloaded to a direct access device.

The minimum virtual storage partition or region required for APT-IC is 640K bytes; for APT-AC, 768K bytes.

The auxiliary storage requirement for the operating system is the sum of the system residence, work space requirements and input/output stream requirements. The computing system should have available approximately thirteen 3330 cylinders (or its equivalent) for the N/C processor and its execution requirements. (This number will vary with the amount of data referenced and produced by a particular part program.)

The auxiliary storage estimates for the N/C processors are:

	3330 Cylinders or Equivalent	
	APT-IC	APT-AC
Load Modules	6	7
Processor Diagnostics	2	2
Sample Part Program	3	3
Source Data Set	50	65
Object Data Set	12	12

The amount of space for work and Library files is a function of the part program and the number of entities placed in the Library files. If system entities are kept in the data set, the data set must be made permanent. With a small library, the storage requirements should range between three and eight 3330 cylinders (or equivalent).

The estimated number of input cards ranges from 200 cards to 3000 cards.

The cutter location file is estimated to range from one to three cylinders.

**SOFTWARE REQUIREMENTS**

The Numerical Control Processors are written in the Assembler and FORTRAN IV H-level languages. For maintenance in the OS/V5 environment, it requires the OS/V5 Assembler and Linkage Editor, the FORTRAN IV H-level compiler and their associated libraries, SYS1.MACLIB and SYS1.FORTLIB. For maintenance in the VM/370 CMS environment, the equivalent system functions: Assembler, Compiler and Linkage Editor operating in the CMS environment, are required. The processors are designed to reside on a direct access device in executable form and are scheduled as a job on S/370 under control of either OS/V5 or VM/370 CMS.

The processors make use of the BSAM, QSAM, BPAM and BDAM access methods for I/O and data management facilities.

These program products execute under the current releases of OS/V5, OS/V5 operating under VM/370 and VM/370 CMS.

**COMPATIBILITY**

The two APT program products represent an upward compatible family of Numerical Control Processors. APT-AC is the most advanced and is a superset of APT-IC.

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manuals* (GH20-1423 for APT-AC and GH20-1424 for APT-IC).

## OS/VS RPG II RELEASE 1 5740-RG1

### PURPOSE

OS/VS RPG II is a programming language that can be used to create programs to perform a wide variety of commercial data processing jobs. OS/VS RPG II is based on the DOS/VS RPG II Release 3 compiler and is a powerful, easy-to-use programming language on OS/VS systems. OS/VS RPG II Release 1 runs under the control of OS/VS1 Release 7.0 and OS/VS2 Release 3.8 (MVS) with or without MVS/SP installed.

### HIGHLIGHTS

The new licensed program provides:

- RPG II Compiler under OS/VS1 and OS/VS2 (MVS).
- DOS/VS RPG II Source Compatibility for batch functions.
- Autoreport Support.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The OS/VS RPG II compiler is designed to operate on any IBM S/370, 30XX or 43XX System supported by OS/VS1 or OS/VS2 (MVS). A minimum of 128K bytes of virtual storage must be available. For performance reasons, a minimum of 24K bytes of real storage is recommended.

Space must be available for two workfiles (minimum 40K bytes on a DASD) and for listing and punch output. The Autoreport and compilation do not require any OS/VS1 or OS/VS2 (MVS) features beyond the standard support. If the SORT Function of the Autoreport is used, the pertinent OS/VS Sort/Merge is required.

- **At COMPILE TIME:** The following IBM devices are supported:
  - Source input and object output  
Any device supported by QSAM for device independent files, fixed length and input.
  - Listing output  
Any device supported by QSAM for device independent files, output, control characters and record length equal to or greater than 121.
  - Copy books  
Any device supported by BPAM.
- **At OBJECT TIME:** All devices supported by DOS/VS RPG II Release 3 are supported by OS/VS RPG II, with the following exceptions because of environmental differences:
 

IBM 2560	Multi-function Card Machine
IBM 3504	Card Reader
IBM 5203	Printer
IBM 5424/5	Multi-function Card Units
IBM 1442	Card Read Punch
IBM 2311	Direct Access Storage Device
IBM 3310/3370	Direct Access Storage Device

**Note:** The IBM 1442 Card Read Punch is only supported by OS/VS1.

The OS/VS RPG II Compiler supports the 3350 and 3375 direct access storage devices with the following restriction:

If the files, used by the OS/VS RPG II object program, are resident on a 3350 or 3375 DASD type, the device field (columns 40-46) of the file description specification has to contain the value of the 3330 DASD type ('DISK 30'): The relevant file characteristics are provided by the DD-card entries. Compiler workfiles can be resident on a 3350 or 3375 DASD without restrictions.

#### SOFTWARE REQUIREMENTS

The OS/VS RPG II compiler is designed to operate with the OS/VS1 and/or the OS/VS2 (MVS) Operating System and will run on OS/VS1 Release 7.0 and OS/VS2 Release 3.8 (MVS) with or without MVS/SP installed and all future releases unless otherwise stated. To use VSAM files, the appropriate support must be available.

#### COMPATIBILITY and CONVERSION

- **SOURCE PROGRAMS:** RPG II source programs written for DOS, DOS/VS and VSE are accepted by the OS/VS RPG II Compiler with no or minor changes.  
Differences between DOS/VS and OS/VS will be addressed in the following way:
  - Language features required or optional under DOS/VS or VSE but whose statements have no meaning under OS/VS1 or OS/VS2 (MVS) will be ignored (for example, symbolic device on the file specifications).
  - Language features required under DOS/VS or VSE, but specifiable at object time under OS/VS, will be treated such that this specification is possible via job control language statements (for example, blocksize on the file specification).

- **OBJECT PROGRAMS:** All DOS or DOS/VS RPG II programs must be compiled from source code using the OS/VS RPG II compiler and the object code link-edited into a load library.
- **DIFFERENCES BETWEEN OS/VS RPG II and DOS/VS RPG II:** The following devices are not supported under OS/VS:

IBM 2560	Multi-function Card Machine
IBM 3504	Card Reader
IBM 5203	Printer
IBM 5424/5	Multi-function Card Units
IBM 1442	Card Read Punch (see Note)
IBM 2311	Direct Access Storage Device
IBM 3310/3370	Direct Access Storage Device

**Note:** The IBM 1442 Card Read Punch is only supported by OS/VS1.

The interfaces with CICS/DOS/VS and DL/I DOS/VS and the RPG II Source Entry Facility (RSEF) are not available under OS/VS. Combined files are not supported by OS/VS RPG II. ADDRROUT files can not be created because they are not supported by OS/VS Sort/Merge. Equivalent support can be provided by user written routines or VSAM files. The OS/VS RPG II compiler does not allow PL/I subprogramming. Stacker Select on Input is not possible under OS/VS RPG II.

#### PERFORMANCE CONSIDERATIONS

The process of adapting the DOS/VS RPG II compiler to OS/VS only minimally impacts the path length of the compiler and object programs. Any differences of compile time and object time between the DOS/VS and OS/VS version are the result of operating system characteristics.

#### DOCUMENTATION

(available from Mechanicsburg)

*OS/VS RPG II Licensed Program Specifications (GC33-6121) ... OS/VS RPG II Program Summary (GC33-6131) ... DOS/VS RPG II and OS/VS RPG II General Information (GC33-6120).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## 5740-SM1 - DATA FACILITY SORT (DFSORT) R6

### PURPOSE

The DFSORT (5740-SM1) provides a high-performance disk and tape sort that runs under the OS/VS operating systems: MVS, MVS/XA and VS1. DFSORT also executes under VS/1 or MVS/370 when they are running as guests under VM/SP or VM/370.

### SPECIAL SALES INFORMATION

Some prospects for the DFSORT (5740-SM1) are:

- Customers ordering the 3330/3333 mdl 11, the 3340/3344, 3350, 3380 and/or 3375 Direct Access Storage Facilities.
- Customers wanting to take advantage of the new reenterable high performance techniques for sorting applications with direct access intermediate storage.
- Customers wanting to have an in-main-storage sort capability
- Customers wanting to take advantage of dynamic allocation features.
- Customers wanting to use noncontiguous work files.
- Customers wanting to use secondary allocation capabilities for work files.
- Customers wanting to dynamically invoke merge only applications.
- Customers wanting to use alternative collating sequence capabilities.
- Customers wanting to preserve the order, from input to output, of records with equal control fields.
- Customers wanting to handle records with binary or character control fields with a length of more than 256 bytes.
- COBOL and PL/I users wanting to take better advantage of sort/merge features (such as alternative collating sequence).

### HIGHLIGHTS

DFSORT Release 6 provides the user with:

- Significant performance improvements over OS/VS Sort/Merge Release 5.0 for most sorting applications:
  - Improved fixed-length record sort performance.
  - Improved variable-blocked spanned record (VBS) sort performance.
  - Sort performance optimized to larger region sizes.
  - Improved merge performance for both fixed- and variable-length records.
  - Removal of most restrictions that previously caused reversion to the older sorting techniques (Peerage or Vale).
  - Reductions in CPU seconds and EXCP counts when executing typical sort and/or merge applications.
- Usability and productivity enhancements including incorporation of some functions found in DOS/VS-VM/SP Sort/Merge Version 2 (5746-SM2).
  - INCLUDE/OMIT
  - INREC/OUTREC
  - SUM
- Improved message handling.
- New statistics messages.
- Improved installation/execution options.
- Extended parameter list support.
- Extended architecture (MVS/XA) user support, such as allowing user data and user exits to reside in virtual storage above 16 megabytes.

All device support previously provided via PTF to OS/VS Sort/Merge Release 5.0 has been incorporated in DFSORT Release 6.

### DESCRIPTION

**Improved Performance:** Release 6.0 has been enhanced to provide the potential for significant improvements in CPU time and EXCP performance. A new sorting technique for use with fixed-length records may give users significant improvements for many sort applications. In addition, an improved merge-only technique should provide users with significant performance improvements for all supported file types.

Users of the 3380 should also realize substantial performance gains and improved throughput when executing sort/merge applications under DFSORT Release 6. More performance detail is contained in the "Technical Information" section below.

**Usability and Productivity Enhancements:** Several key control statements available with the current release of DOS/VS-VM/SP

Sort/Merge Version 2 (5746-SM2) have been added to DFSORT Release 6.0 to provide the OS/VS user with enhanced productivity and/or usability when compared to OS/VS Sort/Merge Release 5.0.

- INCLUDE/OMIT - Allows the user to select or omit certain records, based on data field contents, prior to execution of a sort or merge. Use of this function may improve sort performance by only sorting or merging records which are pertinent to the application.
- INREC/OUTREC - Provides the option of reformatting input records either before sorting or at output.
- SUM - Allows user-designated fields in records with equal control fields to be added together and placed in a single record containing the summarized data.

Support has also been enhanced with the availability of DFSORT Release 6 to remove restrictions that previously precluded utilization of the higher performing Blockset sorting technique. Among the enhancements are support for:

- BSAM input and output data sets.
- All control field formats.
- All statements in the SORTCNTL data set.

Further details on the specification/override of DFSORT options are available in *DFSORT Application Programming: Guide* (SC33-4035).

**Message Handling:** Message handling has been improved by:

- A macro (ICEMSGS) that allows an installation programmer to modify message text to conform to customer-specified requirements.
- Use of a single DD statement to request printing of diagnostic messages for all sort techniques.
- User-specified message/control statement printing hierarchy.
- Option-in-effect messages.

**New Statistics Messages:** Release 6.0 provides additional, more accurate statistics about sort execution. New messages will provide data on:

- Number of bytes sorted.
- Whether SORTWK files have been reallocated on cylinder boundaries.
- EXCP counts for SORTIN, SORTOUT, SORTWK.

More accurate information about intermediate storage space usage will also be provided.

**Improved Installation/Execution Options:** Options have been added to Release 6.0 to improve command utilization and ease of installation. Several of the key options include:

- Allowing specification of separate installation option defaults for JCL and dynamic invocation of DFSORT through changes to the ICEMAC macro.
- Allowing users the option to specify DFSORT STIMER macro usage.
- Allowing comment statements in SORTCNTL and SYSIN data sets.
- Allowing an invoking program to specify most option changes without recompilation.

Release 6.0 also provides for:

- Control card continuation in columns 2-71.
- Dynamic secondary allocation for SORTOUT.
- Option name consistency across source (ICEMAC installation macro, EXEC parm statement, and SYSIN, SORTCNTL and parameter list control statements).

**Extended Parameter List:** A superset of 24-bit parameter list functions is provided by the Release 6.0 extended parameter list. Highlights of this support include:

- All supported control statements may be passed to DFSORT.
- Callers using 31-bit addressing may pass 31-bit addresses to DFSORT and specify the addressing mode to be used when DFSORT enters a caller-loaded exit.

**Extended Architecture User Support:** In addition to the functions provided by the Extended Parameter List, DFSORT provides the following support to an MVS/XA user:

- Allows programs dynamically invoking DFSORT and/or user exits called by standard techniques (Blockset, Peerage, or Vale) to reside in virtual storage above or below 16 megabytes.
  - Execution may be done using 24-bit or 31-bit addressing.
  - Data residing in virtual storage above or below 16 megabytes may be passed to DFSORT.

## DFSORT R6 (cont'd)

### Features Retained from Earlier Releases:

The major features of OS/VS Sort/Merge Release 5 have been retained in DFSORT Release 6, including:

- VLR- BLOCKSET support
- OPTION control statement
- Suppression of record count checking
- Alternate collating sequence for character (CH) control fields
- SORT-related SMF statistics
- All device support previously provided to DFSORT Release 5.0

**Other Features:** OS/VS Sort/Merge (5740-SM1) includes the functions, facilities and options of the OS Sort/Merge (5734-SM1), among which are:

- Support of the 2314, 2319, 3330 and 3333 Direct Access Storage Facilities and the 2400- and 3400-series tape devices as intermediate storage in sorting applications.
- Ability to specify any units supported by QSAM as input and output devices.
- Ability to be dynamically invoked by COBOL, PL/I and Assembler language programs.
- Ability to specify as many as 64 control fields.
- Ability to utilize as many as 32 tape units as intermediate storage.
- Ability to concatenate input data sets on unlike devices.
- Ability to take checkpoints in both sort and merge applications.

### CUSTOMER RESPONSIBILITIES

Installation of the OS/VS Sort/Merge program product is a customer responsibility. The user must install a sort program provided SVC, if using an operating system other than MVS.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

DFSORT is designed to operate with:

- All IBM processors supported by VS1, MVS or MVS/XA.
- Any IBM device supported by OS/VS for program residence.
- Any device used by QSAM for input and output.

As intermediate storage:

- In direct access applications - At least one IBM direct access storage device (3330/3333, 3340/3344, 3350, 3375, 3380 or 3850). It may be the same device as is used for the system residence device.
- In tape applications - At least three IBM magnetic tape units (2400- or 3400-series).

A minimum of 88K bytes virtual storage is required for the DFSORT product. (If VSAM data sets are used, the requirements will be greater.) Not all non-VSAM applications can run in as little as 88K bytes of storage; for example, restrictions apply to program residence, user exits, and input/output block sizes. For optimal DFSORT performance, 256K bytes to 1M bytes of virtual storage should be allocated, depending on file size. Further information on storage size definition may be found in *DFSORT Installation* (SC33-4034) and the *DFSORT Application Programming: Guide* (SC33-4035).

#### SOFTWARE REQUIREMENTS

DFSORT is MVS/370 operating system supported releases otherwise announced. DFSORT also executes under VS/1 or MVS/370 when they are running as guests under VM/SP or VM/370.

For operation under MVS, the IBM 3375 or 3380 products require:

- MVS/System Product-JES2 (5740-XY5) or MVS/System Product-JES3 (5740-XYN) and either of the following:
  - Data Facility Device Support (5740-AM7),
  - MVS/370 Data Facility Product (5665-295).

For MVS/XA operation, the IBM 3375 or 3380 products require:

- MVS/System Product-JES2 Version 2 (5740-XC6) or MVS/System Product-JES3 Version 2 Release 1 (5665-291).
- MVS/XA Data Facility Product (5665-284).

For VS1, the IBM 3375 or 3380 require:

- OS/VS1 Release 7.0.
- OS/VS1 Basic Programming Extensions (5662-257) Release 2.0 or later for 3375 support.

- OS/VS1 Basic Programming Extensions (5662-257) Release 4.0 or later for 3380 support.
- Data Facility Device Support (5740-AM6) Release 1.2 or later.

Either System Modification Program (SMP) Release 4 or System Modification Program Extended (SMP/E, 5668-949) is required for installation and subsequent maintenance of DFSORT.

### COMPATIBILITY

With the exceptions noted below, user programs that use published external interfaces and which execute with OS/VS Sort/Merge Release 5.0 will perform the same function under the operating systems supported by DFSORT Release 6.

In order to enhance overall DFSORT performance, dynamic linking of user exits will no longer be allowed. Some users may have to execute a one-time job to linkedit the exits into a load library, altering their MODS cards to specify this library.

Additional compatibility considerations:

- DFSORT Release 6 will recognize but ignore Phase 2 user exits (E21, F25, F27, F28, E29).
- Temporary SORTWK data sets will be reallocated in cylinders to achieve better performance.
- If more than 32 SORTWK data sets are specified, only the first 32 will be used.

### PERFORMANCE CONSIDERATIONS

Through incorporation of the functions found in the OS/VS Sort/Merge Performance Improvements Program Offering (5796-PQW), as well as additional functional enhancements, DFSORT Release 6 provides significant performance improvements over OS/VS Sort Merge Release 5.0.

- Improved fixed-length record sort performance.
- Improved variable-blocked spanned record (VBS) sort performance.
- Sort performance optimized to larger region sizes.
- Improved merge performance for both fixed- and variable-length records.
- Removal of most restrictions that previously caused reversion to the older sorting techniques (Peering or Vale).

DFSORT Release 6 continues to exploit the features of the new high-performance 3380 Direct Access Storage, resulting in improved elapsed time performance and faster execution of most sort applications when compared with the 3350.

A set of test cases, intended to be representative of many fixed-length record sort program user environments, was used to evaluate the performance improvement of DFSORT Release 6 as compared to OS/VS Sort/Merge Release 5.0.

The test cases were measured on a 3081 Processor having 16 megabytes of storage, with an MVS/XA system installed. SORTIN, SORTOUT, and SORTWK were on 3380 Direct Access Storage devices. The measurements were made using fixed-length records of 80 to 1,000 bytes and file sizes of 3M bytes to 150M bytes. Two cases were measured: One with composite results for region sizes of 128K, 256K, 512K and 768K; the other with improved results in a 1M region. The following performance improvements are provided by DFSORT Release 6 over OS/VS Sort/Merge Release 5.0:

- Case 1: 128K, 256K, 512K and 768K regions:
  - 14 % average reduction in CPU seconds.
- Case 2: 1M region:
  - 40 % average reduction in CPU seconds.
  - 75 % average reduction in EXCP counts.

The performance improvements quoted above are the percent reductions in the sum of the times or counts of all of the test cases measured.

The actual improvements experienced by any specific user or for any specific file are dependent on many factors, including record length, file size and region size.

Elapsed time results for sorting in a multitasking environment are application profile- and workload-dependent, therefore the results may differ from user to user.

IBM does not represent or warrant that users will experience the same changes in performance as have been measured in the above examples.



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PP 5740-SM1.3

Dec 83

Major Revision

PROGRAM PRODUCTS

**DFSORT R6 (cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*DFSORT Licensed Program Specifications (GC33-4032) ... DFSORT  
General Information (GC33-4033).*

**RPQs ACCEPTED:** No

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**LICENSED PROGRAM MATERIALS AVAILABILITY**

**Restricted Materials:** No. This licensed program will be available without source licensed program materials. It will be available with object code.

PROGRAM PRODUCTS

**DIRECT ACCESS STORAGE DUMP RESTORE  
DASDR (5740-UT1)**

**DESCRIPTION**

DASDR provides high speed dump and restore of data on direct-access devices by volume, selected data set, or track. Data can be dumped from and restored to the 3330/3333 mdls 1 and 11, 3340/3344 (except under OS/MVT), and the 3350 devices. †

The DASDR program product is composed of two programs: A system utility program (DRWDASDR) and a standalone program (DRUDMPRS).

**DRWDASDR HIGHLIGHTS**

- Selective DUMP operations to tape by set name (for most SAM, PAM, DAM and ISAM data sets) or by track.
- Selective RESTORE operations by data set name or by track from a full-volume dump tape or a selective data set dump tape created by the DASDR program product.
- Dynamic alternate track assignment during the RESTORE operation.
- Read multiple count, key, and data (full-track-read) command usage by the DUMP operation.
- Operator override on many data check errors.
- Support for an installation-supplied password checking routine.
- A new tape format which supports the selective data set DUMP or RESTORE operation, full-track-read command, and the handling of data checks.

The complete contents of a direct-access volume can be dumped to another compatible direct-access device, to a tape volume, or to a system output device. A selected data set can be dumped to a tape volume and restored from that volume. From a full-volume dump tape, either a selected data set, selected tracks, or all of the dumped data can be restored to a supported direct access device.

If a data check is encountered on DASD during the DUMP operation, the operator is given the option of bypassing the error and continuing the operation or terminating the job. During a RESTORE operation, if a data check is encountered on a track, an alternate track can be dynamically assigned at the operator's option. If a data check is encountered on tape during the RESTORE operation, the operator is given the option of bypassing the track in error and continuing or terminating the job.

DRWDASDR will utilize the full-track-read command, if available, which allows an entire track of data to be read in one disk revolution.

A new tape format has been implemented which supports the use of the full track read, selective data set DUMP or RESTORE operation, selective RESTORE by track, and the handling of data checks. Optionally, a tape format that is compatible with IEHDASDR can be utilized, which allows dump tapes to be created that can be restored by IEHDASDR and IBCDMPRS as well as by DRWDASDR, and which allows tapes created by IEHDASDR and IBCDMPRS to be restored by DRWDASDR.

**SECURITY**

DRWDASDR will support an optional installation-supplied password checking routine, which is given control when password protected data sets or VSAM data spaces are encountered. The installation routine returns codes which control further processing of the DUMP/RESTORE operations.

DASDR operating under MVS, will utilize capabilities of the Restore Access Control Facility (RACF, 5740-XXH, Release 1) if available. DASDR will also operate in a RACF Release 2 environment, but will only support RACF Release 1 function.

**DRUDMPRS HIGHLIGHTS**

Dumps and restores full volume direct-access devices, operating as a standalone utility.

Although not providing all of the features available with the system utility program (DRWDASDR), DRUDMPRS is provided to dump and restore full volume user data from and to the supported direct-access devices. A full direct-access volume can be dumped to tape volumes or other supported compatible direct-access devices in the IEHDASDR compatible format only. The data contents of these direct-access volumes can be restored from dump tapes created by IEHDASDR compatible format only. The data contents of these direct-access volumes can be restored from dump tapes created by IEHDASDR, IBCDMPRS and DRWDASDR (in either the IEHDASDR-compatible tape format or the new DASDR tape format) to a direct-access volume that resides on a compatible device.

**Performance:** DRWDASDR performance will be improved over that currently available with IEHDASDR by:

- Increased overlapping of I/O operations.
- Elimination of the channel program record for each track image record written to tape.

- Use of full-track-read command (if available).

Additionally, with the capability of dumping and restoring data selectively by data set name, operational efficiency may be improved by removing the necessity to perform the full-volume DUMP or RESTORE operation.

**Customer Benefits**

- Reduction in machine time required for dump/restore functions.
- Operational flexibility provided by selected data set dump/restore.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Storage Requirements:** Minimum storage size required to execute DRWDASDR is 256K bytes.

**SOFTWARE REQUIREMENTS**

This program product will operate with OS/VS Release 5 and 6, SVS Release 1.7, MVS Release 3.7 and OS/MVT Release 21.8. This program product will also run under VM/370 Release 3 using one of the previously mentioned systems.

**Note:** The 3340/44 is not supported by OS/MVT.

**Prerequisites:** SVS Release 1.7 will require the 3350/3344 ICR (5742-017) if these devices are to be used.

DASDR is not supported by OS/MVT Release 21.8 when operating on a S/360.

OS/MVT Release 21.8 will require the 3350/3330 mdl 11 PRPQ 5799-ARG (EG4653) if these devices or the full-track-read command are to be used.

The full-track-read feature is available on the 3350 and 3344 direct-access devices. The full-track-read feature can be used by 3330 and 3340 devices attached to a 3830 Control Unit mdl 2, or a S/370 mdl 145, 148, 155II, 158, 165II or 168 and 3345 (mdls 3, 4 and 5) ISC, configured for 3350. The 3340 can also use the full track-read feature when attached to a 3830 or ISC configured for a 3344 or a 135 IFA configured for a 3344.

A type 4 user SVC (or a type 3 under MVS) will be required by DRWDASDR. Also, DRWDASDR must be an authorized program for VS1 and VS2.

**DOCUMENTATION** (available from Mechanicsburg)

*DASDR Specification (GH20-9116) ... OS/MVT & OS/VS DASDR User's Guide (SH20-9111).*

**TERMS and CONDITIONS:** See PP Index

**Note:** Distribution of DASDR is via tape. Therefore, access to at least one 2400/3400 Magnetic Tape Unit is required for installation.

† Note that support of these devices does not include their use as staging or virtual volume devices under control of a 3850.



## DATA FACILITY DATA SET SERVICES RELEASE 2 (5740-UT3)

### PURPOSE

The Data Facility Data Set Services (DFDSS) licensed program assists OS/VS users with protection and recovery of information on direct access storage devices, including the new 3380 and 3375 and 3850 Mass Storage System (MSS) virtual volumes and 3880 mdl 13, by providing full volume, partial volume and data set dump and restore facilities on a system basis and full and partial volume restore on a stand-alone basis.

### HIGHLIGHTS

#### New with Release 2:

- Integrated Catalog Facility VSAM data set support for MVS.
- Usability enhancements.

#### Previously announced highlights of DFDSS are as follows:

- Multiple data set dump and restore.
- Volume defragmentation, with a minimum of data movement, to consolidate free space on the volume.
- Full or partial volume dump with the ability to restore some or all of the dumped data.
- Optional data set deletion after dumping.
- Devices supported include:
  - 2305-2
  - 3330 mdls 1 and 11
  - 3330V (MSS virtual volumes)
  - 3340/44
  - 3350
  - 3375
  - 3380
  - 3880 mdl 13
- Data Set Filter
- Stand-alone Restore
- User Installation Exit
- Enhanced performance capabilities.
  - User selectable performance options which allow the allocation of system resources to vary the performance of Data Facility Data Set Services.
  - Optional write check on restore.
  - Default option which dumps only the used portion of SAM and PAM allocated space.

### DESCRIPTION

Data Facility Data Set Services is a utility with the following functions new for Release 2:

#### Integrated Catalog Facility VSAM data set support for MVS

- Dump and Restore. DFDSS supports Integrated Catalog Facility VSAM data sets at the cluster level. This means that all components belonging to a cluster on a single volume will be processed during dump and restore. However, DFDSS does not catalog or uncatalog any data sets, nor does it support key-range data sets or the DELETE function. Individual Integrated Catalog Facility VSAM data sets can now be restored from a full volume dump created by DFDSS Release 2.
- DEFRAG now supports Integrated Catalog Facility VSAM data sets.
- Integrated Catalog Facility data sets are supported by the usability enhancements in this release with the exception of the enhancements to RENAME.

#### Usability Enhancements

- A new WAIT parameter permits DFDSS to wait a specified time, then retry if a system resource needed for processing is unavailable.
- A new TOLERATE(ENQFAILURE) parameter permits DFDSS to dump, restore and print data sets without gaining control of the resource after retry of ENQ has failed.
- RENAME now permits changing any or all of the qualifiers of a data set name during data set restore of non-VSAM data sets.
- RENAMEUNCONDITIONAL permits the restoration of data sets under a new name regardless of whether or not they previously existed on the target volume. Applies to non-VSAM data sets only.
- Additional filtering capability permits selection of data sets based on data set organization (DSORG), type of space allocation (cylinder, track, block or absolute track), and relative date (creation, expiration and last reference). The last reference relative date does not apply to VS1.

- A new NORUN parameter provides the ability to calculate the fragmentation index and list the data sets selected by the filter without actually executing a dump, restore or defragmentation.
- The FRAGMENTATIONINDEX parameter allows the setting of a threshold below which defragmentation will not be executed on the volume.
- A new WORKSIZE parameter permits the defragmentation of volumes with more data sets or extents than previously possible.
- Tracks can now be copied or restored to a volume in use.
- The TOLERATE(IOERROR) parameter now permits certain types of permanent input errors, allowing copy and dump to continue without termination.
- Cylinder-allocated data sets whose extents do not fall on a cylinder boundary will now be processed by DEFRAG.
- A user authorization exit now permits checking authorized use of Integrated Catalog Facility VSAM and non-VSAM password- or RACF-protected data sets.
- In conjunction with the Authorized Program Facility of the operating system, DFDSS permits the bypassing of RACF and password checking.

#### Previously announced functions for DFDSS are as follows:

Data Facility Data Set Services is a new utility with the following functions:

A DUMP statement allows dumping of data from DASD or MSS virtual volumes to tape, or to a data set on another DASD or MSS. A full volume, one or more data sets (from one or more volumes), or selected tracks may be dumped. Data sets, once they have been dumped may, optionally, be deleted. A data compress option is available to save space on the Dump Tape (or data set).

A RESTORE statement causes a previously created dump data set to be copied back onto a DASD device of the same type. Specific tracks or data sets may be restored even though the dump was taken for a full volume or multiple data sets. Data sets may, optionally, be renamed during the restore operation.

A DEFRAG control statement allows complete or partial consolidation of the fragmented free space on a volume. No additional devices, neither tape nor disk, are required for a DEFRAG.

A COPY statement copies a full volume or selected tracks between volumes of the same device type.

The COPYDUMP function copies the contents of a dump tape (or data set) onto one or more new tapes (or data sets) to provide multiple copies.

A PRINT statement supports printing of selected tracks, a selected data set or the VTOC.

Under OS/VS2 (MVS) dynamic allocation may be used to ease direct access storage device scheduling.

Data Set Filtering allows selection of data sets, based on specified criteria, during a dump, restore or DEFRAG operation. The criteria allowed are partially qualified data set names, creation date, expiration date, last referenced date and data set changed indicator (MVS only). The selection is by inclusion or exclusion for Dump and Restore, and by exclusion for DEFRAG.

Stand-alone restore provides full restore from a full volume dump tape or partial restore from a full volume, partial volume or data set dump tape. Stand-alone restore of dump tapes produced with compress option is not supported.

A User Installation exit will be provided to allow the customer to override DFDSS options selected by an individual user. This exit provides the customer with an opportunity to control and override user options before execution. For example, a user selection of optimization could be overridden by the customer via this exit.

Data Facility Data Set Services Release 1 control statements use Access Method Services syntax.

### CUSTOMER RESPONSIBILITIES

Customers are responsible for ordering and installing Data Facility Data Set Services Release 2 and any prerequisite programs

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

Data Facility Data Set Services is designed to operate on any IBM processor using OS/VS1 Release 7, OS/VS2 Release 3.8, MVS/System Extensions, MVS/System Product, or MVS/XA and has the same constraints as these SCPs and BCPs.



PROGRAM PRODUCTS

Data Facility Data Set Services Release 2  
Performance Improvement

Data Facility Data Set Services (cont'd)

Data Facility Data Set Services is a DASD Dump, Restore, and Defrag program that uses DASD, tape drives and unit record devices.

SOFTWARE REQUIREMENTS

Data Facility Data Set Services is designed to operate with OS/VS1 Release 7, OS/VS1 Basic Programming Extensions, or OS/VS2 Release 3.8 and all subsequent releases including System Extensions and System Product, and MVS/XA, unless otherwise stated.

Users of the IBM 3380 require the functions provided by OS/MVS Data Facility/Device Support (5740-AM7), MVS/370 Data Facility Product (5665-295) or MVS/XA Data Facility Product (5665-284). Users of the IBM 3375 must have the functions provided by either the programs listed above, or by OS/VS1 Data Facility/Device Support (5740-AM6).

The IBM 3380 and 3375 must be initialized by the Device Support Facilities utility of either the applicable operating system, the stand-alone program (5747-DS1), or equivalent.

Users wishing to use the Integrated Catalog Facility VSAM data set support in DFDSS Release 2 require the functions provided by MVS/370 Data Facility Product (5665-295).

COMPATIBILITY

Data Facility Data Set Services Release 2 is a complete replacement for all previous releases of DFDSS and is upward compatible for all prior functions.

DFDSS Releases 1, 1.1 and 1.2 cannot restore from dump tapes created by Release 2.

Data Facility Data Set Services Release 2 cannot restore by data set the Data Facility Extended Function cataloged VSAM data sets from dump tapes created by Releases 1, 1.1 or 1.2.

The PURGE keyword in a data set restore has been replaced by the REPLACE keyword. The PURGE keyword is still supported and has the same meaning as before.

CONVERSION

Data Facility/Data Set Services uses Access Method Services syntax for its control statements. Users of IEHDASDR and the DASDR licensed program (5740-UT1) will be required to alter control statements of existing job steps to run with Data Facility/Data Set Services.

SECURITY

Data Facility Data Set Services Release 2 complies with and conforms to the data security and auditability controls of the systems it supports. The target or source data may be either RACF- or password-protected, which would require a user to be RACF-authorized or to supply the password. User management is responsible for evaluating, selecting, applying and implementing such features, and for the appropriate administrative and application controls.

PERFORMANCE

Measurements of MVS test environments have shown that Data Facility/Data Set Services can provide significant reductions in processor and elapsed time for full volume dumps, when compared to DASDR (5740-UT1). These improvements are summarized below:

Data Facility Data Set Services  
Performance Improvement

From Device	Processor Time	Elapsed Time
3330-11	18 %	21 %
3350	26 %	28 %

These estimates are based on measurements performed on a 3031 Processor running a single region of OS/VS2(MVS) with a pre-release version of Data Facility/Data Set Services installed. Test volumes of composite average data sets (as described at GUIDE 47, Fall 1978) were used on the specified DASD, dumping to a 3420 Magnetic Tape Unit mdl 6. Performance Option 1, which uses equivalent resources and logic to that of DASDR, was specified. Data Facility/Data Set Services defaults to dump only the used portion of SAM and PAM allocated space.

This performance data is derived from a select set of test cases and is given for information purposes only. There is no warranty or guarantee that the same performance characteristics will apply to other users or system configurations. Actual performance improvements are dependent on many factors, including volume contents and organization, user specifications of performance options and the devices involved.

Further measurements of MVS test environments have shown that DFDSS Release 2 can provide significant reductions in processor and elapsed time for both dumping and restoring VSAM data sets when compared to EXPORT/IMPORT. These improvements are summarized below:

	Processor Time	Elapsed Time
DUMP (option 1) versus EXPORT	600 %	200 %
DUMP (option 4) versus EXPORT	700 %	200 %
RESTORE versus IMPORT	600 %	800 %

Note: DFDSS DUMP/RESTORE is not a total functional replacement for EXPORT/IMPORT in all circumstances.

These estimates were based on measurements performed using the 3380 DASD and the 3420-6 Tape Units on a 3031 Processor running a single region of OS/VS2 MVS with a pre-release version of Data Facility Data Set Services Release 2 installed. Test data included VSAM data sets of various types, containing differing numbers of records and record sizes.

DOCUMENTATION  
(available from Mechanicsburg)

Title	Order Number
Licensed Program Specifications	GC26-3948
User's Guide and Reference	SC26-3949
Diagnosis Guide and Reference	SY26-3878.

MVS SYSTEM INTEGRITY APPLIES: Yes

RPQs ACCEPTED: No

## SYSTEM/370 ENERGY MANAGEMENT SYSTEM 5740-U11

### PURPOSE

The S/370 Energy Management System provides the Electric Utility Industry with a modular set of supervisory and application programs to aid in the control of medium to large power networks.

### DESCRIPTION

The S/370 Energy Management System is designed to provide host processor logic in a hierarchy of processors serving an electric utility company at the regional, system, or pool operating center level. The S/370 Energy Management System communicates with and through S/7(s) to IBM 3707 Remote Data Acquisition and Control Stations, the basic data gathering device. The processing load is performed by the online host S/370; data acquisition and power device control functions are performed by the S/7(s) on command from the host.

Major functions provided include:

**Data Acquisition** -- Retrieves data from the power network, converts this information to standard engineering units, provides limit checking and status monitoring.

**Supervisory Control** -- Central point of network control. Network status and alarm conditions detected by the data acquisition routines can be displayed for operator action. Control actions to activate power system devices are accepted and verified, then forwarded through the network to the proper destination. Original data base parameters describing the points being measured within the power network can be varied by a system operator, given the proper security authorization.

**Load Frequency Control (LFC)** -- Power network performance data, in conjunction with user-supplied parameters, is used to compute power requirements necessary to supply the system frequency and tie-line loadings. LFC can be suspended by the operator, or can operate in one of three selectable modes:

- Flat frequency - maintenance of scheduled frequency, tie-line obligation ignored.
- Flat tie-line maintenance of tie-line obligation, frequency deviations ignored.
- Tie-line bias control - deviations from both tie-line obligations and scheduled frequency received balanced consideration.

**Economic Dispatch Control** -- Computes each generating unit participation to economically deliver the load to distribution points. Generation unit capacity, fuel and operational costs, line losses, and interchange obligations are considered for either all units under control of the LFC program module or all units within the power system.

### HIGHLIGHTS

Utilizes the IBM 5985 mdl H02 Color Display Control Unit (3456 character positions, 127 program changeable character set, seven colors, alphanumeric keyboard, up to 48 special function keys).

- Configuration options covering a range of power network sizes ranging from a minimum system consisting of a single S/370 and S/7, to a duplexed S/370 network supporting two levels of system control lower than that performing the major monitoring function.
- Offline system preparation functions, including data base and display compilers.
- Control hierarchy time synchronization.
- Logging of events, alarms, and historical data.
- Support for stripchart recording, and audible alarms.

### CUSTOMER RESPONSIBILITIES

- Management and control of the Power System.
- Understanding the utility network and the desired control strategy.
- Selecting and preparing an appropriate equipment site.
- Selecting of S/7 and S/370 options and parameters to tailor the system to the user's environment.
- Providing data set contents for defining initial values, limits and other control parameters.
- Ordering and installing required system control programs, program products, and PRPQs.
- Initiating orders for required computer and terminal equipment needed in the system.
- Installing all required instrumentation and common carrier facilities to meet minimum equipment requirements.
- Designing and implementation of any specialized application programs and display formats required.
- Training of personnel.

- Insuring accuracy of initial data, network, and real-time sensor data input definitions.
- Insuring that the completed System contains all reasonable check points and controls to maintain the power system integrity and the desired level of service and availability.
- Reviewing S/370 Energy Management System security and restart facilities to select those appropriate for the protection of the power network.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The diversity of electric power networks capable of being served by the S/370 Energy Management System require that configuration assistance (available through the Energy Management Systems Center), be used in the decisions required to select hardware and programming options. Typical systems are shown as a guideline:

For compilation: A S/370 mdl 135 I (524,288 bytes), and appropriate system console, input, output, residence, and data sets as outlined in the Sales Manual under the heading "Operating System/Virtual Storage 1".

Typical System: A S/370 mdl 145 I (524,288 bytes), (including one byte multiplexer channel, two block multiplexer channels, and floating point). The configuration must include sufficient I/O devices to support the requirements for system output, system residence, and system data sets. Sufficient direct access storage must be provided to satisfy user information storage requirements. Direct access devices may be chosen from a 3333 Disk Storage and Control (Integrated), a 3330 Disk Storage Facility, or a 3340 Direct Access Storage Facility (or combinations).

The system requires a S/7 processor for power system local and remote data acquisition and control. This system must be attached to the host S/370 via the Channel Attachment feature (RPQ D08112).

Also required in the minimum configuration is an IBM 5985-H02 Color Display Control Unit (RPQ Y94176), an IBM 5941-H02 Display Console (RPQ 7H0014), Channel Adapter to attach to the S/370 (RPQ Y94177) and customer-supplied color TV monitors.

Distribution and support of S/370 Energy Management System require the availability of one 9-track tape drive.

#### SOFTWARE REQUIREMENTS

Special Real-Time Operating System (PRPQ 5799-AHE), Display Management System (PRPQ 5799-AFD), and S/7 Energy Management System (5707-U11) are all prerequisites to the installation of a S/370 Energy Management System.

The program product runs in an OS/VS1 Release 4 environment on S/370. OS/VS1 (5741-VS1) must therefore be already installed, or ordered together with the products already discussed in this section. Program product modules are written in S/370 Assembler language, Access method used are EXCP, BDAM, QSAM and BTAM.

S/370 Energy Management System is not supported under VM/370.

#### DOCUMENTATION (available from Mechanicsburg)

*General Information Manual (GH20-1496) ... Promotional Overview Brochure (G520-2869) ... Program Product Design Objective (GH20-4255)*



**DEVELOPMENT MANAGEMENT SYSTEM/CICS/VS**  
**RELEASE 4**  
**DMS/CICS/VS-OS (5740-XC5)**  
**DMS/CICS/VS-DOS (5746-XC4)**

**PURPOSE**

Development Management System/CICS/VS (DMS/CICS/VS) is an advanced application generator designed to simplify the implementation of interactive data processing applications. The preprogrammed display management, file and data base management, and message handling facilities of DMS/CICS/VS make it possible to implement online applications with little or no traditional programming. DMS/CICS/VS does this by providing preprogrammed facilities that perform functions that are common to most online applications such as: Screen and function selection, screen display, multi-screen paging, and message routing between display stations. Preprogrammed data base and file functions for searching, browsing, inquiring, data entry, record adding and updating are provided as well as other functions that regularly appear in online programs.

**PRODUCT OVERVIEW**

DMS/CICS/VS applications are defined non-procedurally using the interactive Application Generation facilities. Application developers describe their data files and records, display screen images, and application processing logic using DMS/CICS/VS interactive development dialogs. DMS/CICS/VS 'programming' is done using a fill-in-the-blanks technique that encourages the application developer to concentrate on what the application should do, not how a program is supposed to do it. For example, at the same time the display screen data fields are defined, the data editing and validation requirements are specified. These editing and validation requirements are specified using a menu selection technique rather than procedural code such as COBOL. This approach reduces errors and the time normally required for coding. This fill-in-the-blanks approach is used throughout the application definition process, making it possible to achieve much higher levels of productivity than possible using traditional programming techniques. Furthermore, the preprogrammed facilities of DMS/CICS/VS create a design structure for online applications that can reduce the time spent on this key part of application development.

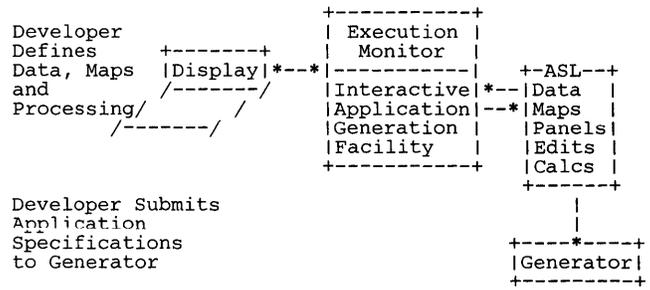
DMS/CICS/VS has a repository for application specifications. Because of this facility, components of previously developed applications may be easily reused in a new application. In addition, it is a simple process to develop a set of application 'models' that can be easily modified for new applications that have a similar structure. This technique is especially useful for new and inexperienced programmers. It allows them to create a new application effectively by simply copying and modifying prior work.

For those parts of applications where the supplied functions do not precisely fit the need, DMS/CICS/VS offers a simple calculation language. These calculation/edit statements may be used to specify arithmetic operations, multi-field data editing and movement of data between fields. They may also be used to alter the normal flow of the application. While the calculation language makes it possible to fully develop many online applications, DMS/CICS/VS also provides an interface to other traditional programming language programs via a calc/edit 'CALL' statement.

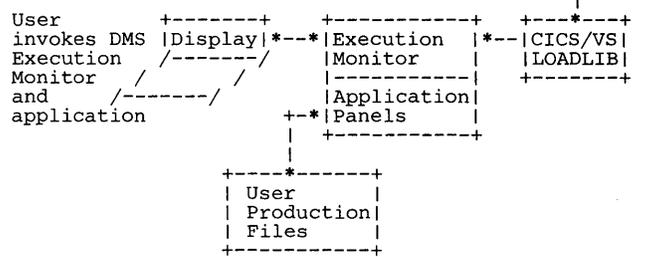
The DMS/CICS/VS product consists of two pieces, an execution-time monitor that contains the precompiled facilities, and an Interactive Application Generation Facility (IAG) that allows the application to be defined.

In the diagram that follows, it can be seen that as the DMS/CICS/VS application is defined, the specifications are placed in the Application Specification Library (ASL). When the specifications are complete, they are processed through a generator. This step prepares the application for execution in a production environment.

**APPLICATION DEVELOPMENT ENVIRONMENT**



**PRODUCTION ENVIRONMENT**



In addition to creating data definitions initially using IAG dialogs, DMS/CICS/VS also provides an IBM Data Dictionary extraction utility. This utility uses the dictionary Program Access Facility to read data base definitions out of the dictionary and place them into a format in which they can be directly loaded onto the ASL. When loaded to the ASL, they can be marked as read-only so that consistency between the ASL and Data Dictionary will be maintained.

**HIGHLIGHTS**

- The DMS/CICS/VS Application Generation feature allows the application designer to specify application requirements using either an Interactive Application Generator (IAG) or the forms base application generation capability.
  - The Panel Description Form defines the data which specifies the processing sequence of operator responses, the routing of messages, the location of static fields on a display panel and the location and type of the variable display fields. In addition, calculation/edit statements are used to perform simple arithmetic operations, permit data editing and permit altering of the DMS/CICS/VS processing flow without the necessity of coding user exits.
  - The File Description Form describes a file or group of files and the format of the records in the file.
  - The Data Transfer Form specifies the files and fields involved and the operations performed for batch functions such as file-to-file update or initial file load from existing user files.
  - The Interactive Application Generation Facility provides for data, panel and application definition and has the capability to provide clarification and explanations of functions that may not be understood by the user.
- Flexible panel definition provides:
  - Referencing as many as four data bases or files by each panel for data entry, inquiry or update.
  - Control of field mode. For example, selected fields of records being updated can be displayed in protected mode, preventing their modification by the operator.
  - Chained supervisor functions. DMS/CICS/VS operations may be combined to avoid the need for several operator responses to perform a set of functions with a single logical purpose.
  - Communication fields for interpanel communication with DMS/CICS/VS. Data can be passed between a series of related panels. This information can be prespecified in the panel description, entered by the operator or entered by a user-written program. Communication fields also provide a convenient interface to user data-editing routines.
  - Field level functions. Functions available at the data field level include dollar edit, code conversion and user exit programs.

## DMS/CICS/VS R4 (cont'd)

Data field initialization. Data entry fields may be initialized by input from the panel description form, file data or communication field data.

- Extensive 3270 Information Display Station support:

Screen sizes supported are: 480, 960, 1,920, 2,560, 3,440. The IAG does not support the 480 screen size.

All 3270 field attributes are supported.

Minimum data transmission. Only fields which are modified are transmitted from the display to the central processing unit. Nulls are not transmitted.

Program function key support. Use of a program function key is interpreted as an operator response and can be controlled by the panel designer. Up to 24 program function keys can be supported.

Selector light-pen support. Detectable fields may be used for control function selection or multiple key selection.

Numeric lock feature support. Data entry fields may be defined as numeric, causing the keyboard to lock when an attempt is made to enter a nonnumeric character.

Audible alarm support. The alarm may be sounded when a specified panel is displayed.

- Operator identification card reader support. Up to 37 data characters may be entered using the magnetic card reader.
- Images or messages can be routed from one display station to another display station or to a 3284/3286 or 3287/3289 Printer. Transactions can be logged into a sequential data set for subsequent online or offline processing.
- Application security through use of CICS/VS and DMS/CICS/VS signon procedures can be used to control operator access to predetermined applications.
- Ability to hold records for update across multiple panels, both files and data bases are supported.
- Three data integrity options. A DMS-only option provides data integrity for files that are unique to the DMS/CICS/VS environment, preventing simultaneous update of the same data, while allowing read-only inquiries to take place. System Data Integrity is an option which provides data integrity at the CICS/VS subsystem level, offering protection for files shared by DMS and non-DMS applications. The third option uses a Save and Compare technique which provides system-wide data integrity without the necessity of maintaining CICS/VS or DL/I locks on the data being updated.
- User program exits before and after execution of DMS/CICS/VS file and data routing operations. This permits an extension of the calculation/edit capabilities for unique application dependent editing and cross-checking of data prior to its incorporation into data bases, files or display at the 3275/77 or 3276/78 Display Station. These exit points are also available to perform calculation/edit operations.
- Formatted Data Facility allows the user to perform editing, calculations and application logic in a user exit by symbolic rather than physical reference to data fields. This is allowed immediately before a panel is displayed or immediately after a response is entered. The facility can be used with COBOL, PL/I, RPG II or Assembler language to simplify the use of user exits.
- Search capabilities using generic arguments to produce a list of keys or records. The list may be routed to a 3275/77 or 3276/78 Display Station or a CICS/VS transient data destination.
- Extensive file support.

Support is provided for grouped DMS/CICS/VS files, key-sequenced VSAM files, indexed sequential files and sequential files. All files are supported in fixed length record format. The intersystem communication facility is also supported.

Group files allow single logical files to be specified as a group of multiple physical files, making access to the files more efficient and providing for a soft fail capability. If one physical file becomes inoperative, it can be taken offline and restored without affecting the operation of the remaining physical files in the group.

Batch facilities are provided for single key-sequenced VSAM files.

- DL/I Data Base Facility:

Supports the CICS implementation of IMS/VS (DB) and DL/I DOS/VS for:

- Inquiry - Single, multiple or repeated segments and repeated segments within repeated segments (\$RPT within \$RPT).
- Insertion - Single, multiple or repeated segments.
- Update - Single or multiple segments and repeated dependent segments.

- Deletion - Single or multiple segments, or by group.

Access to DL/I data bases from secondary indexes is permitted.

Subscreens of data (windows) can be defined to contain repetitive occurrences of DL/I segments. These panels can be paged until all occurrences of these segments have been displayed. The number of segments to be displayed or number of pages to be displayed can be dynamically selected by the operator.

The user can also selectively access all occurrences that match specified keys or qualification statements.

Both fixed and variable length records are supported.

### CUSTOMER RESPONSIBILITIES

The user should become thoroughly familiar with both the operating system and the Customer Information Control System (CICS), before beginning to plan for and install the Development Management System/CICS/VS. In order to install DMS/CICS/VS and its facilities to implement online applications, the user must first:

1. Install all required communication equipment (display stations, control units, modems, transmission control units).
2. Generate a CICS/VS system in accordance with his system configuration and installation requirements.
3. Generate optional data base and data dictionary systems in accordance with his system configuration and installation requirements.
4. Select DMS/CICS/VS system generation options and link-edit the options program module.
5. Define record layouts for all files to be accessed by DMS/CICS/VS during either interactive or batch operation.
6. Define layouts and hierarchies for all data bases to be accessed by DMS/CICS/VS during either interactive or batch operation.
7. Describe the application.
8. Describe data transfer operations required for the application.
9. Generate file, index, panel and data transfer specifications using DMS/CICS/VS application generation programs.
10. Generate interface DBDs for data base accessing. Optionally, the DB/DC Dictionary can be used to generate these DMS/DBDs.
11. Add DMS/CICS/VS and user program names, user-defined panel names, data file descriptions, and data base descriptions to CICS/VS tables.
12. Provide for the backup of online files by:
  - Establishing a procedure for copying files at periodic intervals.
  - Using CICS/VS automatic file journaling facility for DMS/CICS/VS.

Once the system is operational, only the procedures in step 12 must be performed on a regular basis. For implementing new applications or additional modifications of existing applications, the appropriate combination of steps 5 through 11 must be performed. The IAG will assist in steps 5, 6, and 7.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The machine configuration for the Development Management System/CICS/VS varies according to the user's application needs. The requirement for operation under CICS/VS is any IBM S/370, IBM 303X Processor or IBM System 4300 with enough real storage to meet the combined operating requirements of CICS/VS, the host operating system, the appropriate access methods and other user required applications. CICS/VS machine options and storage requirements are discussed in the *CICS/VS General Information Manual*.

Sufficient I/O devices must be included to support the requirements for system input, system output, system residence and system data sets. Also included must be sufficient direct access storage devices to satisfy user information storage requirements. A magnetic tape unit (9-track) must be available for program distribution and maintenance.

At least one 3275/3277 or 3276/3278 Display Station (local or remote) must be included in all configurations.

The system supports the following terminals; only those features mentioned are supported.

- 3178
- 3271 mdls 1, 2, 11, 12
- 3272 mdls 1, 2
- 3274 mdls 1A, 1B, 1C, 1D, 51C, (SNA or BSC)
- 3275 mdls 1, 2, 11, 12
- 3276 mdls 1, 2, 3, 4, 11, 12, 13, 14
- 3277 mdls 1, 2
- 3278 mdls 1, 2, 3, 4
- 3279 mdls 2A, 2B, 3A, 3B (base color mode)

**PROGRAM PRODUCTS**
**DMS/CICS/VS R4 (cont'd)**

- 3284 mdls 1, 2
- 3286 mdls 1, 2
- 3287 mdls 1, 2, 1C, 2C (black and white only)
- 3288 mdl 2
- 3289 mdls 1, 2
- 3290 (3270 compatibility mode)
- 3790 DSC Mode (3790 Configuration Support #9165)
- 8775 mdls 11, 12 (in 3270 compatibility mode)
- 3270 options as follows:
  - EBCDIC Transmission Code (#9761)
  - ASCII Transmission Code (#9762)
  - Keyboard Numeric lock (#4690)
  - Selector Light-Pen (#6350)
  - Audible Alarm (#1090)
  - Operator Identification (#4600)

The appropriate telecommunication control units and line adapters must be included in the configuration. Use of a printer with the PL/I (SC) character set is recommended for printing application generation output.

**SOFTWARE REQUIREMENTS**

DMS/CICS/VS is written in S/370 Assembler language and operates under the control of the currently supported version(s) of CICS/VS, and subsequent releases unless otherwise stated in future revisions of this document. The programming system requirements for DMS/CICS/VS are the same as those for CICS/VS.

Product	DOS/VSE		MVS	
	Component ID	VS1	Component ID	Component ID
VSAM	5746-SC-VSM	5741-SC-1DE	5752-SC-1DE	
DAM		5741-SC-1D7	5752-SC-1D7	
ISAM		5741-SC-1D8	5752-SC-1D8	
DL/I	5746-XX-1			
IMS/DB		5740-XX-2	5740-XX-2	
DB/DC Data Dictionary	5746-XX-C	5740-XX-F	5740-XX-F	

CICS/OS/VS (5740-XX1) operates under the IBM Operating System (OS/VS1 or OS/VS2). See the *CICS/VS General Information Manual* for the required programming system components.

CICS/DOS/VS (5746-XX3) operates under the IBM Disk Operating System (DOS/VS and DOS/VSE). See the *CICS/VS General Information Manual* for the required programming system components.

**STORAGE REQUIREMENTS**

The following are estimates which may be used for planning purposes only to determine virtual storage requirements in the online processing environment. They do not include storage for the operating system, DL/I, other CICS/VS applications running concurrently with DMS/CICS/VS in the same partition or for the CICS/VS modules and tables required to support DMS/CICS/VS.

	10-Terminal System		Additional Bytes Per Unit
	DOS/VSE	OS/VS	
DMS/CICS/VS			1000/900
Trans. Work Areas	10,000	9,000	per terminal
DMS/CICS/VS			
Online Supervisor	9,000	8,500	
DMS/CICS/VS			
loadable modules	81,000	78,000	
Transmission line buffer	2,000	2,000	2,000/line
DMS/CICS/VS terminal working storage	81,000	78,000	
	117,000	112,500	

DMS/CICS/VS uses the task control, storage control, program control, terminal control, file control transient data, temporary storage and dump control facilities of CICS/VS. In addition, space must be available for CICS/VS tables and transaction control areas (TCAs). Each DMS/CICS/VS panel requires an entry in the processing program table (PPT). In addition, for each terminal there are normally two entries in the destination control table (DCT). The temporary storage auxiliary table size should be increased by about ten entries per terminal (more if extensive use of the online file search function of DMS/CICS/VS is anticipated).

DL/I requires the following dynamic storage during the time a given panel is accessing a DL/I data base:

500 bytes

plus

the sum of segment lengths in the Data Base Description (DBD)

plus

178 bytes for each segment card on the panel description form (including the one generated for the root segment)

Additional storage must be allowed for record I/O buffers, access methods, and user code. Users must study their applications to determine the amount of additional storage required, based on the size of buffers and the number of terminals that may require I/O areas concurrently.

The transmission line buffer size depends on the type of 3270 devices attached to the line. Typically, about 1,500 bytes of working storage per terminal are required for DMS/CICS/VS. This amount is dependent on screen size and the complexity of the user's applications.

The performance of programs in a virtual storage environment is highly dependent on the system resources available, the programs that operate concurrently and system and application data set placement. For improved online performance, adequate real resources (main storage, processor computing capability, channels, direct access devices, etc.) must be available. For planning purposes, the following estimates of real storage requirements for DMS/CICS/VS may be used.

	Bytes
DMS/CICS/VS online supervisor	4,000
DMS/CICS/VS loadable modules	26,000
Transmission line buffers	2,000/line

DL/I and CICS/VS modules and tables, access methods and variable dynamic storage impose additional real storage requirements.

RPOs ACCEPTED: No



**MVS/SYSTEM EXTENSIONS  
5740-XE1**

**DESCRIPTION**

MVS/System Extensions is an enhancement to MVS offering increased performance (through control program improvements) and installation management and control enhancements to MVS users. The Program Product is available for the IBM 3031, 3032 and 3033 Processors, and for the S/370 mdl 158 and 168 processors with the S/370 Extended Feature installed.

Release 1, Modification Level 1 (R1.1) of the MVS/System Extensions provides performance enhancements and some control improvements. Release 2, Modification Level 0 (R2.0) of the MVS/System Extensions replaces Release 1 and maintains its performance and control enhancements. In addition, Release 2 makes new installation management functions available in the SMF, SRM and operator-message handling areas.

**Performance Improvements**

MVS/System Extensions R1.0 test measurements have been completed on the S/370 158, 168, 3031, 3032 and 3033 processors.

The following results have been obtained comparing MVS Release 3.7 with MVS/System Extensions R1.0 to MVS Release 3.7 without MVS/System Extensions. Both systems include SUs 4, 5, 7 and the other SU prerequisites for MVS/System Extensions R1.0:

- Supervisor state execution time reductions ranging from 20 percent to 27 percent.
- Uniprocessor throughput improvements ranging from 14 percent to 18 percent.
- Multiprocessor throughput improvements ranging from 17 percent to 20 percent

Actual performance will vary depending upon customer environment and storage and I/O configuration. No assurance can be given that an individual user will achieve the test results.

- A throughput improvement of about 14%.
- Additional multiprocessing improvements providing greater throughput potential for AP and MP installations.

Actual performance will vary depending upon customer environment and installation use of product improvements.

Utilization of the S/370 Extended Facility/Feature/Additional Feature provides the following enhancements:

- Several high frequency control program paths are improved.
- Additional level of storage protection has been implemented to protect critical low storage from inadvertent alteration.
- Dynamic address translation hardware is made more efficient by reducing the duplicate entries in the Translation Lookaside Buffer and improving the programming signals that indicate certain Translation Lookaside Buffer entries must be purged.

**CUSTOMER RESPONSIBILITIES**

Individual accounts should examine the following sections and apply the information to their specific environments.

**RELEASE 1.0 HIGHLIGHTS**

**Path Length Improvements:** Reductions in processor execution (CPU) time are achieved through path length improvements for important system functions.

Based upon selected path length measurements, CPU time savings per occurrence by path for MVS/System Extensions R1.0 compared to VS2 3.7 and prerequisite SUs 4, 5 and 7 (Scheduler, Supervisor 1 and 2), are derived as below. Processor execution time savings will vary depending on specific account environments.

**I/O Paths and Related Services**

Improvements have been achieved through optimization of code in mainline paths and in dispatcher and interrupt handler paths. For I/O PURGE and HALT, a new UCB scanning technique and usage of branch entry services has shown a CPU time reduction.

**Derived CPU Time Savings**

EXCP	22%
EXCPVR	13%
SIO (EXCP)	12%
SIO (ASM)	14%
PURGE (CLOSE)	41%
PURGE (QUIESCE)	38%
I/O HALT	42%

**Storage Management Improvements**

A reduction of SRB usage during page fault processing, faster paths for fixing or freeing pages, first time page reference processing and Unreferenced Interval Count (UIC) updating and a decrease in the frequency of UIC updating are among improvements that have been added. When SRM detects the availability of a sufficient amount of real storage, TSO address spaces going into TERMINAL WAIT might not be physically swapped out, resulting in a CPU time savings in the swap path of up to 59%.

**Derived CPU Time Savings**

PAGE FAULT	32%
SWAP	11%
FAST PAGE FIX	73%
PURGE TLB processing (MP/AP only)	up to 95%
UIC updating path	31%

**Supervisor Control Improvements**

Reduction of LOCAL and DISPATCHER LOCK requirements, usage of the CPU TIMER for time recording and a READY TCB pointer technique are among the changes to the dispatcher. Improvements to interrupt handling have been made by optimizing I/O recursion handling and reducing paths in the program FLIH for page fault handling. Usage of the S/370 Extended Facility/Feature provides significant path length improvements in the system TRACE function. Code optimization has yielded a further reduction in processor execution time for these supervisor functions.

**Derived CPU Time Savings**

SRB dispatch	40%
TCB dispatch	20%
Overall average dispatch	31%
LOCAL LOCK OBTAIN/RELEASE	30%
CMS LOCK OBTAIN/RELEASE	71%
I/O Interrupt FLIH	62%
EXTERNAL Interrupt FLIH	5%
PROGRAM Interrupt FLIH (PAGE FAULT with I/O)	12%
PROGRAM Interrupt FLIH (PAGE FAULT with no I/O)	17%
SVC/SIO/I/O Interrupt/SRB dispatch	12%
Dispatch task exit prologue	21%

**Supervisor Service Improvements**

Improvements in SVC FLIH processing and a reduction in LOCAL lock requirements for EXIT prologue, yield a CPU time savings for SVC paths. MODESET and CALLDISP are changed to type 6 SVCs, and PURGEDQ uses FESTAE which does not obtain the LOCAL lock. Improvements in WAIT/ POST and VALIDITY CHECK result in a reduced path for these functions.

**Derived CPU Time Savings**

SVC Type 1/Exit	28%
SVC Type 2,3,4/Exit (no locks)	32%
SVC Type 6/Exit	3%
MODESET	29%
CALLDISP	27%
PURGEDQ	31%

**Contention Improvements:** Reduction in contention for system resources provides additional CPU time savings and improved system performance in UP, AP and MP environments.

- LOCAL LOCK usage is reduced in dispatcher, EXIT prologue, system issued PAGE FIX/PAGE FREE requests, MODESET/CALLDISP, PAGEFAULT and PURGEDQ paths.
- Channel Balancing Algorithms, selectable via SYS1. PARMLIB, and Logical Channel (LCH) Redrive Rotation allow for a reduction of channel contention.
- System responsiveness is increased through reduction of disabled supervisor time.
- Fewer dispatchable units in the page fault path allow for reduced contention for that function.

Additional contention improvements are achieved through shorter paths for system functions where serialization does occur. For example:

**Derived CPU Time Savings**

Suspension of SRB for LOCAL LOCK in LOCAL LOCK OPTION on SCHEDULE	53%
Request for SYNCHRONOUS OPTION on PAGE FIX with I/O	35%

For S/370 AP and MP environments contention is further reduced.

### MVS/System Extensions (cont'd)

- The dispatcher eliminated dispatcher lock usage permitting parallel dispatching and decreasing contention for other dispatcher lock users (TIMER, POST, etc.).
- I/O PURGE usage of the UCB lock has been reduced.
- Holding time for the SALLOC lock is reduced through faster PAGE FIX/PAGE FREE and the improvements in the PURGE TLB processing function.
- Frequency of SIGP is decreased through the improved PURGE TLB processing function and reduction of IOS usage of SIGP, resulting in an additional reduction of disabled time.
- Improved work selection is achieved through MEMORY SWITCH modifications.
- Enabled dispatcher spin when unable to dispatch allows for improved system responsiveness.

**Control Improvements:** Control improvements allow for more effective allocation of resources.

SRM Control items provide the customer with improved control over the distribution of services/resources to do his work.

- The Multi-programming Level (MPL) target adjustment function (adjusting the number of swappable address spaces allowed in storage for a domain) can now use service rate as a means of distributing resources among domains of work. A service objective for a domain may be specified to control total service rate to a domain or average service rate to ready users within a domain.
- The APG function has been enhanced to optionally include multiple mean-time-to-wait groups, multiple fast rotate priorities, and a new function in SRM called time slice dispatching. These enhancements will permit better control over dispatching priorities from the IPS and allow an installation to regulate a multi-subsystem environment including nonswappable address spaces.
- A Priority Queuing option for controlling I/O requests against logical channels has been added to allow the user to improve the response time of specific users or critical applications.

An IOS Control item allows the user additional tuning capability:

- Three optional channel selection algorithms: Sequential, Last Channel Used and Rotate, are supported. A new SYS1.PARMLIB member allows the user to select the appropriate algorithm on a logical channel (LCH) basis.

Improved resource usage recording allows for better system control:

- Service values can now include SRB time at the installation's option. The different components of service values are now recorded separately by SMF.
- The dispatcher now uses the CPU timer for time recording to increase accuracy.

### RELEASE 2.0 HIGHLIGHTS

**SMF Enhancements:** A major revision to SMF provides more data with increased installation control over the amount of data collected, and allows a non-disruptive migration to full utilization of the new function.

- **Selectivity of SMF data:** Installations may now choose exactly which record types they want to record, and which types they do not want to record. Thus, users can now avoid collecting records they do not need, and reduce SMF overhead and data file space usage. This also aids migration to MVS/System Extensions Release 2 -- new record types can be avoided until the installation is prepared to use them. Selectivity is available either at a system level, or at the TSO, started task or batch level.
- **New SMF data:** Several enhancements improve the quantity and quality of overall SMF data.
  - Data is now collected for started tasks (type 4, 5, 14, 15, 20, 30 and 40 records).
  - A new record (type 30) is made available to standardize a record format for all jobs. This record will contain data found in type 4, 5, 20, 34, 35 and 40 records, and can be used in place of them for a potential reduction in complexity and savings in SMF and post processing times. In addition, new data in the type 30 record includes:
    - DDNAME for device entries.
    - SRB and TCB Processor time for the initiator.
    - Job number assigned by the job entry subsystem.
    - Total address space EXCP count.
    - Mount counts for DASD, tape and Mass Storage Subsystem.
  - JOBLIB/STEPLIB EXCP counts in record types 4, 30, 34.

- Another new record (type 90) indicates the changes in SMF and system status. Records are written at IPL, switch SMF, halt EOD, set time and date, SETDMN and SET SMF/IPS/OPT command time. Also an IPL prompt record can be requested by the installation. IPL prompt allows the operator to enter reliability data at IPL which is written to the SMF file in a type 90 record.

- Type 23 records (new) record certain SMF status data. The number of records and buffers written and the maximum number of full SMF buffers are now recorded.

- Finally, type 32 records are introduced. When this release is used in conjunction with the TSO Command Package licensed program (5740-XT6), the type 32 records will contain the total count of each TSO command and subcommands of EDIT, ACCOUNT, OUTPUT and OPERATOR by command and subcommand type. TSO commands issued as subcommands are not counted except as noted above. In other cases where subcommands are issued, the detail portion of the type 32 records will not contain meaningful data for the TSO products and user applications and their respective subcommands. Complete details will be available in the publications at FCS.

- **Functional accounting:** By using the new type 32 records, in conjunction with the TSO Command Package licensed program (5740-XT6), installations can begin to implement the concept of "functional accounting", or charging users for resources in terms they understand. With the type 30 records for TSO and the type 32 records, installations can determine the average resource usage per type of TSO command, subject to the limitations on type 32 records, above, and then bill on the basis of a fixed charge per TSO command. (Note: The TSO Command Package licensed program (5740-XT6) is required to place TSO data in type 32 records).
- **The SMF writer has been redesigned to reduce bottlenecks and loss of data, and to improve SMF services.** Chief among the improvements has been to change the SMF data sets to preformatted VSAM data sets accessed in SRB mode. In addition, where possible, SMF is making use of branch entries to MVS services and offering a branch entry to SMF to eligible components. These changes contribute to a path length reduction in writing SMF buffers.

Other SMF writer enhancements include the capability to designate up to 36 SMF data sets and up to 99 SMF buffers as an installation option. (To save space, buffers above an installation designated minimum number are only allocated on demand). A dump utility program is provided to move data from the new SMF datasets into data sets that can be archived. This makes the SMF data sets available for re-use. The output of the dump program is compatible with the old SMF data set format and can be used by current accounting routines. This utility also has record and file concatenation and selection capabilities on a time, date, system ID and record type basis. Installation exits are called during the dump process to allow additional selection/processing capability.

Installations currently restrained from recording full SMF data because of performance considerations will find data recording ability improved with Release 2.

- **Compatible migration:** An installation's data reduction programs do not have to be modified to install this release (as long as they do not use the *active* SMF data file for input). Current data reduction programs can continue to be used as long as necessary, and the new SMF data can be phased in at any convenient time.
- **Minimize loss of SMF data due to system failure:** Before Release 2, SMF data for long running jobs is lost if the system fails before the job ends. There are cases where data is lost after presentation to SMF because the buffer containing the data does not fill up and, therefore, is not written out before some system failure. To minimize these losses with Release 2, installations can specify that interval data be collected in type 30 records. The interval times are installation specifiable on a job type (batch, TSO, etc.) basis. To minimize the loss of data in the SMF buffers in the event of a system failure, installations may also specify the maximum time that data may reside in an SMF buffer before being written.
- **SMF flexibility:** To ease usage of all the new SMF options, operator commands will be available to display and change the current options. SMF will allow installations to distinguish between job types (batch, TSO, etc.) in record selection, in interval time specification and in invocation of installation exits in order to more closely match data requirements with data collection. All SMF installation exits reside in their own load modules for ease of installation replacement.

**SRM Enhancements:** The SRM is significantly enhanced in Release 2. Control of system resources to meet installation defined goals is necessary for effective usage of the system. Release 2 SRM contains enhancements to centralize and improve system control, to improve the RMF reporting of certain transactions and to ease the use of certain SRM facilities.

**MVS/System Extensions (cont'd)**

- **Centralized control:** One of the main factors in determining how SRM allocates system resources to address spaces is the performance group of the address space. Thus, proper performance group number assignment becomes an important part of allocating the appropriate resources to each user. Before Release 2, control of performance group number assignment was distributed across several components. With Release 2, a single system service is available to allow the assignment of performance group numbers. This optional facility, managed by the SRM, uses a new SYS1.PARMLIB member called the installation control specification. Installations may now specify in the PARMLIB member which performance group numbers are permitted, or required, to be assigned to batch jobs, TSO users or users of IBM or user written subsystems, started tasks, mounts, etc., for both transaction control and reporting. (To support this function, installations can now specify up to 999 performance groups in the IPS).

If the installation control specification PARMLIB member is not provided, the current methods of assigning performance groups are used. In addition, units of work can be migrated to installation control specification control individually to ease the conversion process.

- **Improved resource control:** Release 2 contains several improvements in resource control:

– Storage isolation

The storage isolation function protects selected groups of users from having frames stolen during real storage shortages. Thus, these users are less affected by fluctuations in real storage availability. In particular, storage isolation can be used to protect the working set of a critical interactive (e.g., DB/DC) application when its transaction load fluctuates and there is a shortage of real storage. With sufficient frames for its working set, the application should have fewer periods of excessive paging, resulting in more consistent response times. Storage isolation can also be used to place an upper limit on the number of frames held by a user when there is a shortage of real storage. Frames in excess of this limit are favored for stealing. The storage isolation function applies both to private area and common frames.

– Storage load balancing and selectivity of load balancers

In addition to the Processor and I/O load balancing functions, a new storage load balancing function is designed to minimize periods of real storage contention. The function detects real storage imbalances, either shortages or excessive availability, and favors heavy users of real storage for swap-out or swap-in accordingly. The load balancing functions (storage, processor and I/O) can be requested individually or in any combination for selected groups of users.

– Extended priority I/O queuing

With Release 1, deferred I/O requests could be queued on a logical channel either in a FIFO manner, or by priority according to address space dispatching priority. With Release 2, installations will optionally be able to specify I/O priority different from dispatching priority for appropriate address spaces.

– TSO response time objective

Using a new response time parameter in the first period of a TSO performance group, installation management can specify the desired response time for trivial TSO transactions. By limiting response time when the system is under-utilized and reserving excess capacity for future applications, end users are less affected by fluctuations in the system's workload.

- **Improved reporting**

– Privileged user reporting.

Privileged address spaces have, in the past, not had their SRM service statistics made available to RMF for reporting. With Release 2, these statistics will be made available to RMF so that RMF may report a more complete picture of system activity.

– Subsystem transaction reporting.

In conjunction with the installation control specification assignment of performance group numbers to individual transactions, SRM now has the capability to keep service statistics for transactions managed by subsystems (modifications to the subsystems are necessary to provide transaction data to SRM).

RMF can report this subsystem transaction data via the online monitor, background reports or post-processing summaries. The reported data consists of transaction rate, response time and, in certain cases, service consumption. This reporting permits direct feedback on an installation's performance objectives and eliminates the need for multiple report processors. Note: For transaction reporting to be active, a subsystem must issue the

new SYSEVENT macro instructions to provide transaction data to SRM.

When MVS/System Extensions Release 2 is used in conjunction with the TSO Command Package licensed program (5740-XT6), data on TSO commands can be kept and reported. Furthermore, the installation can optionally have SRM treat each command within a CLIST as an individual transaction rather than treating the entire CLIST as a single long transaction.

- **Ease of use improvements:** Because proper installation usage of SRM is important for effective system control, Release 2 eases the usage of certain SRM facilities. The introduction of the installation control specification (above), for example, will make it possible for the installation to ensure jobs are assigned to the correct performance groups.

Other improvements include:

– Constants to PARMLIB

The characteristics of MVS can be altered by adjusting the value of SRM constants. In the past, alteration of some of these values has required modification of IBM code. To ease this burden, Release 2 is making approximately 30 key SRM constants specifiable in PARMLIB member IEAOPTXX. In addition, a SET command is available to dynamically change these values by changing from one IEAOPTXX member to another.

– Device allocation selection options

Before Release 2, four SRM algorithms were supported to control selection of tape devices from the eligible device list at allocation time. However, if the installation wanted an algorithm other than the default algorithm supplied, modification of IBM code was required. With Release 2, any one of the four algorithms can be chosen using a new keyword in the IEAOPTXX member of PARMLIB.

**Action Message Retention Facility:** Proper and timely handling of operator messages is important in any system. Certain messages that require the operator to take some action are called action messages, and are given particular message descriptor codes (1, 2, 3 and 11). Before Release 2, these messages could roll off the operator's screen with no easy way for the operator to reconstruct the set of unsatisfied action messages. The action message retention facility allows the operator to retrieve all unsatisfied action messages.

When the operator activates the facility, the system retains all action messages (descriptor codes 1, 2, 3 and 11) displayed on the operator console(s) until either the system detects that the required action is performed and deletes the message or the operator requests that the message be deleted. The operator retrieves outstanding action messages that have rolled off or have been erased from the screen by entering the DISPLAY R command.

Immediate action messages (descriptor codes 1 and 2) and critical eventual action messages (descriptor code 11) appear at a higher intensity on consoles that support dual intensity displays. Intensification of these messages helps the operator to distinguish them from other messages. Action messages can be deleted with the CONTROL command or with the delete operator message (DOM) macro instruction. If the action message retention facility is deactivated, those messages that have been retained will remain until the operator or the issuer requests their deletion.

When Release 2 is used in conjunction with the TSO Command Package licensed program (5740-XT6), retained action messages may be displayed from a TSO terminal in operator mode.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

MVS/System Extensions requires the S/370 Extended Facility of the IBM 3031, 3032 and 3033 Processors, or the S/370 Extended Feature on IBM S/370 mdls 158 and 168. MVS/System Extensions supports the following processors:

Model 158-1	UP/MP/AP
Model 158-3	UP/MP/AP
Model 168-1	
with RPQ S20579	UP/MP
Model 168-1	
with RPQ S20580	AP
Model 168-3	UP/MP/AP
3031 Processor	UP/AP
3032 Processor	UP
3033 Processor	UP/MP/AP

The minimum total storage required by MVS/System Extensions depends on many factors. These include an installation's configuration, the subsystems, program products, problem programs in use and others. However, the following are the approximate real and virtual storage changes for the MVS/System Extensions:



PROGRAM PRODUCTS

MVS/System Extensions (cont'd)

	Release 1	Release 2*
Nucleus (real)	30,000	6,200
PLPA (virtual)	10,000	66,300

\* Release 2 figures are in addition to those provided for Release 1. Additional storage requirements are variable - see the *General Information Manual*, (GC28-0872-3) for full details.

The specified operating environment may change, and will be restated at FCS.

SOFTWARE REQUIREMENTS

MVS/System Extensions R1.0 operates on MVS Releases 3.7 and 3.8:

- On MVS Release 3.7, MVS/System Extensions R1.0 requires the following selectable units as prerequisites: 4, 5, 7, 16, 17, 27, 33, 51 and 55.
- On MVS Release 3.8, MVS/System Extensions R1.0 has no prerequisite selectable units.
- On MVS Release 3.7 or 3.8, when MVS Processor Support 2 (SU64) is installed on a system containing MVS/System Extensions R1.0, an MVS/System Extensions - Processor Support 2 feature must also be installed.

MVS/System Extensions R2.0 operates only on MVS Release 3.8:

- On MVS Release 3.8, MVS/System Extensions R2.0 requires the following prerequisite: Processor Support 2
- With MVS/System Extensions R2.0, the MVS/System Extensions - Processor Support 2 feature is not required.

Information concerning prerequisite PTF's required for installation of MVS/System Extensions is in the program directory shipped with the product.

INSTALLATION CONSIDERATIONS

MVS/System Extensions requires a Stage 1 assembly followed by the normal SMP apply. Alternatively, a full SYSGEN can be used for installation. See the program directory for additional installation information.

In order to support MVS with MVS/System Extensions installed as a guest operating system under VM/370, the VM/System Extensions program product (5748-XE1) is required.

To use the functions provided by RMF, the OS/VS2 MVS Resource Measurement Facility, Version 2, Release 2 is required.

Product Parts Overview

	RELEASE 1	R1 MVS PROC Supt 2 FEAT	RELEASE 2
PURPOSE	PERF. FUNC	SU64 COMPAT. FOR REL. 1	FUNCTION
MVS BASE	3.7/3.8	3.7/3.8	3.8
PREREQUISITES	4,5,7, 16,17,27, 33,51,55 or MVS 3.8	Release 1 & SU64	64
AVAILABLE	3/78 on 3.7 3/79 on 3.8	3/79 on 3.7 6/79 on 3.8	8/79
LAST DATE FOR PROGRAMMING SUPPORT	12/80 on 3.7 & 3.8	12/80 on 3.7 & 3.8	(6 MONTH NOTICE)
RMF SUPPORT	RMF V2 R2 (MVS/System Extensions Support)	RMF V2 R2 (MVS/System Extensions Support) Processor Support 2 feature	RMF V2 R2 (MVS/System Extensions Support) MVS/System Extensions Release 2 feature

COMPATIBILITY

Presently, there are no known incompatibilities between MVS and currently available PPs caused by MVS/System Extensions that will not be eliminated by FCS. However, modifications to some Program Products may be necessary for them to execute on MVS with the MVS/System Extensions installed. PTFs or new versions or releases for certain PPs will be provided. Details will be announced at availability.

User written programs using standard external interfaces will run with MVS/System Extensions. Programs that interrogate control program control blocks may require modifications. Licenses will receive documentation on MVS/System Extensions control blocks.

The Release 2 enhancements in the SMF area may require certain changes in an installation's accounting procedures - See the *General Information Manual* (GC28-0872-3) for complete details.

IBM devices supported by MVS today will continue to be supported by MVS with the MVS/System Extensions installed.

MF/1 and DSS will not be supported with the MVS/System Extensions.

Program Products supported by MVS Release 3.7 or 3.8 should continue to run with MVS/System Extensions installed (with the RMF exception noted). APARs will be accepted for any such IBM program product that does not run successfully after MVS/System Extensions is installed.

For program support purposes, MVS/System Extensions Release 1 and the MVS/System Extensions - Processor Support 2 feature will be considered current until December, 1980.

DOCUMENTATION: (available from Mechanicsburg)

Title	Order Number
OS/VS2 MVS/System Extensions Licensed Program Design Objectives	GC28-0871
OS/VS2 MVS/System Extensions General Information Manual	GC28-0872

## PROGRAM PRODUCTS

**OS/VS2 MVS TSO 3270 EXTENDED DISPLAY  
SUPPORT SESSION MANAGER  
Release 2 Modification Level 0 (5740-XE2)****PURPOSE**

The TSO Session Manager provides a full screen display facility. It complements the full screen functions of the TSO 3270 Display Support and Structured Programming Facility program product. The combination of these two products provides full screen 3270 display support for the entire TSO environment.

**DESCRIPTION**

The TSO Session Manager, available to the TSO user from logon to logoff, has facilities that enhance TSO in several key areas.

**Journaling of TSO Sessions** - gives the 3270 Display user the benefits of a hardcopy typewriter terminal by providing a complete journal of all input and output activity for the interactive session. All or part of this session journal can be made available during the TSO Session. This gives the user the capability to recall an earlier part of a session for the purpose of reviewing prior input/output, making up new input from portions of the journal for resubmitting, or executing in context. The journal is kept in MVS virtual storage for immediate viewing on the display screen. In addition, the user may keep a permanent record by copying all or part of the journal to a data set or directing it to a hardcopy printer.

A new TSO concept defines "streams" of input and output data that are kept in MVS virtual storage. These data streams provide the capability for the session journal and other data to be maintained as a virtual sheet of typewriter paper that can be viewed via Session Manager windows.

**Customizing of 3270 Display Terminal** - users can now dynamically tailor the display screen, data streams and program function (PF) keys to fit their needs. The Session Manager also provides users with default screen layout and program function key definitions at Logon time to manage session input and output. The default environment is defined via an IBM provided and/or installation provided default module(s) to give users additional selectivity.

The PF key defaults provide window scrolling, screen snapshots and command entry functions. User definition (or customization) of PF keys and windows may be done at any time during the session. PF keys can be used to perform repetitive functions such as changing screen displays or invoking TSO commands, TSO CLISTs or Session Manager commands. Users can alternate between use of default definitions and previously saved and customized definitions.

The user may also define multiple windows (up to 25) and specify which data streams are to be displayed in each window.

In Release 2, mdl 3276 and 3278 Display terminals are supported in three screen modes, giving users a 2560 and 3440 character (32, and 43 lines) display area as well as the 1920 character (24 lines) default mode. This will extend the size of windows that an installation may define and provide for retention and viewing of more data on the screen at any one time.

Up to 24 Program Function Keys as provided on models 3276/2378 Displays are supported. Each set of 12 PF Keys (basic and optional feature) are defined to provide the same (12) default definitions. Users may then redefine any of the PF Keys (up to 24) to provide a customized environment.

**Full-Screen Support for all Line-oriented TSO Functions** - user written applications and Execution Processors such as TSO Test, PL1 Checkout Compiler Program Product and COBOL Interactive Debug now get full-screen support without having to rewrite existing applications. Full-screen support includes: Full screen I/O, customization of PF keys and windows and use of the session journal.

**Installation Management Exits** - In Session Manager Release 2 installations can now write routines to monitor the user's terminal session and log all or selected activity. The installation can also select the data streams to be monitored. The user exits have the capability of recording the line of data and stream name along with a time stamp.

**HIGHLIGHTS**

Retention of desirable typewriter terminal features -- the session journal facility can be used to view or print all or part of a session's input/output during a session.

Up to 9 data streams -- streams retain session journal and other inputs/outputs for interactive use during session. Unique streams contain data such as TSO input, TSO output, Session Manager command interactions and messages.

User control of display -- although a default of four windows for input/output is provided, dynamic customization allows the definition of up to twenty-five windows. Users may use one or more windows to view any data stream.

Scrolling capabilities -- Users can scroll forward, backward, left and right over data displayed in any window.

Up to twenty four program function keys -- default definitions of PF keys and user customizations of PF Keys allows the user to perform many time saving functions; they can execute TSO commands, CLISTs and Session Manager commands.

Co-existence with other full screen applications -- Session Manager relinquishes control of the display screen when a full-screen I/O is invoked. It resumes control when the full-screen application ends.

Saving and restoring of PF key definitions -- users may define sets of PF keys. Those definitions can be saved in virtual storage and later restored.

Highlighting of user input -- user entered commands recorded in the TSOUI stream are highlighted on the display screen to differentiate from system output in that stream.

Highlighting of currently executing command -- users can watch the execution of commands in the TSOIN stream by watching the highlighting move down the stack of commands displayed on the screen.

Unlocked keyboard capability -- the keyboard can remain unlocked thereby allowing users to enter data even while a program may be executing.

Audible alarm support (if terminal feature is present) -- the alarm alerts users when new data is displayed, messages have been received or user input is required.

Message stacking -- messages sent to a user's terminal do not interrupt the session. They are stacked and then displayed at the user's convenience. The sounding of the audible alarm signals the receipt of messages as they are stacked.

Display support from logon to logoff -- full-screen support is given to all line-oriented commands and modes without need for program modifications.

Multitasking -- Session Manager commands can execute while TSO commands are executing.

Session Manager commands as an alternative to PF keys -- by using Session Manager commands, users at display terminals lacking PF keys can still manage the screen and perform PF key-like functions such as scrolling.

Three new TSO commands -- SMCOPY copies a stream to a data set, SMFIND is used to locate data in a stream and SMPUT allows a user to issue a Session Manager command directly from the main TSO command input window.

These functions extend the facilities of the 3270 display terminal to the line-oriented TSO environment. They allow the user greater control over the interactive session, with the objective of increased user productivity.

Since users have the option of using defaults or their own customized definitions, they may determine exactly what is to be displayed at the terminal and maintain control over the display terminal throughout the session. The complete history of the session is available to the user. This saves re-execution of time consuming commands by allowing the user to review previous output. New inputs formed from the journal also save keystrokes.

**Relationship between Session Manager and the TSO 3270 Display Support and Structured Programming Facility Program Product (SPF).**

SPF is a TSO command processor which was specially designed to take advantage of 3270 Display Terminal features (scrolling, program function keys, full screen read/write and split screen) for context editing, data set and library maintenance and utility functions. The TSO 3270 Session Manager does not attempt to duplicate the capabilities of the SPF command processor. Instead, it provides support of 3270 Display Terminal features for other TSO command processors which were originally designed for use on keyboard printer terminals and which work in a line-oriented mode. Application execution and testing/debugging activities using TSO Test, the PL1 Checkout Compiler program product and the COBOL and FORTRAN Interactive Debug program products are among the key user tasks for which Session Manager provides new display support.

Installations where the TSO workload consists primarily of editing, data set browsing and remote job submission may find that SPF adequately addresses their display support requirements. Installations where application execution makes up the majority of the TSO workload may find that the Session Manager adequately meets their needs. However, installations where the workload consists of a full range of TSO capabilities should consider both SPF and the Session Manager.

**Task Control:** Since the Session Manager operates in parallel with the TSO Terminal Monitor Program (TMP), The Session Manager com-

**MVS TSO 3270 Session Manager (cont'd)**

mands may be entered via keyboard or program function keys, even while other TSO commands are executing.

**Interactive Debugging:** The users of program development and debugging programs such as TSO Test, PL1 Checkout Compiler or COBOL Interactive Debug will be able to take advantage of the full screen functions; multiple windows and data streams, and assign PF keys to commonly used test functions (i.e., displaying a set of registers, a key data area or buffer).

The user no longer has to reexecute TSO commands just to have the output redisplayed since the session journal can be viewed at any time during the session to examine or evaluate output or reenter test input or commands. Printing the journal to hardcopy gives a permanent log of the test session. Additional data such as comments may be directed to the journal to highlight a particular part of the test session.

**Display Technique:** The Session Manager partitions the 3270 display screen to provide multiple input/output "windows" or "viewports" through which data streams can be viewed. The user may define as many as 25 unique windows.

Data is viewed by scrolling or moving a window over a data stream in a forward, backward, left or right direction. This operation may be performed in any of the windows on the screen.

**Data Streams:** A data stream is a collection of input and/or output commands, data, messages, etc. that are associated with a user TSO session under the Session Manager. The concept of data streams allows input and output to be saved in virtual storage and selectively displayed on one or more of the "windows" of the display screen. Each data stream is maintained in virtual storage. Input from the terminal and output destined for the terminal is placed in one of these data streams as defined by the Session Manager defaults and/or by the user. The data stream can be viewed through a window as it is being updated. The streams have a default size that may be modified by the installation. All data is placed in the stream starting from the top and progressively filling up the allotted space. When all allocated space is full, the data will wrap around to the top of the stream.

One or more streams may be displayed in one or more windows of the display screen. By use of scrolling (see "Display Techniques") these streams may be viewed by the user as if viewing a data set. Session Manager streams are:

TSOIN	Input for TSO commands and applications, etc., is placed in this stream. This data will be read by TSO as if it were input from the terminal keyboard.
TSOOUT	Output from TSO (ready, prompts, messages, application output) is placed in this stream. Additionally, the input from the TSOIN stream is placed here. This gives a complete record of the terminal session. This stream when journaled to an output data set looks identical to the terminal sheet produced by a TSO typewriter terminal.
SMIN	Session Manager input commands are placed in this stream.
SMOUT	Session Manager diagnostics and informational messages output are placed here.
HEADER	Column indicators, scroll values and locked or unlocked status of the main window are placed in this stream.
MESSAGE	Collection point for messages sent from outside the user memory.
EXTRA1, EXTRA2, EXTRA3	Output from SNAPSHOT commands of screen images is placed in the EXTRA1 stream. The other two streams are inactive until targeted for use by Session Manager commands.

**Program Function Keys:** The program function keys can be dynamically defined by the user. The user may "program" them to suit his needs and change them at any time during the session. They can be used to invoke frequently used CLISTs Session Manager commands, provide input to programs and allow many repetitive type functions.

Casual users or new users may choose to utilize the supplied defaults rather than define their own.

Program function keys as defined in the default environment may be changed at any time during a session.

**PF Keys for Models 3276/3278 Displays**

PF Key 1 - PF Key 12 are assigned defaults in exactly the same manner as with the 3275/3277 models with 78-key keyboards. The additional 12 PF Keys on these modules (PF Key 13 - PF Key 24) are also supplied the same default definitions as PF Key 1 - PF Key 12. The installation or user may then choose to redefine any of these PF Keys dynamically, or at Logon via specification of a unique default module.

Default PF keys include:

**For SNAPSHOTS**

- PF 4 Takes a snapshot of the screen image and places it in a data stream.
- PF 1 Prints the stream containing the snapshots of the screen.

**For SCROLLING:** Scrolling takes place in the main window which defaults to the TSOOUT stream but may be redefined by the user.

- PF 2 Sets a scrolling value for PFKs 7, 8, 10, 11 to specify amount of scroll.
- PFs 7,8,10,11 For scrolling backward, forward, left and right respectively.
- PF 9 Used to scroll backward to oldest data in a stream.
- PF 12 Used to move main window to newest data in a stream and unlock it, thereby allowing scrolling to take place.

**Command Entry/Searching**

- PF 3 Begins Session Manager command entry in the main window.
- PF 5 Used to scroll the main window backwards until a text string entered by the user is found.
- PF 6 Alternates the current window between viewing the TSOIN and TSOOUT streams.

**Session Manager Commands:** Commands are provided to allow the user to define, control and modify the display environment.

Defaults are provided for many command operands for ease of use. These commands may be entered from the keyboard, or by defining a program function key to cause command execution, or via TSO CLISTs.

**Change Commands:** Allow modification of the cursor, a PF key, a stream, windows, terminal attributes or functions of a stream.

**Define/Delete:** To define a window, its size, associated stream and other attributes; and to delete the window.

**Screen Control Commands:** Provide function equivalent to the program function key default definitions: (e.g., FIND (same as PF 5) to find a text string, SCROLL (same as PF 7-12).

**FIND LINE Command** identifies the line number of a specific line being viewed in a stream window.

**Session Control Commands**

- **Query Command:** informs the user of what the Session Manager environment is, including current definitions of windows, streams, PF key settings and session functions.
- **SAVE/RESTORE Command:** allows a user to save PF keys, screen or window display environments on a LIFO stack (Last In First Out) and restore the environment.
- **RESET Command:** reestablishes the defaults provided at Session Manager startup.
- **END:** Terminates the Session Manager display support or the TSO session.
- **PUT:** Allows the user to insert a character string in any stream. Insertion of a TSO input stream will cause the string to be executed as a TSO command.

**TSO Commands**

Three commands are supplied with the Session Manager.

- **SMCOPY:** Copies all or part of a data stream or a data set to another data stream or data set. The target data set may be SYSOUT, enabling any TSO stream, including the session journal, to be printed at a system printer.
- **SMFIND:** This command locates a character string in a Session Manager stream.
- **SMPUT:** A command that sends a specified text string to a specified stream. A string sent to the TSOIN stream will be interpreted as a TSO command.

**Help Command:** Help Data Set members are supplied to give information on Session Manager commands and its TSO commands.

**Message Handling:** When a message is received in the users TSOOUT stream the Audible Alarm, if present, will be sounded. A user can then display the message in a designated window by utilizing a PF key assigned to TSOOUT.

**CUSTOMER RESPONSIBILITIES**

Installation of this program product will require installation personnel to be knowledgeable in OS/VS2 MVS TSO.

**MVS TSO 3270 Session Manager (cont'd)**

**User Guidelines:** *TSO 3270 Extended Display Support-Session Manager Users Guide and Reference Manual* GC28-0912-0 ... this publication introduces the user to the Session Manager by providing a "how to" primer in the context of using the IBM-supplied default display environment. In addition, command syntax and System Programmer reference information is provided.

**TSO HELP Data Set** - Session Manager provides additional members for the TSO SYS1.HELP data set to provide the user with descriptive information and syntax for Session Manager commands and new TSO commands.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This licensed program is designed to operate on an IBM S/370 under OS/VS2 MVS with the Time Sharing Option. There are no additional hardware requirements.

- **Terminals**

The following terminals are supported by the Session Manager:

- 3275 or 3277 mdl 2, 3275 mdl 12
- 3276 mdls 2, 3, 4, 12, 13, 14
- 3278 mdls 2, 3, 4 (local or remote attachment - SNA or non-SNA)\*

Session Manager also supports any 3270 data compatible terminal (1920 character matrix only). It will also support the 3276 and 3278 mdls 3, 4, 13 and 14 in 1920 character default mode as well as in extended screen capacity mode.

\*3278 mdls 3, 4 are available on the 3274 controller and on the 3276 controller.

- **Keyboards supported are:**

- 75-Key EBCDIC Typewriter (#4621)  
[Requires (#9881)]
- 87-Key EBCDIC Typewriter (#4627)  
[Requires (#9882)]
- 66-Key EBCDIC Typewriter (#4630)
- 78-Key EBCDIC Typewriter (#4633)
- 78-Key Operator Console (#4632)
- 66-Key EBCDIC Typewriter/APL (#4637)\*
- 78-Key EBCDIC Typewriter/APL (#4638)\*
- 78-Key Text (#4639)\*
- Character Set: EBCDIC (#9882)

\* Note: Feature #1066 is a prerequisite for these three keyboards. These three keyboards will be supported via PTF subsequent to FCS of the Session Manager.

**Features supported but not required are:**

- Audible Alarm (#1090)
- Print Dual Case Character Set (RPW-8K0366).
- Data Analysis - APL Feature (#1066 on the 3277 mdl 2 Display Station and the 3271/ 3272 Control Unit)

**SOFTWARE REQUIREMENTS**

The Session Manager is designed to work with MVS Release 3.7 with TSO/TCAM Level 9 or Level 10, TSO/VTAM Level 1 or Level 2 and subsequent releases and modifications unless otherwise stated.

In order to take advantage of the increased screen capacity features of the 3276/3278 Display terminals (Models 3, 4, 13, 14) TSO with the ACF/VTAM or ACF/TCAM program product installed is required.

This licensed program is distributed in the Basic Assembler language.

**Storage Estimates:** Virtual storage requirement for TSO 3270 Extended Display Support-Session Manager are:

- PLPA 6,536 bytes
- Private Area 316,824 bytes

The approximate space requirements increase for the system libraries (based on IBM 3330 Disk Storage with a 13,030 byte track size) are:

Library		Tracks
SYS1.SMLIB	159,000 bytes	13
SYS1.MACLIB	20,700 bytes	2
SYS1.HELP	21,600 bytes	2
SYS1.LPALIB	5,800 bytes	1

**DOCUMENTATION:** (available from Mechanicsburg)

General Information Manual	GC28-0911
Licensed Program Specifications	GC28-0914



PROGRAM PRODUCTS

**MATHEMATICAL PROGRAMMING SYSTEM  
EXTENDED/370  
(MPSX/370)  
MIXED - INTEGER PROGRAMMING  
(MIP/370)**

5740-XM3	MPSX/370	OS/VS and VM/370 with CMS
Feature	MIP/370	OS/VS and VM/370 with CMS
5746-XM2	MPSX/370	DOS/VS and DOS/VSE
Feature	MIP/370	DOS/VS and DOS/VSE

**DESCRIPTION**

MPSX/370 and its optional feature MIP/370 are new products based on their predecessors MPSX (5734-XM4) and its MIP feature. MPSX/370 and MIP/370 provide new and enhanced capabilities and improved performance when compared to MPSX and MIP. The scope of operational models that can be optimized by MPSX/370 and MIP/370 has been extended.

Mathematical programming applications are found in all industries. Some of the best-known applications are: material allocation, ingredient blending, creation of animal feedlots, production planning, investment analysis, capital budgeting, plant/warehouse location, machine loading, work force allocation, and production/distribution.

MPSX/370 solves linear and separable programming problems. It uses the revised simplex method (LU form of the inverse) with free or bounded variables and ranged constraints, and provides a full set of facilities for problem revision, crashing and reduction, selective printed and filed analysis of output and solutions, parameterizations, getoff/restart, and report writing. Dynamic storage allocation, matrix scaling, dynamic adjustment of tolerances, cycling and multiple pricing, together with the LU form of the inverse, provide increased performance. Two control languages can be used to direct the optimization; the MPS Control Language (MPSCL) is specific to MPSX/370 which contains its own compiler and executor, the Extended Control Language (ECL) is based on PL/I and permits using MPSX/370 within complex applications and coding more sophisticated algorithms. Direct communication between control program and MPSX/370 data and results is provided for this purpose.

The optional MIP/370 feature of MPSX/370 (described below) solves mixed integer linear programming problems, linear programming problems in which designated variables must take integral values. It uses a "branch and bound" method. Numerous control options are present and a specific method is used for "Special Ordered Sets".

The Matrix Generator and Report Writer (MGRW) (5734-XMC) is an existing program product whose Version 1 Modification Level 2 and subsequent releases are designed to operate under MPSX/370 OS/VS. It is a language which provides MPSX/370 users with facilities to build models, to analyze the results, and to produce reports in a meaningful format.

MPSX/370 and its MIP/370 feature are designed to operate under OS/VS, DOS/VS, DOS/VSE and VM/370 with CMS. Terminal communication to monitor MPSX/370 runs can be achieved through the use of OS/VS2 TSO and VM/370 with CMS.

MPSX capabilities not supported by MPSX/370 are: the Generalized Upper Bounding (GUB) feature, input and output in communication format (READCOM/MARVEL), and input in non-MPSX format (TRANSLATE).

**HIGHLIGHTS**

**MPSX/370:**

- Program logic provides for a maximum of 16,383 rows and virtually an unlimited number of columns.
- State-of-the-art techniques provide increased performance over and greater numerical stability than MPSX:
  - New high performance INVERT procedure.
  - LU form of the inverse formed in INVERT and maintained in optimization.
  - Devex method as option for the choice of the incoming vector.
  - Automatic adjustment of multiple pricing and cycling.
  - Dynamic adjustment of tolerances.
  - Automatic detection and correction of degeneracy.
  - Dynamic storage allocation and improved data organization.
- Two control languages are available:
  - MPSCL, specific to MPSX/370, contains its own compiler and executor and provides easy control of straightforward optimization. (MPSCL was the control language of MPSX and MPS/360).

- ECL, a new control language based on PL/I, is designed to provide an interface for MPSX/370 and user programs other program products, and data bases through the use of DL/I. ECL also affords the possibility of building recursive applications through use of its facilities to store matrix data (INQUIRE) and optimization results (SOLUTION, RANGE, TRANCOL, TRANROW) into ECL arrays and to use ECL structures, to revise the problem file, to modify the work-matrix, and to insert a starting solution taken from data stored into ECL structures (REVISE, MODIFY, INSERT, FORCE). Using ECL, new algorithms can be built by calling internal computational routines (e.g., FTRAN, CHUZR) and accessing internal MPSX/370 arrays. (Users should consider PL/I array size limitations.)

- The OS/VS, VM/370 and DOS/VS versions are fully compatible with each other.
- Optimization can be monitored from a terminal using OS/VS2 TSO and VM/370.
- A primer is provided to help the beginner use MPSX/370.
- Many MPSX capabilities have been enhanced in MPSX/370:
  - Improved problem file organization, with provision for automatic protection of filed items.
  - Additional free input data format.
  - Optional user control of storage allocation.
  - A new INSERT procedure, making specification of outgoing variables unnecessary. INSERT has new options that handle insertion of a solution into a revised problem, a reduced problem, or a multiblock problem solved by block.
  - FORCE, a new procedure to improve a starting basis or perform postoptimal analysis.
  - INQUIRE and MODIFY, new procedures that inquire and modify the matrix.
- MPSX/370 and MIP/370 facilities compatible with MPSX and MPSX/MIP include:
  - MPSX control language compatible
  - Input data compatible
  - Output files - Standard format
- MPSRG, a former IBM Type 2 program, an easy-to-use report generator language is part of MPSX/370.
- The MPSX features that have been deleted from MPSX/370 are: communication format I/O (READCOM/MARVEL), the Generalized Upper Bounding (GUB) feature, and input in non-MPSX format (TRANSLATE).

**MIP/370**

All improvements to MPSX/370 apply equally to MIP/370 (high performance, the new control language ECL, full compatibility of DOS/VS, OS/VS and VM/370 versions, monitoring through OS/VS2 TSO, and VM/370, primer). Highlights specific to MIP/370 are:

- The "branch and bound" method has been improved, increasing its performance over that of MIP "branch and bound". Among the improvements are:
  - LU form of the inverse in MIXFLOW.
  - New strategies and choice criteria.
  - A specific algorithm for Special Ordered Sets (Special Ordered Sets are rows expressing that the sum of a set of bivalent variables (0-1 variables) must be equal to 1; such rows are frequent in decision models).
  - Improved organization of data.
- Program logic provides for a maximum of 32767 integer variables and Special Ordered Sets. (However, a realistic limit is very much smaller and is dependent on problem type and structure).
- Comprehensive facilities are provided to control the search for integer solutions, limit the search according to user criteria, and study multi-block models using a stagewise strategy.
- Full control of the printed output has been provided.

**USE**

MPSX/370 is made of a set of procedures, each of them performing a specific function such as input data conversion, building of a starting solution, primal optimization, solution editing, etc. MIP/370 is an

PROGRAM PRODUCTS

MPSX/370 and MIP/370 (cont'd)

additional optional set of procedures. MPSX/370 and MIP/370 procedures may be called from a user control program, a sequence of operations used to solve a given mathematical programming problem. Processing of an MPSX/370 problem is performed in two job steps. The first job step invokes a compiler to compile the user control program. The second job step is the execution of the compiled user control program. The compiler and executor for the MPS control language (MPSC) are contained in MPSX/370. For the extended control language (ECL), the PL/I Optimizing or Checkout compiler must be used.

CUSTOMER RESPONSIBILITIES

The customer must have a knowledge of mathematical programming to construct a mathematical model of the process he wishes to study or optimize.

To use MPSX/370 to optimize or study the model, the customer must formulate the model information as input data to MPSX/370, write an MPSX or ECL control program to perform the desired optimization calculations, and execute the control program.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

MPSX/370 under DOS/VS or DOS/VSE:

The minimum machine configuration to install, execute, and support MPSX/370 and its optional MIP/370 feature under DOS/VS or DOS/VSE is:

- Minimum operating system real storage requirements.
- Universal instruction set.
- At least 132 print positions, when the system output is a printer.

On S/370, MPSX/370 DOS/VS operates under under DOS/VS or DOS/VSE. On 4300 processors, MPSX/370 DOS/VS operates under DOS/VSE. It has been designed to operate under DOS/VSE with the Program Product VSE/Advanced Functions.

MPSX/370 under OS/VS

The minimum machine configuration to install, execute, and support MPSX/370 and its optional MIP/370 feature under OS/VS is:

- Minimum operating system real storage requirements.
- Universal instruction set.
- At least 132 print positions, when the system output is a printer.

On S/370s or 303X processors, MPSX/370 (OS/VS and VM/370 with CMS) operates under OS/VS1 or OS/VS2. On 4300 processors, MPSX/370 (OS/VS and VM/370 with CMS) operates under OS/VS1 Release 7 and subsequent releases unless otherwise identified.

MPSX/370 under VM/370 with CMS

The minimum virtual machine configuration to install, execute, and support MPSX/370 and its optional MIP feature under VM/370 is:

- MPSX/370 alone: CMS virtual machine with 700K storage (MPSC) or 850K (ECL) and mini-disk space equivalent to 6 cylinders of a 3330 disk or 3000 512-byte blocks of an FBA device.
- MPSX/370 with MIP/370: CMS virtual machine with 800K storage (MPSC) or 950K (ECL) and mini-disk space equivalent to 8 cylinders of a 3330 disk or 4000 512-byte blocks of an FBA device.

If the system output is a printer, it must have at least 132 print positions.

On S/370s or 303X processors, MPSX (OS/VS and VM/370 with CMS) operates under the control of CMS which in turn operates under the control of VM/370.

On 4300 processors, MPSX/370 (OS/VS and VM/370 with CMS) operates under the control of CMS which in turn operates under the control of VM/370 Release 6 and subsequent releases unless otherwise identified. MPSX/370 has been designed to operate under VM/370 with either the Program Product VM/BSE Release 2 or the Program Product VM/System Extensions Release 2, and their subsequent releases unless otherwise identified.

Address Space Requirements (DOS/VS, OS/VS and VM/370)

Compilation

For an MPSC Program, execution of DPLCOMP requires 128K. For an ECL Program, executed by a PL/I compiler, an estimate of minimum virtual region size is given in:

- OS PL/I Optimizing Compiler, Programmer's Guide, SC33-0006
- OS PL/I Checkout Compiler, Programmer's Guide, SC33-0007-01
- PL/I Optimizing Compiler, Programmer's Guide, SC33-0008-02

Execution

The minimum address space required to execute a control program is:

$$O + P + D + E$$

where:

- O is the size of the MPSX/370 system and procedures.
  - O = 300K under DOS/VS or OS/VS
  - O = 360K under VM/370 without the MIP/370 feature.
  - O = 450K under VM/370 with the MIP/370 feature.
- P is the size of the ECL program, if any.
- E is non-zero only if n MPSX/370 internal files are located on FBA devices under DOS/VSE. The value of E is: n x 8K.
- D is the address space for problem data.

The address space D required for problem data depends mainly on the number of rows and integer variables of the problem, although the number of columns and non-zero elements have secondary impacts on storage requirements. Figure 1 gives D with respect to number of rows and number of integer variables:

Rows	LP Problem with No Integer Variables		LP Problem with i Integer Variables where i is the Number of Integer Variables plus the Number of SOS	
	Minimum	Designed Norm	Minimum	Designed Norm
200	35,000	70,000/ 97,000	45,000 + 87i	80,000 +100i/ 107,000 +200i
500	55,000	140,000/ 228,000	67,000 +87i	152,000 +100i/ 240,000 +200i
800	75,000	219,000/ 358,000	89,000 +87i	233,000 +100i/ 372,000 +200i
1,200	102,000	323,000/ 532,000	119,000 +87i	340,000 +100i/ 550,000 +200i
1,600	128,000	416,000/ 700,000	148,000 +87i	436,000 +100i/ 720,000 +200i
2,000	156,000	500,000/ 880,000	179,000 +87i	523,000 +100i/ 903,000 +200i
3,000	222,000	720,000/ 1,300,000	253,000 +87i	750,000 +100i/ 1,330,000 +200i
4,000	290,000	930,000/ 1,750,000	330,000 +87i	970,000 +100i/ 1,800,000 +200i
6,000	424,000	1,360,000/ 2,600,000	477,000 +87i	1,400,000 +100i/ 2,650,000 +200i
8,000	558,000	1,800,000/ 3,500,000	630,000 +87i	1,900,000 +100i/ 3,600,000 +200i
10,000	692,000	2,200,000/ 4,350,000	780,000 +87i	2,300,000 +100i/ 4,450,000 +200i
16,000	1,100,000	3,500,000/ 7,000,000	1,230,000 +87i	3,600,000 +100i/ 7,100,000 +200i

- Designed Norm gives an estimate of the range of address space for problem data recommended for the specified problem size. The first amount implies an acceptable proportion of I/O operations: the second amount implies no or very low proportion of I/O.
- Minimum gives an estimate of the minimum address space for problem data required for the specified problem. It entails a high I/O rate.
- Choice of a virtual region size to optimize a problem should be done according to these estimates plus real storage availability.

Files (DOS/VS and OS/VS):

MPSX/370 requires approximately two cylinders on a 3330 or an equivalent amount of space on other direct access storage devices for the system residence file. MIP/370 requires additional direct access space of approximately ten tracks on a 3330 or the equivalent on other devices.

During execution, MPSX/370 requires a minimum number of utility files for permanent and temporary data storage. However, if a set of optional files is available and is specified by the user, it can be used by the system for greater flexibility and more efficient problem solution. The amount of space they require depends on the size of the problem. A rough estimate of the space required can be obtained by using the formula 1,000,000 + 100e bytes where e is the number of non-zero elements of the problem.



PROGRAM PRODUCTS

**MPSX/370 and MIP/370 (cont'd)**

**SOFTWARE REQUIREMENTS**

MPSX/370 and MIP/370 are written in Assembler. Both operate on S/370 virtual storage configurations in virtual mode, under the current release of DOS/VS, DOS/VSE, OS/VS1 and OS/VS2, which themselves can operate under control of VM/370. MPSX/370 and MIP/370 use the SAM data management facilities of DOS/VS and the BSAM and BDAM data management facilities of OS/VS and VM/370. Terminal monitoring of MPSX/370 runs is possible under the control of OS/VS2 TSO and VM/370.

The following program products are prerequisites for using the extended control language:

Program Product	DOS/VS	OS/VS
PL/I Resident Library	5736-LM4	5734-LM4
PL/I Transient Library	5736-LM5	5734-LM5
PL/I Optimizing Compiler	5736-PLi	5734-PLi

Under OS/VS or VM/370 with CMS, the PL/I Checkout Compiler (5734-PL2) can replace both the PL/I Optimizing Compiler and the PL/I Transient Library, in particular when monitoring an ECL control program in interactive mode from a terminal. MPSX/370 is a prerequisite for using MIP/370.

**DOCUMENTATION:** (available from Mechanicsburg)

IBM Mathematical Programming System Extended/370 (MPSX/370).

*Program Product Specifications* (GH19-1093) ... *General Information* (GH19-1090) ... *Primer* (GH19-1091).

**RPQs ACCEPTED:** No



PROGRAM PRODUCTS

**PROJECT ANALYSIS AND CONTROL SYSTEM  
PROJACS DOS/V5 (5746-XP1)  
PROJACS OS/V5 (5740-XP1)**

**DESCRIPTION**

PROJACS is a set of programs designed to aid management fulfill its responsibilities in the planning and controlling of projects using the critical path method.

The effective management of a complex project involves the following aspects: Determining the tasks which are to be performed, planning and supervising their execution and controlling the use of resources such as men, machines, material and money.

PROJACS is a modular tool for helping management carry out these functions. It consists of a Main Processor and three optional features: The Resource Allocation Processor, the Cost Evaluation Processor and the Network Preparation Processor.

The functions of the Main Processor are: Generation and updating of networks, time analysis of a network by the critical path method, output of reports and the supervision of the other processors. The Resource Allocation Processor (optional feature) provides schedules based on resource availability. The Cost Evaluation Processor (optional feature) computes costs and summarizes them with respect to functional subdivision of the project. The Network Preparation Processor (optional feature) facilitates network generation and updating by means of standard module library management and a network drawing capability.

**HIGHLIGHTS**

**Main Processor**

- Modularity.
- Flexibility of program control through use of control statements.
- Eight calendars and eight work weeks.
- Direct access Master File containing up to 500 networks.
- Each network may contain up to 100 subnets.
- Up to 5,000 activities per subnet and 15,000 per network.
- PERT/CPM and Precedence notations.
- Parallel interfacing of subnets within a network.
- Four types of precedence relationships with positive or negative lags.
- Multiple starts and ends.
- Five types of scheduled dates.
- Nine milestone levels.
- Four organization tables, each one being a five-level tree structure.
- Progress Reporting.
- Timenow date and backwards computation.
- Ability to freeze dates and floats for comparison with further computations.
- Flexible report generation: Activity selection, sorting options and report formatting.

**Resource Allocation Processor**

- Fixed-time or fixed-resource scheduling of multiple projects.
- Used-by-job and carried forward resources.
- Dated and cyclic changes for resource availabilities.
- Operation concept allowing variable resource requirements for an activity.
- Resource Generation.
- Replacement of an operation by an alternate one.
- Allocation of up to 50 resources.

**Cost Evaluation Processor**

- Computation of direct costs based on resource requirements and resource rates.
- Two types of resource rates: Normal and overtime.
- Resource rates varying with time.
- Overhead costs and budgets defined for organization table entries.
- Costs summarization by time periods and organization table entries.

**Network Preparation Processor**

- Concept of standard module which is a subnet used in several networks.

- Possibility of cataloging up to 100 standard modules in the Standard Module Library and retrieving them for inclusion into new networks.
- Ability to draw a network or some parts of it on the printer.

PROJACS is designed as a replacement product for PCS/360 customers since most of the highlights are improvements over PCS/360, and a conversion program is provided to facilitate the migration of PCS/360 customers to PROJACS. This program is distributed with the Main Processor and produces a deck of cards in PROJACS format for any network stored in the PCS/360 Permanent Storage File.

**USE**

The Main Processor can be used without any of its optional features. The other processors can be used independently of each other, but they always require the Main Processor. The Cost Evaluation Processor may use results from the Resource Allocation Processor.

**CUSTOMER RESPONSIBILITIES**

Current users of PCS/360 should convert their networks into PROJACS data format using the conversion program. All users must be familiar with the fundamentals of the critical path techniques and learn the particular features of this system. Tailoring of output reports to user requirements necessitates preparation of the most frequently used reports and, in certain cases, translation of headings before actual use of the program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**PROJACS DOS/V5:**

The minimum machine configuration to install, execute and support PROJACS DOS/V5 in addition to DOS/V5 requirements:

- IBM S/370 (96K bytes) with the floating point feature.
- One direct access storage device (2314/2319, 3330 or 3340).
- One card reader.

The program requires an address space of 400K bytes.

The direct access storage space needed depends on the application size. For most applications, a direct access storage space of 10M bytes is sufficient.

**PROJACS OS/V5:**

The minimum machine configuration to install, execute and support PROJACS OS/V5 is:

- IBM S/370 mdl 135 (144K bytes) with the floating point feature.
- I/O units as required by OS/V5.
- One Direct Access Storage Device in addition to OS/V5 requirements.

The program requires an address space of 600 bytes.

The direct access storage space needed depends on the application size. For most applications, a direct access storage space of 10M bytes is sufficient.

**SOFTWARE REQUIREMENTS**

PROJACS is mainly written in PL/I with a few routines in Assembler. It operates on S/370 Virtual Storage configurations in virtual mode under DOS/V5, OS/V51 and OS/V52 and under DOS/V5, OS/V51 and OS/V52 executing under VM/370. It uses SAM and DAM data management facilities.

**PROJACS DOS/V5:**

The following program products are prerequisites for execution of the program:

- DOS PL/I Transient Library (5736-LM5)
- DOS/V5 Sort/Merge (5746-SM1)

Note: If 3330 or 3340 DASD support is not required, DOS Sort/Merge (5743-SM1) can be used or if only 2314/2319 direct access facilities are used, the DOS tape and disk Sort/Merge (360N-SM-483) can be used.

The DOS PL/I Resident Library (5736-LM4) is also required for installing and servicing the program.

The DOS PL/I Optimizing Library (5736-PL1) is required to compile the source modules.



PROGRAM PRODUCTS

**PROJACS (cont'd)**

**PROJACS OS/VS:**

The following program products are prerequisites for execution of the program:

- OS PL/I Transient Library (5734-LM5).
- OS/VS Sort/Merge (5740-SM1) or OS Sort/Merge (5734-SM1).

**Note:** The OS/VS Sort/Merge provides additional features and improved performance over OS Sort/Merge and is required for 3330 mdl 11 or 3340 DASD support.

The OS PL/I Resident Library (5734-LM4) is also required to install and support the program.

The OS PL/I Optimizing Compiler (5734-PL1) is required to compile the source modules.

**DOCUMENTATION :** (available from Mechanicsburg)

*Program Product Specifications* (GH19-1083) ... *General Information Manual* (GH19-1055).

## HIERARCHICAL STORAGE MANAGER (HSM) RELEASE 3.2 (5740-XRB)

### PURPOSE

Hierarchical Storage Manager provides value to customers by helping them to manage DASD space efficiently in Total Storage Management environments. Critical online DASD storage is optimized for new applications when HSM moves inactive data to secondary storage. Applications are isolated from secondary storage containing inactive migrated and backed-up data because application programs access primary online DASD only. People resources are made available for application development as HSM automatically performs space management and incremental backup functions. Critical DASD space becomes available for new users and the growth of their new applications.

### SPECIAL SALES INFORMATION

In addition to the benefits provided by the space and availability management functions described above, consider the advantages offered by key HSM functions described here.

ISPF panels for HSM space maintenance is a data-set-oriented function which provides end-users with online capability to easily manage their own data without having to review periodic data center reports.

The DASD conversion function can reduce your customer's installation workload by 'moving' HSM-supported data from one DASD volume device type to the same or different volume device type, such as the 3380 and 3375. In addition, HSM will automatically reblock physical sequential data sets on the initial 'move' to the 3380 and 3375 if the SETSYS CONVERSION option is chosen.

The data compaction option can save HSM-owned space on secondary storage devices. IBM internal accounts that are using HSM have documented an average byte compaction ratio of approximately 2 during migration, which translates into an average space saving of 50%.

The average storage space saving that can be attained in a given environment for new applications is dependent on the total number, size, type and content of the data sets selected, the devices used, and the functions enabled for compaction. HSM will use additional CPU resources when data sets are compacted and decompact.

HSM supports the 3380, 3375, 3350 and 3330 Direct Access Storage, and MSS devices for all space and backup management functions, and the 3420 Tape Subsystem for the retirement and backup management functions. A combination of compacted real DASD as Migration Level 1 volumes, and virtual DASD as Migration Level 2 volumes, provides an attractive price/performance space management combination for large HSM configurations.

### DESCRIPTION

Data set movement within the hierarchy is automatically initiated by HSM in batch and interactive environments based upon installation parameters and data set references. HSM provides a device-independent link between HSM-managed primary and secondary devices by managing them as a hierarchy to store subsequent user data such as HSM migration and backup data.

HSM automatic functions are supplemented by command functions which users can execute from their terminals. End-user commands can be executed from ISPF panels for HSM.

HSM executes as a continuously-running task with MVS/XA, MVS/370, or with MVS/XA and MVS/370 in multithost environments. HSM operates below the 16 megabyte line under MVS/XA. User-written HSM exit algorithms that will be used in MVS/XA environments must be link-edited to remain below the 16 megabyte line.

HSM space management provides three major daily space management functions:

- **Data Set Migration:** The migration function can be used to move inactive data sets from a primary volume with the migrate attribute to a DASD or virtual migration volume, or from migration level 1 volumes to migration level 2 volumes. A minimum migration age may be user-specified for each primary volume.
- **Data Set Deletion:** The deletion function with a specified inactive age criterion can be used to automatically scratch inactive data sets from primary volumes with the delete-by-age attribute. In addition, an HSM volume command can be issued to scratch inactive data sets from migration volumes, from non-HSM-managed volumes, and from any primary volume. The command function can also be used to supplement the automatic function performed on a primary volume.
- **Data Set Retirement:** The retirement function can automatically scratch inactive data sets on primary volumes with the delete-if-backed-up attribute if the backup function has created current backup copies. The backup and retirement functions jointly provide HSM with the capability to retire, automatically or by command, inactive data sets from primary volumes to tape, DASD, or mass storage volumes. In addition, an HSM volume command can be

issued to retire inactive data sets from migration volumes, from non-HSM-managed volumes, and from any primary volume. The command function can also be used to supplement the automatic space management function specified for a primary volume.

HSM space management process also provides:

- **Data Set Recall:** The recall function can automatically move the migrated data sets to a primary volume when they are referenced. Recall is a multitask function.
- **Related Functions:** The related functions include extent reduction for non-VSAM data sets, compression of partitioned data sets, small-data-set-packing on migration level 1 volumes, and scratching of list and utility data sets. HSM moves only used space for sequential and partitioned data sets.

HSM availability management provides options such as the days on which backup will run, the number of days between consecutive backups of a data set, the number of versions to be retained, and the time of day when backup will run. HSM availability management also provides:

- **Data Set Backup:** HSM provides multitask incremental backup for a maximum of 15 volume backup tasks, with a default of two. Each customer should determine the number of concurrent volume backup tasks that is practical in his environment. Changed data sets on primary volumes can be copied to tape, DASD, or mass storage backup volumes, automatically or by command. Changed and unchanged data sets on a volume can be backed up by command.
- **Data Set Recovery:** Recovery is the process of explicitly restoring a backup version of one or all the data sets that were on a primary volume to the same or a different primary volume by an explicit command. The data set recovery command is also used to return a retired data set back to a DASD volume. In addition, HSM can be used to supplement a volume restore utility. For example, a primary volume can be restored to the level of a weekly volume dump tape created by Data Facility Data Set Services (5740-UT3), and then restored to the current day level by using HSM.

By providing data-set-oriented Interactive System Productivity Facility (ISPF) panels, HSM gives end-users the capability to easily review the status of all or a subset of their cataloged data. On an exception basis, they may use the ISPF panels to delete their primary and HSM-migrated data sets (and optionally any HSM backup copies), condense, backup, migrate, recall, and recover their data, and alter the backup frequency and number of backup versions retained by HSM. HSM space maintenance for data sets provides:

- ISPF panels for the display of data set status and detail information.
- Space maintenance commands with defaults for ease of use in executing data set administrative tasks from the ISPF panels.
- Tutorial ISPF panels for user guidance in doing HSM space maintenance.
- Optional parameter entry ISPF panels for experienced end-users to enter any command keyword.

The data compaction option can save significant storage space in HSM environments. The compacted data can reside on DASD, tape (backup and retired data sets only), and mass storage volumes in HSM-owned space. HSM data compaction:

- Is transparent to user and application programs, and occurs during automatic, command, volume, and data set functions, and
- Is enabled by SETSYS command to compact data sets during migration, backup-to-DASD, backup-to-tape, all, or none (default).
- Uses a Huffman frequency-encoding algorithm to compact data only as data sets are moved or copied from a primary or from a non-HSM controlled volume.
- Has optional tables tailored to compact source, object, and general (default) data sets as specified.
- Has enhanced user exits for user-written algorithms to approve or disapprove compaction of eligible data sets during volume migration and backup.
- Automatically decompacts data sets during recall and recover operations, even with the option disabled for all functions.

Other HSM functions and capabilities include:

- **DASD Conversion:** An HSM-authorized administrator can 'move' HSM-supported data from one DASD volume device type to the same or different volume device type. This function is designed to make it easier to convert current HSM-supported DASD to the 3380 and 3375 DASD.

## HSM R3.2 (cont'd)

- **Batch and TSO Support:** HSM space management and backup processes support both batch and TSO environments.
- **Multihost Support:** HSM can be active on more than one host in a multihost environment, and must be available on all hosts in a JES3 environment. HSM-managed volumes and control data sets must be on sharable units if more than one host requires access to the data.
- **Reblocking:** An optional conversion aid that automatically reblocks migrated data sets from non-3380 and non-3375 volumes when they are initially recalled to 3380 or 3375 volumes.
- **Tape Backup:** Backup of primary volumes to tape daily backup volumes. Tape or DASD spill backup volumes can be specified if the daily backup volumes are DASD.
- **Tape Backup Volume Control:** This function selects, assigns, and recycles the HSM tape backup volumes. Recycling is by command, or is automatic if all of the versions on a tape have been superseded.
- **User Exits:** HSM provides information to several optional user exits which permit user-written algorithms to approve, disapprove, selectively control reblocking, change certain HSM selections, and invoke functions related to HSM.
- **Control Data Sets:** HSM uses migration, backup, and offline control data sets to manage the data sets in the HSM-owned space on migration and backup volumes.
- **3850 Mass Storage System:** MSS provides low-cost-per-megabyte data storage frame models to store migrated, backed-up, and retired batch and TSO data sets managed by HSM for subsequent use.
- **Integrity:** A command is provided to initiate reconstruction of up-to-date HSM control data sets from backup versions and journal records.
- **Additional User Capabilities:** Commands are provided to determine HSM status, change parameter settings, specify JES3 presence, and determine the utilization status of the journal and control data sets.
- **Devices Supported:** 3380, 3375, 3350, 3330 mdls 1 and 11 and the 3850 Mass Storage System for primary, migration, and backup volumes, and the 3420 (9-track) for backup volumes.
- **Access Methods:** SAM, PAM, movable DAM, and VSAM data sets are supported by HSM.
- **Coexistence:** The HSM data compaction option in Release 3.1 must not be enabled in a multihost environment until it is installed on all hosts, otherwise a Release 3.0 host could attempt to recall a compacted data set and destroy it.  
HSM Release 3.2 can coexist with HSM Release 3.1 in a multihost environment.  
See the *OS/VS2 MVS Hierarchical Storage Manager System Programmer's Reference and Operations Guide* (SH35-0023) for other guidelines and restrictions that may apply to a multihost coexistence environment.
- **RACF Support:** HSM interfaces with RACF for data set protection.
- **JES3 Support:** HSM space management and backup processes support data sets in a JES3 environment where SETUP is used.

### CUSTOMER RESPONSIBILITIES

The HSM installation consideration details documented in the *OS/VS2 MVS Hierarchical Storage Manager System Programmer's Reference and Operations Guide* (SH35-0023) include most of the following items:

- Order the HSM Independent Study Program.
- Request a review of the HSM Preventive Service Planning (PSP) information.
- Develop an HSM installation plan.
- Install the prerequisite SCP code, and functional prerequisites for HSM.
- Install HSM Release 3.0, 3.1 and 3.2 on one HSM host.
- Define the HSM migration, backup, and offline control data sets.
- Define the required and optional HSM parameters.
- Allocate the HSM log, the journal data set, the small-data-set packing data sets, and backup copies of the control data sets.
- Identify volumes to be specified as primary for space management and backup functions.
- Identify volumes to be used for migration and backup data.
- Create VATLIST entries if desired.

- Set up a procedure for starting HSM.
- Set up a procedure to maintain backup copies of HSM control data sets.
- Set up a procedure for dumping and printing log data sets.
- Set up TSO and TSO/E HELP members.
- Link-edit any user-written exit routines.
- Set up a SYS1.PARMLIB member for HSM parameters.
- Identify to HSM if JES3 is used.
- Ensure consistency of HSM/JES3 pool definition and recall option across processors.
- Execute single host test plan prior to multihost test and production.
- Install HSM Releases 3.0, 3.1 and 3.2 on all HSM hosts.
- Install HSM Data Compaction Option (3.1) on all hosts, and test prior to production.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

HSM is designed to operate on IBM processors which are supported by JES2 and JES3, under MVS/System Product Version 2 (MVS/XA), MVS/System Product (MVS/SP) Version 1, MVS/System Extensions (MVS/SE), and OS/VS2 (MVS) Release 3.8, as specified under "Software Requirements".

The supported storage devices include the IBM 3380, 3375, 3350, 3330 mdls 1 and 11, and the 3850 for primary, migration and backup volumes, and the IBM 3420 Tape (9-track) for backup volumes.

#### SOFTWARE REQUIREMENTS

HSM operates with JES2 and JES3 under MVS/XA and MVS/370 as specified below:

The functional prerequisites for HSM with MVS/XA are as follows:

- **JES2:** JES2 component of MVS/SP-JES2 2.1.0 (5740-XC6) or subsequent release.
- **JES3:** JES3 component of MVS/SP-JES3 2.1.0 (5665-291) or subsequent release.
- **RACF:** RACF Release 4 (5740-XXH) or subsequent release.
- **ISPF panels for HSM space maintenance:** HSM Release 3.1 (5740-XRB) and ISPF Release 1.1 (5668-960) or subsequent release. The BROWSE command requires ISPF/PDF MVS Release 1.1 (5668-268) or subsequent release.

The functional prerequisites for HSM with MVS/370 (MVS/SP, MVS/SE and MVS 3.8) are as follows:

- **JES2:** JES2 component of MVS/SP-JES2 1.1.0 (5740-XY5), or JES2 Release 4.1, an integral part of OS/VS2, 5752-VS2, (optionally with 3800 Enhancements); or NJE for JES2, 5740-XRB, (optionally with NJE for JES2 3800 Enhancements).
- **JES3:** JES3 component of MVS/SP-JES3 1.1.0 (5740-XYN), or JES3 Release 3 selectable unit with OS/VS2, 5752-VS2 (optionally with JES3 3800 Enhancements, and JES3 Networking PRPO, 5799-AZT).
- **3800 or 3375 Devices:** MVS/370 DFP Release 1 (5665-295) or subsequent release, or DFDS (5740-AM7).
- **RACF:** RACF Release 4 (5740-XXH) or subsequent release.
- **HSM space management of VSAM data sets:** MVS/370 DFP Release 1 (5665-295) or subsequent release, or DFEF (5740-XYQ).
- **ISPF panels for HSM space maintenance:** HSM Release 3.1 (5740-XRB) and ISPF Release 1.1 (5668-960) or subsequent release. The BROWSE command requires ISPF/PDF MVS Release 1.1 (5668-268) or subsequent release.

**Storage Requirements:** The private HSM virtual address space recommended to use all Release 3.2 functions is 3 megabytes.

**Customer Education:** A self-study course, Hierarchical Storage Manager Implementation for MVS (32905), consisting of two video cassettes and associated texts, is available from Science Research Associates (SRA). The self-study course does not include the HSM Release 3.2.

### INSTALLATION INFORMATION

Customers planning to install HSM should request their IBM programming support or support center representative to review the HSM Preventive Service Planning (PSP) information.



PROGRAM PRODUCTS

**HSM R3.2 (cont'd)**

The HSM basic materials tape shipped from the IBM program library contains the service updated Releases 3.0 (base) and 3.1 (incremental addition), and the new Release 3.2 (incremental addition).

Release 3.0 contains the base HSM functions. Release 3.1 contains the data compaction option, usability improvements, and changes required for HSM operation with MVS/XA. Release 3.1 enhancements contain the DASD conversion, performance improvements, minimum age by volume, and 'SYSx.' space management, initially shipped on PUT tape 83-01 (APAR OZ64320), which will be integrated into the Release 3.1 incremental addition on a subsequent HSM service update. Release 3.2 contains the ISPF panels for HSM space maintenance.

HSM Release 3.1 (5740-XRB) and ISPF Release 1.1 (5668-960) are installation prerequisites for HSM Release 3.2. The BROWSE command requires ISPF/PDF MVS Release 1.1 (5665-268).

Release 3.2 must be installed on a Release 3.0/3.1 (any Release 3.1 level) base by SMP4 or SMP/E as described in the HSM Program Directory. HSM Releases 3.0 and 3.1 may be installed by SMP4, SMP/E or SYSGEN.

HSM supports SAM, PAM, movable DAM, and VSAM-type data sets.

**DATA SECURITY, AUDITABILITY and CONTROL**

HSM complies with and conforms to the data security and auditability controls of MVS/XA or MVS/370 environments. If RACF is available, HSM will invoke that licensed program to provide and maintain RACF user data set protection. Customer management is responsible for the selection, application and adequacy of those controls.

**DOCUMENTATION**  
(available from Mechanicsburg)

*OS/VS2 MVS Hierarchical Storage Manager General Information* (GH35-0007).

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No.



## PROGRAM PRODUCTS

**STORAGE AND INFORMATION RETRIEVAL SYSTEM/  
VIRTUAL STORAGE (STAIRS/VS)  
OS/VS (5740-XR1)****PURPOSE**

The conventional method for indexing documents in a specialized information system or a library has been fatiguing and cumbersome work for specialists. Today, documents, articles from periodical magazines, patent texts, and their abstracts, can be converted into machine-readable form for entry into a computer system.

Once entered, the material can be used during subsequent searches, using the language of the technical area involved, to retrieve the desired documents.

The full texts, or their associated bibliographic identifiers (such as title, author, publisher, and source), make up a dynamically growing file of data which can be searched by specialists in law, engineering, medicine, sales, marketing, management, and other fields, to retrieve material of interest pertaining to their own spheres.

**DESCRIPTION**

The Storage And Information Retrieval System/Virtual Storage (STAIRS/VS) Release 4 is an enhancement of the current release (Release 3.0) of STAIRS/VS and will replace it.

In addition to the service corrections that have been incorporated into STAIRS/VS Release 4.0, the new release will have the following functional enhancements:

- **PRINT/MAIL Improvements**
  - The Print/MAIL commands will support additional (optional) parameters, such as:
    - End-user information (address or others) listed at print time
    - Comment line
    - Display of all PRINT/MAIL requests of the terminal session
    - Cancellation and reactivation of PRINT/MAIL requests during the terminal session
  - Confirmation of a print request is forced, if a certain (data base-defined) number of documents is exceeded.
- **SAVE/EXEC Improvements**
  - Displaying the names of saved profiles
  - Displaying the queries of a saved profile
  - SDI (Selective Dissemination of Information) function for saved profiles
- **SIGN-ON/OFF and Other Improvements**
  - News function
  - Status display after use of the command CHANGE, at sign-off, and on request, containing user and data base name, time of day, session time, and accounting information
  - The command EDIT allows the user to edit a saved query profile without execution

STAIRS/VS is a terminal-oriented multi-user dialog system for the storage and retrieval of information, which also allows for batch processing. It offers the user a variety of resources for data base creation and maintenance and, especially, for data base searching and display and/or printing of documents and/or formatted data.

STAIRS/VS operates under the IBM operating systems OS/VS1 Release 7.0 and OS/VS2 MVS Release 3.8 and MVS/SP Version 1 Release 3.0 (collectively referred to as OS/VS) or subsequent releases unless otherwise identified.

For data communication, STAIRS/VS uses the facilities of the IBM S/370 Customer Information Control System/Virtual Storage (CICS/VS) Version 1, Program Number 5740-XX1, Release 5 or the IBM Information Management System/Virtual Storage (IMS/VS) Version 1, Program Number 5740-XX2, Release 1.6 (OS/VS1) or Release 2 (OS/VS2 MVS) or subsequent releases of both systems unless otherwise identified.

Device-dependent message-formatting routines are provided by STAIRS/VS for the IBM 3270 Information Display System (display units with screens of 24, 32 or 43 lines that are 80 characters wide, and associated printers), for the IBM 2740 and 2741 Communication Terminals, and for 'batch' simulated terminals (combination of an input and an output data set). While all of the above terminals are supported by STAIRS/VS under CICS/VS, the IBM 2741 and the IBM 2740 without the Station Control feature are not supported by STAIRS/VS under IMS/VS; this is because they are supported by IMS/VS as response terminals only.

**HIGHLIGHTS**

Documents can be searched and retrieved with a highly flexible form of dialog in which previous queries can be extended or referred to. Query

formulation varies from everyday language to mathematical formulation in terms of:

- Boolean and context logic for the document text and/or
- Comparison operators for the contents of formatted fields.

Query formulations can be saved for current or later use, a feature which serves as a 'current awareness profile' capability. There are two modes of saving queries: Either in a reserved area accessible only to the user who had saved the queries, or in a common pool accessible to any user of the installation. The saved queries can be displayed and modified online.

It is possible to add a user-written exit module (in Assembler or PL/I language) for user-specific processing of:

- SEARCH query prior to processing by STAIRS/VS, and/or
- The document list resulting from a retrieval step.

The contents of the formatted fields of the documents can be modified online. The modified fields are immediately available for the SELECT function. The documents that are presented as answers by the system can be ranked according to their probable relevance or they can be sorted according to the contents of a formatted field. Search and display can be restricted to a subset of paragraphs of the documents.

Documents viewed on display terminals can be paged forward and backward.

In an IBM 3270 display terminal, the keywords of a query, where appearing in the text, can be displayed with double intensity - if CICS/VS is used. The paging command P\* can be used to skip to the next page of the displayed document on which a word is highlighted.

There are two options for document highlighting. With global highlighting, all words from the query occurring in the displayed text are highlighted. With query highlighting, only those words in the displayed text are highlighted that match the logic of the query. With this option also synonyms of query-words are highlighted - if they match the query logic.

It is also possible to have those paragraphs displayed or printed automatically which contain query hits - even if they have not been specified for display.

Retrieved documents, or pages of them (when using a display terminal), can be copied immediately on a print-terminal (e.g., the IBM 3284 Printer). They can also be transmitted for later printing on a high-speed printer. Words from the queries can be underscored in the printed output. This function corresponds to highlighting of query words at IBM 3270 display terminals. Only global highlighting, however, is provided; all words from the queries are underscored regardless of the logic of the queries.

The number of data bases that can be handled online is limited only by the capacity of an OS/VS installation for DD-statements per job-step.

Up to sixteen different data bases of identical structure can be concatenated and searched by one query, as if they were a single data base. This holds for each subset of the sixteen data bases, thus providing the capability of retrospective search as well as current information selection.

Up to four data bases of identical structure can be merged to a single data base. This provides a possibility of reorganization for a (logical) data base consisting of concatenated (physical) data bases.

A retrieval dialog which has been interrupted by system or machine malfunction can be continued, after the system has been restarted, at any other terminal by means of the STAIRS/VS warm-start function. The data base restart/recovery facilities of IMS/VS are not effective for STAIRS/VS.

Facilities to help maintain the privacy and security of data bases are incorporated in the system. Security of data can be enhanced at data base, document, paragraph, and field levels by means of registered user names, passwords, and privacy codes.

When CICS is used, data bases may be created online and concatenated to existing ones so that the extended data bases can, subsequently, be used for retrieval with STAIRS/VS. The input for this online data base creation can be produced in the appropriate format by means of the IBM Advanced Text Management System (ATMS-III/OS/VS, Program Number 5740-XYL), which operates only under control of CICS/OS/VS.

Alternatively, the ATMS output for STAIRS/VS may be used as input for the Batch Data Base Creation program of STAIRS/VS. This program is of course also applicable to STAIRS/VS under control of IMS/VS. Input for batch data base creation in the same format can also be generated by the Document Composition Facility, Release 2 (5748-XX9) and the Distributed Office Support System/370 (5740-XY9).

## PROGRAM PRODUCTS

**STAIRS/VS (cont'd)****CUSTOMER RESPONSIBILITIES**

This section briefly discusses the activities to make STAIRS/VS operational; it gives a rough guideline for assessing the total installation effort. It is assumed that a system running under OS/VS with either CICS/VS or IMS/VS with the Data Communication Feature has already been installed.

The major implementation steps are:

- STAIRS/VS must be installed according to the installation description and the distribution tape.
- The required tables for CICS/VS or the control blocks for IMS/VS must be regenerated including the entries required for STAIRS/VS.
- The supplied sample data base can be accessed using the sample users to verify the installation.
- User registration records for the anticipated users of the system must be generated.
- Documents to be incorporated into the STAIRS/VS data base(s) must be edited according to the input specifications of the Data Base Creation programs. The data base(s) must be loaded and appropriate DSCBs generated. The users must be registered for the data base(s). The data base(s) must be included in the File Control Table, and DD cards for the data base data sets must be included in the Job Control of the online STAIRS/VS job and the Print utility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

For compilation and/or execution of STAIRS/VS, an IBM S/370, an IBM 3031, 3032, or 4300 Processor with a main storage capacity large enough to run IMS/VS or CICS/VS is required.

The additional storage required for STAIRS/VS may vary widely, depending on the number of active terminals and the used system:

- For STAIRS/VS under CICS/OS/VS  
120K bytes for the first terminal and 8K bytes for each additional active terminal in the CICS/VS region. If online data base creation is used, 125K bytes are required additionally: 60K bytes for the Online Data Base Creation program and 65K bytes for the Sort/Merge program.
- For STAIRS/VS under IMS/VS  
A batch message processing region with 200K bytes for the first terminal and 8K bytes for each additional active terminal.
- The batch Data Base Creation and Maintenance programs of STAIRS/VS require an address space of 128K bytes.

For the data bases and other STAIRS/VS data sets, the same devices are used as supported by OS/VS and CICS/VS.

One IBM nine-track magnetic tape device is required for the installation.

At least one 1920-character or larger IBM 3270 display station, attached to the appropriate control unit, or an IBM 2740 or IBM 2741 Communicating Terminal must be available. The Communicating Magnetic Card Selectric Typewriter mdl 6610 and the IBM Displaywriter System can be used as IBM 2741 terminals via switched lines, if CICS/OS/VS and BTAM are used. The IBM 2740 without the Station Control feature and the IBM 2741 are supported only if CICS/OS/VS is used.

**SOFTWARE REQUIREMENTS**

Most modules of STAIRS/VS are written in the IBM Assembler language and use the macro language facility. Some batch utilities are written in PL/I. All modules are distributed in both source and load module form. Thus, for the execution of the PL/I modules, only the PL/I Transient Library, Program Number 5734-LM5, is required. If a STAIRS/VS module written in PL/I is to be compiled (for APAR corrections, program modifications, or user-written exits), the PL/I Optimizing Compiler, Program Number 5734-PL/I, and the PL/I Resident Library, Program Number 5734-LM4, are also necessary. For data base creation, the OS/VS Sort/Merge, Program Number 5740-SM1, is used. If online data base creation under CICS/OS/VS is used, ATMS-III/OS/VS, Program Number 5740-XYL, is needed.

STAIRS/VS is designed for an online OS/VS environment and requires the following programs:

- OS/VS1 Release 7.0 or OS/VS2 MVS Release 3.8 or MVS/SP Version 1, Release 3.0.
- CICS/OS/VS Version 1, Program Number 5740-XX1, Release 5 or IMS/VS Version 1, Program Number 5740-XX2, Release 1.6 (OS/VS1) or Release 2.0 (OS/VS2 MVS) with the Data Communication feature.

Subsequent releases of the above programs are also supported unless otherwise provided by IBM.

**DOCUMENTATION**  
(available from Mechanicsburg)

*STAIRS/VS General Information Manual (GH12-5114).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No

## 5740-XR8 - NJE for JES2 NETWORK JOB ENTRY FACILITY FOR JES2

### PURPOSE

JES2 with the NJE facility is upward compatible from JES2 and provides additional functional enhancements. It supports the interconnection of NJE for JES2 configurations via binary synchronous communications (BSC) lines and channel-to-channel (CTC) adapters. The purpose is to exchange job input, job system output (SYSOUT) data, NJE for JES2 operator commands, and operator messages between NJE subsystems operating on OS/VS2 MVS Release 3.7. The job input and SYSOUT distinctions are controlled by installation provided defaults, JOB control statements, and/or operator commands.

### SPECIAL SALES INFORMATION

NJE for JES2 is designed for customers with geographically separated processors. It also may be used with configurations in the same geographic location as an alternative to the JES2 multi-access spool facility. It builds upon and uses the facilities of JES2 RJE MULTI-LEAVING for transmission of job input, job SYSOUT, operator commands, and operator messages between OS/VS2 Release 3.7 systems using NJE over binary synchronous communications (BSC), Synchronous Data Link Control (SDLC) and channel-to-channel (CTC) adapter connections. It also expands the capability of the multi-access spool facility in that communications flow through the spool volumes shared by members of a multi-access spool node. NJE for JES2 has the following features:

A job entry network can consist of up to 99 nodes (where a node can be a single processor (UP, MP), a multiprocessor or a multi-access spool configuration) each interconnected via BSC communication lines, SDLC lines or CTC adapters.

Nodes may be interconnected in any manner, using any mix of BSC leased point-to-point lines, BSC dial-up lines, and channel-to-channel adapters. Network configurations may change dynamically during normal operations; such changes are automatically taken into account by the NJE network path managers.

The channel-to-channel special feature attached to block multiplexer channels of S/370 mdls 145, 148, 155II, 158, 165II and 168 is supported for network communications. See *System/370 Special Feature: Channel-to-channel Adapter*, (GC22-6983).

The 2701 Data Adapter Unit with the Text Transparency feature, 2703 Transmission Control, and 3704/3705 Communication Controllers (in the emulation mode) are supported for network communications in point-to-point transparent-text transmission mode over binary synchronous communication lines.

NJE for JES2 supports the following combinations of BSC, SDLC and CTC adapter and multi-access spool connections:

1. Up to seven systems may be connected via the multi-access spool to form a node.
2. Up to 99 nodes may be defined in the network.
3. More than one BSC and/or CTC adapter connection may be used in a multi-trunk connection between nodes.
4. Any and all members of a node may be connected to any member of other nodes via the BSC, SDLC, and CTC adapter connections. Such connections may create multiple-path arrangements.
5. NJE will keep track of as many as eight alternate paths and may use more than one path for concurrent communication between two nodes.

Except for the additional communication equipment required to handle NJE lines and the minimal additional address space NJE requires, NJE for JES2 makes no direct requirements for additional hardware. NJE activity causes buffers to be fixed in storage during normal NJE operations, thus requiring more main storage in heavily loaded systems. Additional SPOOL volumes may also be required to hold the jobs and SYSOUT data that will pass through the system.

### DESCRIPTION

The Network Job Entry (NJE) facility provides for the transmission of selected jobs and in-stream data sets, system output (SYSOUT) data sets, operator commands and messages, and job accounting information from one computer system to another across a communication link.

A job entry network consists of one or more interconnected computer systems (called nodes), running under OS/VS2 MVS. These nodes have the capability of communicating with one another and passing the information indicated above from one node to the next. The number of nodes which can exist within a job entry network ranges from one to 99.

The nodes can be single processors (UP/AP), tightly coupled multiprocessor processors, or multi-access spool systems.

A job may enter the network via any JES2 local or remote input device and will be queued for transmission to another node if the node of entry is not the execution node. A job designated for execution at another node is either transmitted directly to that node or is transmitted through

intermediate nodes located along a path to the execution node. Transmission of jobs along BSC communications links is handled on a store-and-forward basis; that is, a job must be completely received by a node before any action will be taken to either execute the job or transmit the job to another node. Once a job has been completely received by a node, the transmitting node frees the resources that were allocated to the transmitted job. Transmission of jobs through ACF/VTAM links is logically direct to the execution node.

The execution node is determined in one of three ways: [1] when the job enters the job entry network, a default execution node is defined based upon the device upon which the job entered the system, [2] the default execution node may be overridden by the submitter of the job through a /\*XEQ or /\*ROUTE XEQ control statement submitted as part of the job, [3] the execution node may be explicitly defined by the use of NJE operator commands.

As a job is received on an intermediate node along BSC communications links, it is spooled and queued. If that node is not the execution node, the job will be queued for transmission to the next node in the path to the execution node. Transmission to the next node will not be initiated until the job has been completely received from the previous node. As a job leaves a node, its resources on that node are freed. Intermediate nodes supported by ACF/VTAM and ACF/NCP/VS will not require the host processor and spool resources.

When a job reaches its execution node, it is queued for conversion and execution. The input data sets which have been transmitted with the job are available to the job through the normal spooling access methods. Output data sets are generated and spooled in the normal fashion, and may be directed to one or more destinations. If the destination node(s) is different from the execution node the appropriate output data sets are queued for transmission to the destination node(s). If SYSOUT spinoff is specified (FREE=CLOSE or equivalent), the output is eligible for transmission as soon as the data set has been closed. Otherwise, the SYSOUT data sets of a job are saved until execution is complete. After execution is completed the output is eligible for transmission to the appropriate destination node(s). SYSOUT data sets designated to be held for TSO retrieval on a node other than the execution node are transmitted to their destination node to be held.

The destination node(s) for output is determined in one of four ways: [1] when the job enters the job entry network, a default output destination is defined based upon the device upon which the job entered the system, [2] the default output destination may be overridden by the submitter of the job through a /\*ROUTE control card submitted as part of the job, [3] the output destination of a particular data set or group of data sets can be specified through DEST parameters on either JCL Data Definition (DD) statements or on /\*OUTPUT control statements submitted as part of the job, [4] the output destination can be explicitly defined through use of NJE for JES2 operator commands.

The output for a job may pass through intermediate nodes on the way to a destination node(s). In the BSC case, however, transmission to the next node will not be initiated until the output has been completely received from the previous node. Upon receipt by the destination node it is queued for normal output processing. Resources are freed as all output is completely transmitted or outputted for a given job. Intermediate nodes supported by ACF/VTAM and ACF/NCP/VS will not require the host processor and spool resources.

Operator commands may be directed to any node in the network for processing. Command responses are passed back to the originating console. Five NJE for JES2 commands have been identified as global network commands. These commands allow the operator to display jobs, hold jobs, release jobs, cancel jobs, and route jobs that currently reside at another node in the job entry network. The authority of any operator to control jobs in the network has two elements. First is the authority assigned to the operator's console within its own node. Second is the authority assigned to the operator's node, as defined at the node in which the command is to be processed.

At each stage of processing, appropriate accounting information is collected and produced on the processing node for local accounting. In addition, network accounting number support is included. This new facility permits accounting numbers to be assigned across the network and provides initialization parameters, conversion tables and routines and user exits to convert local accounting numbers to network accounting numbers and vice versa. All accounting information is produced through standard System Management Facilities (SMF).

Release 2 of NJE provides all of the capabilities of Release 1, plus additional remote job entry support. Using VTAM, this support allows connection of remote workstations through 3791 Communication Controllers. Connection can be made either through local channel attachment or via SLDC communication lines. New data set header support allows data sets destined for remote devices attached to the 3791 to be spooled at the remote workstation. Multiple logical unit support permits the concurrent operation of multiple devices as remote workstations.

PROGRAM PRODUCTS

**NJE for JES2 (cont'd)**

**NJE for JES2 Initialization:** NJE for JES2 provides for the initialization of NJE control blocks and the definition of nodes in a job entry network. The actual connections between nodes may be defined by NJE initialization statements, but they are normally determined dynamically by the network path managers. Warm-start recovery of NJE processes active at the time of a failure is also provided.

**RTAM:** NJE for JES2 Remote Terminal Access Method supports connection protocols between directly connected job entry subsystems. This allows for the passing of network connection control records to the network path manager for action. Other enhancements include support of the channel-to-channel adapter in a manner equivalent to a high-speed communication line, support of additional logical stream types required by NJE, and support of dynamic assignment of transmission buffer sizes at connection time.

**Network Path Manager:** A network path manager, running in each processor in the job network, interfaces with RTAM and the multi-access spool facility to communicate with all adjacent network path managers. Decentralized network control is achieved by transmitting connection information records throughout the network, thereby maintaining a dynamic picture of the network in each node. The network path managers control the routing of data through the network by providing best-path and alternate-path information to other NJE components. The network path managers at each node participate equally in the configuration-monitoring process. No single node is designated as a network manager: Any subset of an NJE network can function entirely on its own.

**Job Transmitter and Receiver:** A job transmitter has been provided and the NJE for JES2 input service component has been designed to allow transmission of jobs from the input node, through the network, to the execution node. The job is routed along a path determined by the network path managers. When a job is completely received and queued for the next function, the transmitting system frees all resources for the next job.

**System Output Transmitter and Receiver:** A system output transmitter and receiver have been provided to transmit the system output data sets to the appropriate nodes (as determined either by default or by explicit programmer or operator action). The output is routed through paths determined by the network path managers. When a group of data sets has been completely received and queued (either for output or further transmission to another node), the transmitting node frees all resources used in the transmission of the data sets.

**NJE for JES2 Console Services:** The console services component has been designed to pass commands, responses and messages through the network via the paths determined by the network path managers. The remote console processor used for remote job entry (RJE) has been designed to recognize and forward messages and commands from one node in the network to another. The messages and commands are forwarded through the network via communications lines by the RTAM RJE console interface, and are forwarded across shared-spool devices by the multi-access spool facility. The remote console processor also provides services to the network path manager for the passing of network connection information across shared-spool connections.

**Commands:** Commands have been provided to allow the operator to both control the network and obtain information about it. New commands and new operands of existing JES2 commands allow the operator to send messages and commands through the network. The operator can control the NJE transmitting and receiving components in the same manner that RJE devices are controlled. Nodal command authority provides maximum flexibility in each installation's ability to control the effect of commands from other nodes on its operation.

**CUSTOMER RESPONSIBILITIES**

A customer installing the Network Job Entry Facility for JES2 should be a prior user of JES2 with appropriate personnel trained and experienced in OS/VS2 MVS. When installing NJE for JES2 every effort should be made to keep the initial configuration to a minimum number of nodes. After experience is obtained, additional nodes may be planned and added individually. Large network configurations require careful planning by experienced IBM and customer personnel to help ensure that maximum benefits are achieved through the proper use of the system.

**SPECIFIED OPERATING ENVIRONMENT**

**SOFTWARE REQUIREMENTS**

NJE for JES2 has been designed and released to run on OS/VS2 MVS Release 3.7 and on MVS 3.7 under VM/370. If problems are encountered when operating NJE for JES2 under VM/370, it may be required to recreate the problem in a standalone OS/VS2 MVS environment.

Operation of NJE for JES2 in a VM/370 environment is intended for use in a program development and testing environment and for other uses where performance is not critical. If your customer has specific throughput or terminal response requirements for NJE in a VM/370 environment, you should plan to benchmark under VM/370 to ensure that any proposed configuration will meet the customer's performance needs.

The language used to produce NJE for JES2 is the S/370 Assembler Language.

**COMPATIBILITY**

Release 1 of JES2 with the NJE Facility is upward compatible from Release 4.0 (Selectable Unit) and contains the same base function. It will support all programs, functions and devices that operate with JES2 Release 4.0.

The currency, availability and functions provided by JES2 Release 4.0 and Release 4.1 are unchanged by this program product. Current users of JES2 who do not have a job networking requirement should continue operating with the current release of JES2.

**Prerequisites:** The Network Job Entry Facility for JES2 requires the installation of Selectable Unit 10 as a prerequisite to the use of the 3800 Printing Subsystem. Use of SNA devices for RJE workstations will require either VTAM2, or the SCP for ACF/VTAM and ACF/VTAM, as well as the appropriate level of the NCP. Use of SDLC communications links in the NJE network will require installation of ACF/VTAM Version 1 with the Multisystem Networking Facility for ACF/VTAM or ACF/VTAM Version 2.

**PLANNING INFORMATION**

JES2 users should be aware that any modifications made have to be reapplied prior to the use of a new release of NJE for JES2.

**Channel-to-channel Adapter:** NJE supports the CTC adapter as a communication link when it is attached to a block multiplexer channel. The use of the CTC adapter by NJE for JES2 must be separate from any other use of the CTC adapter.

## PROGRAM PRODUCTS

**VS TSIO  
5740-XR9****PURPOSE**

VS TSIO provides the VS APL (Release 2) user, running under VSPC, with many of the data management facilities of the OS/VS operating systems.

VS TSIO facilitates the migration of APLSV (PRPQ 5799-AJF or PRPQ 5799-AQC) customers to VS APL, and may also provide valuable additional functions to other VS APL users.

The VS TSIO program product consists of an Auxiliary Processor and several associated workspaces. The Auxiliary Processor enables users to perform input and output operations on SAM, PAM and BDAM files. If authorized, users can create OS/VS sequential, direct or partitioned data sets, create SYSOUT data sets and submit batch jobs. The workspaces facilitate the use of the Auxiliary Processor, support a file system of APL objects and perform translations to and from various data representations in files.

**HIGHLIGHTS**

Services provided through VS TSIO include:

- Creation and deletion of data sets.
- Sequential reading and writing of data sets.
- Direct reading and writing of records in a data set by their index numbers.
- Output using sysout data sets.
- Renaming a data set.
- Facilities for applications to synchronize the use of files being shared by VS TSIO users.
- Facilities for data set protection.
- Capabilities allow a user to import or export OS SAM, PAM and BDAM files into or out of VSPC libraries dynamically.
- Indirect data set access. Allows selected users a controlled access to another user's protected data sets.
- Submission of batch jobs by authorized users to a job entry subsystem, under the control of an APL program.
- Creation and deletion by specially authorized users of entries in the operating system catalog, or the reading of the volume table of contents (VTOC) of a direct access device.
- Sending of messages by authorized users to the OS/VS console.

Note that VS TSIO does not support data sets created with the indexed sequential access method (ISAM), or the virtual storage access method (VSAM). (However note that VS APL can access VSAM files through another auxiliary processor provided with VS APL for use under VSPC or VM/CMS.)

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The VS TSIO auxiliary processor operates in its own partition or region separate from VSPC. The workspaces distributed with VS TSIO operate in the same partition or region as VSPC, along with the VS APL language processor.

Since VS TSIO operates in a virtual environment, its performance is a function of the real storage available. A minimum of 128K bytes of virtual storage is required.

During installation, 12 cylinders of IBM 3330 space (or the equivalent) are required, of which 5 must be retained to run VS TSIO. In addition, the workspaces distributed with VS TSIO require 150,000 bytes in the VSPC object library. User DASD data sets created or accessed by VS TSIO are not included in the above.

**SOFTWARE REQUIREMENTS**

VS TSIO operates with VS APL Release 2 (5748-AP1) using VS Personal Computing (VSPC). VS TSIO operates either with OS/VS1 VSPC (5740-XR5), or with MVS VSPC (5740-XR6).

VS TSIO uses the basic sequential access method (BSAM), the basic direct access method (BDAM) and the basic partitioned access method (BPAM) to access data sets. Devices supported by VS TSIO are those supported by BSAM, BDAM and BPAM.

VS TSIO is written in Assembler language. The distributed workspace is written in APL.

**DOCUMENTATION**

(available from Mechanicsburg)

*VS APL General Information Manual (GH20-9064-2) ... VS TSIO Guide and Reference (SH20-9107).*



PROGRAM PRODUCTS

**TELEPROCESSING NETWORK SIMULATOR  
RELEASE 5.0  
TPNS (5740-XT4)**

**PURPOSE**

Teleprocessing Network Simulator (TPNS) is a telecommunications testing package that enables a user to test and evaluate his application programs before actual terminal installation. The purpose of TPNS is to provide controlled generation of message traffic into a telecommunications subsystem or application through the use of processing rather than by large amounts of terminal hardware and terminal operator time. TPNS provides the ability to simulate a specified network of terminals and their associated messages, allowing the user to alter network conditions and message loads during a run. Thus, TPNS can be used to stress-test telecommunications application programs with volume messages to evaluate the reliability and approximate performance characteristics under expected operating conditions.

**HIGHLIGHTS**

- Supports Start/Stop, BSC and SDLC Terminals as indicated below.
- Runs under any current release of OS/VS2 (MVS), OS/VS2 (SVS) and OS/VS1 or subsequent releases of these SCPs unless otherwise specified.
- Utilizes flexible, easy-to-use script language.
- Allows for comprehensive operator intervention and modification during the test run, either manually or automatically through the inclusion of operator commands in the message decks.
- Variable message mix and traffic rate.
- Content of generated message may be varied based upon the content of a message received from the application program.
- Message logging and time stamping for offline analysis.
- Preprocessor for checking syntax prior to run.
- Online and offline reports.
- Multiple networks may be simulated simultaneously and independently to multiple subsystems on one or more processors.
- Logic tests on both input and output to allow dynamic changes in message mix during the test run.
- Random generation of test data.
- Multiple console support to allow remote console support of the simulator.
- Logic trace capabilities for logic test debugging.
- High-level message generation by having the TPNS NCP program automatically add necessary line control and terminal framing characters.
- Line trace capabilities for access method debugging.
- Drives application programs running under IBM data communication programs such as IMS, CICS, VSPC, TSO, TCAM, VTAM, BTAM, ACF/VTAM and ACF/TCAM.
- Simulates parallel sessions.
- Supports negotiable bind.
- Supports data encryption.
- Operates within the same S/370 as the application program under test (Simplex Mode) or with TPNS driving application programs in one or more processors (Duplex Mode).
- Exercises the interfaces between the terminal control unit, communication lines and the application program as used in the operational system.
- The ability to simulate S/S terminals up to 1200 bps.
- The ability to use application messages/data to generate TPNS messages. Data received in response to a previous message can be used in a succeeding message.
- Condensed interval reports.
- Enhanced logic testing - logic check can be performed at message generation time.
- Additional console commands to alter the message sequence dynamically.
- Improved network printout.
- Line/terminal device status on interval reports.
- Readable interpretation of the SNA command codes and headers on the log.
- Message rates routed to the console in addition to the printer.
- Ability to observe traffic of individual devices while executing via a monitor.
- All TPNS supported terminals can be simulated using the Advanced language.
- The capability to write messages to the console operator from the TPNS script.

For domain simulation only, TPNS can share an NCP6 or NCP7.1 3705 with ACF access methods in a multi-tail environment, i.e., neither dedicated 3705 nor special TPNS 3705 control program is necessary. When simulating terminals controlled by the system under test, such as

non-SNA terminals, TPNS will continue to require a dedicated 3705 executing a TPNS 3705 Control Program.

**DESCRIPTION**

The principle use of TPNS is to drive the online application program in the following manner:

- Simulate start-stop (S/S), Binary Synchronous (BSC), or Synchronous Data Link Control (SDLC) terminals and the networks to which they would be attached.
- Generate data from descriptions of application messages and transmit those real messages to a running teleprocessing application program.
- Vary the frequency of message transmission within desired limits.
- Time-stamp and log all messages sent from and received by the simulated terminals.
- The user may analyze the message contents for accuracy of data transmitted. The user may also analyze the sending and receiving times to approximate application performance in response times and message rates. TPNS supports a broad range of terminal types and provides flexible, generalized message generation facilities that can be used to simulate a wide variety of telecommunications operations. The following terminal and device types are simulated by TPNS:
  - Start/Stop communication terminals on leased communications facilities:
    - 1050 Data Communications System
    - 2740 Communication Terminal mdl 1 (with Station Control and Record Checking)
    - 2740 Communication Terminal mdl 2 (with Station Control, Record Checking and Buffered Receive).
    - 2741 Communication Terminal
    - AT&T 83B3 Selective Calling System
    - Western Union Plan 115A Outstation
  - Start/Stop Communication terminals on switched communications facilities
    - Western Union mdl 33/35 TWX (break not supported)
  - Binary Synchronous Communication Terminals:
    - 3270 Information Display System Mcls 1 and 2
    - 3262, 3268 mdl 2, 3271 mdls 1 and 2, 3274 Mdl 1C, 3276 Mcls 1, 2, 3 and 4, 3277, 3278, 3284, 3286, 3287, 3288, 3289 (EBCDIC only)
- In addition, the following IBM BSC disciplines are supported:
  - BSC1 (Point-to-Point leased BSC)
  - BSC2 (Point-to-Point dial BSC (terminal answer only)
  - BSC3 (Multipoint BSC)
- The types of BSC terminals which may be simulated using the above BSC 1, 2 and 3 line disciplines include the following:
  - 1130
  - 1800 Data Acquisition and Control System
  - System/3
  - System/34
  - System/36
  - System/7
  - System/360 mdl 20
  - System/360 mdl 25
  - System/360
  - S/370
  - 2770 Data Communication System
  - 2780 Data Transmission Terminal
  - 3780 Data Communications Terminal
- Note: TPNS provides no support for special features on these BSC 1, 2, and 3 devices. Multileaving (mdl 20 Workstation) is supported.
- Synchronous Data Link Control (SDLC) line discipline for Systems Network Architecture (SNA) terminals on leased half-duplex, leased full-duplex, or dial communication facilities:
  - 3600 Finance Communication System
  - 3650 Retail Store System (Supported as 3600-Compatible Device)
  - 3660 Supermarket System (Supported as 3600-Compatible Device)
  - 3614 Consumer Transaction Facility
  - 3624 Consumer Transaction Facility
  - 3767 Communication Terminal
  - 3770 Data Communication System
  - 3790 Communication System
  - 3270 Information Display System (SNA), (3262, 3268 mdl 2, 3271 mdls 11 and 12, 3274 mdl 1C, 3276 mdls 1, 2, 3 and 4, 11, 12, 13 and 14, 3277, 3278, 3284, 3286, 3287, 3288, 3289)
  - 5250 Information Display System (5251 Display Station and 5256 Printer)
  - System/34
  - System/36

**TPNS Release 5 (cont'd)**

8100 DPPX Information System  
8100 DPPX or DPPX/SP Information System  
8100 DPCX Information System

Note 1: In order to execute SNA Dial Communications, the application program must run under an OS/VS operating system which also supports SNA Dial.

Note 2: TPNS SNA simulation is not intended to simulate code residing in the logical control unit other than that code required to transmit and receive message traffic.

TPNS also provides support for devices attached to the 8100 systems via teleprocessing links or remote loop. The level of support for a remote loop is from the 3842 remote loop controller downward; i.e., TPNS simulates the entire remote loop with its attached devices.

Specific device support includes functions of the 3276 and 3278 displays and the 3262, 3268 mdl 2, 3287 and 3289 printers as currently implemented by TPNS. New support for the 8775 character display enhanced functions of highlighting and the APL character set is provided. TPNS also simulates a certain class of devices that use "device headers" rather than the standard SNA headers. These devices include the 3641, the 3642, the 3643, the 3646, and the 3289 mdl 3 with its attached devices. The 3645 and the 3647 devices are supported to the extent that they are compatible with TPNS simulation for logical unit type 1 and the 3641 respectively. The 3644 is supported by allowing the user to specify the device header in the scripting statements.

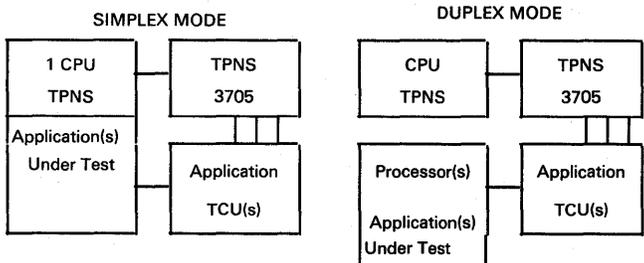
Powerful and comprehensive scripting facilities are provided, by the Advanced Scripting Language, to specify TPNS simulation options at execution time. The script describes the terminal, network configuration and message rates desired by the user. In addition, the script defines teleprocessing messages meaningful to the online application program under test. Individual segments of information in the messages may be generated by different methods including random, table lookup and constants. TPNS provides a comprehensive logic test capability to compare certain data or text received or sent by TPNS. Thus, scripts can vary message data from the simulated terminals based on the content of a prior response from the application program.

Preparation of scripts is simplified by providing common default values for the keyword parameters used in the scripting language.

A facility exists to allow message generation from a single script for multiple terminals. This facility is especially useful in a time sharing environment.

Multiple networks may be simulated concurrently to provide messages for driving multiple telecommunication applications or multiple processors.

TPNS can operate in either simplex or duplex mode. In simplex mode, TPNS and the subsystem (the driven telecommunication application) under test reside in a single processor and execute in separate regions under OS/VS. In duplex mode, two or more processors are required. TPNS resides in one and drives various telecommunication applications in the other(s). Neither simplex nor duplex operation requires that either processor be dedicated to the test run. Dedicated duplex processors would be used primarily for critical application performance approximations. In either mode, TPNS requires a dedicated 3705-I or 3705-II Communications Controller (See exception below), and the application under test requires another transmission control unit (TCU) of the appropriate type required by the application programs.



For domain simulation only, TPNS can share an NCP6 or NCP7.1 3705 with ACF access methods on a multi-tail environment, i.e., neither dedicated 3705 nor special TPNS 3705 control program is necessary. When simulating terminals controlled by the system under test, such as non-SNA terminals, TPNS will continue to require a dedicated 3705 executing a TPNS 3705 Control Program.

TPNS can drive various application programs running under IBM data communication products such as IMS, CICS, VSPC, VTAM, TSO, TCAM, BTAM, ACF/VTAM and ACF/TCAM.

A preprocessor program is provided to syntax check network and message configuration script statements. Two postprocessor programs are provided: one to list out the TPNS log tape in a formatted report,

and one to selectively calculate a response time analysis by network communication line. The response time calculated by the postprocessor is the time required for the application to respond to an input message. The user has, as his option, the ability to write his own response time analysis program using the various TPNS time stamps. TPNS also provides functions for graphing the results of the analysis program.

Properly used, TPNS may reduce testing time and required testing resources while improving the thoroughness of testing for telecommunication applications.

TPNS can provide repeatability for functional testing, a collection of comprehensive transaction messages for regression testing, and message rate statistics for approximating application performance, response times and evaluation of telecommunication network design.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the following functions to install TPNS:

- Generating an appropriate OS/VS SCP including arranging OS/VS2 system authorizations to include necessary references to TPNS modules and placing the provided source, object and macro statements into appropriate OS/VS libraries.
- Generating a functional 3705 Control Program for TPNS. Preparing high-level macro statements to describe type(s) of network(s) whose simulation is desired, and compiling the TPNS 3705 Control Program from provided libraries.
- Ordering and installing the necessary communications equipment to support the application and TPNS environment.
- Providing communication line connections between the TPNS 3705 and the application TCU with appropriate line adapters.

For line speeds of up to 1200 bps, a workable method of connecting two 3704/3705s is to equip the TPNS 3705 with the low-speed local attachment Type 1C Line Set (#4713) and the application 3704/3705 with the low speed external modem Type 1A Line Set (#4711) for driver runs. Equip both 3704/3705s with Business Machine Clock (#4650) specifying the appropriate line speed. These 3704/3705s so equipped can be cable-connected for a distance not exceeding 200 feet.

Another method is to provide external modems on both 3704/3705s or TCUs and connect those modems by common carrier channels or by short cables between the line connectors on a plug board or patch panel. Equivalent physical paths may also be used.

If use of common carrier lines is planned, the customer is responsible for contacting the local common carrier and arranging for the necessary communication services.

- Arranging for appropriate engineering changes required by TPNS. The TPNS 3705 requires engineering change levels to include EC 311283 or REA 23-13007 if SDLC lines are to be used. This engineering change level must also be installed on the application 3705 if NCP Release 3.1 or later is used. If data set eliminators are being used for SDLC simulation, the application 3705 must have the previously mentioned EC or REA and the NCP must be level 3.1 or later.

The customer is responsible for the following functions to use TPNS in simulation tests:

- Determining and specifying significant network configuration, operational and timing alternatives to test.
- Developing the appropriate test data for meaningful transaction messages and application conditions.
- Executing the provided programs for transaction rate tables, or developing unique rate tables to characterize the application activity.
- Preparing TPNS scripts or message files to define the messages and operating parameters.
- Executing report programs to analyze message data transfers and performance approximations.
- Interpreting output results and modifying application programs and test parameters for subsequent runs.
- Developing specialized analysis programs to examine message data or time stamps for the TPNS log tape.

In connection with suggested customer use of TPNS, whether by formal proposal or not, the customer must be furnished, in writing, with the following statement as well as the other pertinent customer responsibilities as set forth above.

"The terminal network simulations provided by TPNS are believed to be sound, but IBM does not warrant or guarantee that users can or will achieve similar results on networks with actual terminals attached. Other IBM terminal devices announced as compatible with the IBM devices specifically simulated by TPNS may be supported in compatibility mode. The simulations will be equivalent only to the extent that the compatible devices function identically. It is the user's responsibility to determine and validate input data and

**TPNS Release 5 (cont'd)**

determine the extent to which these simulation results are relevant to the user's application and system environment."

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

The minimum machine configuration required to run TPNS is an IBM S/370 mdl 145 with conditional swapping feature. (TPNS will run in mdls 155II, 158, 165II, 168 and the 3031, 3032, 3033, 3081, 4341, 4361 and 4381 Processors.) The TPNS virtual region size (V=V or V=R) required for a minimum network of up to five lines and five terminals is 448K. The *TPNS Program Reference Manual* contains additional information necessary for calculating individual region requirements. The TPNS preprocessor will report the control block size required for a TPNS network for each run.

One tape drive is required if message logging is desired. In addition, multiple drives may be specified for alternating tape reels of log messages.

For TPNS simulation runs, DASD storage space is required for the following partitioned data sets:

- User network/message definition records
- TPNS load modules
- 3705 Control Program load modules
- External file message text (optional)
- Rate tables (optional)

For a TPNS 3705 Control Program system generation run, 800 tracks of IBM 3330 DASD storage (or equivalent space on IBM 2314, 3340 or 3350 DASD) is required for TPNS and TPNS 3705 Control Program macro libraries, object libraries and tables.

At least two transmission control units are required. (See exception above. One 3705 must be dedicated to TPNS during the simulation run. The other TCU may be either a 2701/2702/2703 or another 3704/3705 as required by the application under test. TPNS supports multiple 3705s when necessary.

The TPNS 3705 (3705-I or 3705-II) requires a Type 1, Type 2, Type 3 or Type 4 Channel Adapter, a Type 2 or Type 3 Communications Scanner and sufficient start-stop, BSC, or SDLC line adapters to simulate the line configuration required. Each line whose simulation is desired must have an existing communication line or cable connection between the 3705 allocated to TPNS and the TCU allocated to the application program under test.

**Note:** The System Support Programs for Advanced Communication Function NCP/VS program product (5735-XX1) are required if the user has multiple Type 4 channel adapters and the "NROS" feature (#9566) on the 3705s to be used with TPNS.

The TPNS 3705 requires a minimum of 80K storage. Additional 3705 storage is required for line support and control blocks for large networks. Formulas for TPNS 3705 storage requirements are defined in the *TPNS Program Reference Manual*.

**SOFTWARE REQUIREMENTS**

TPNS executes in the virtual mode (V=V) or real storage (V=R) under any current release of OS/VS2 (MVS), OS/VS2 (SVS), and VS/1 or subsequent releases of these SCPs unless otherwise specified.

A modified IBM 3705 Control Program is provided which performs part of the simulation and can only be used with TPNS. The user must perform the TPNS 3705 Control Program system generation to define the TPNS 3705 line configuration.

Source code for TPNS and TPNS 3705 Control Program will be available as optional material.

The 3705 Communications Controller and Network when used by TPNS will be serviced off line by Field Engineering.

**DOCUMENTATION**

(available from Mechanicsburg)

Title	Order Number
General Information Manual	GH20-1907
Language Reference Manual	SH20-1825
Logic Manual	LY20-2259
Reference Summary	GX20-2327
Program Reference Manual	SH20-1823



**TSO COMMAND PACKAGE  
5740-XT6****PURPOSE**

The TSO Command Package program product augments the function available to the OS/VS2 (MVS) TSO user, and facilitates the use of TSO commands in background mode.

The EDIT Recovery facility provides the capability of recovering data entered during an abnormally terminating EDIT session.

Miscellaneous TSO Command Package Functions provided include additional default values permitted to be supplied in the TSO user's *User Attribute Data Set* (UADS) entry, and subcommand and keyboard modifications.

TSO Command Package also increases the range of background processing by providing modifications facilitating the use of existing TSO commands in background mode.

**HIGHLIGHTS**

- Operation of TSO commands in background mode facilitated.
- TSO Edit recovery capability.
- ATTRID available as subcommand of EDIT.
- CKPOINT subcommand of EDIT.
- FREE available as subcommand of EDIT.
- D available as abbreviation of DOWN subcommand of EDIT.
- MSGCLASS, JOBCLASS and SYSOUT CLASS defaults can be specified in UADS entry.
- Length of DEST keyboard is eight characters, consistent with JCL
- Keywords on both commands and subcommands to reduce the need for prompting.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

TSO Command Package has no unique hardware requirements.

**SOFTWARE REQUIREMENTS**

The TSO Command Package program product requires OS/VS2 (MVS) Release 3.7 at the current service level. In addition, this program product also operates in a VM/370 environment under the control of OS/VS2 (MVS).

**Storage Estimates:** The approximate auxiliary storage requirement for the system libraries:

SYS1.CMDLIB	110,117 bytes
SYS1.HELP	334,080 bytes
SYS1.LINKLIB	66,439 bytes
SYS1.LPALIB	455,806 bytes
SYS1.MACLIB	650,800 bytes

**DOCUMENTATION** (available from Mechanicsburg)

*OS/VS2 MVS TSO Command Package Product Specifications* (GC28-0746) ... *OS/VS2 MVS TSO Command Package Users Guide and Reference* (SC28-0748) ... *OS/VS2 MVS TSO Command Package Program Logic Manual* (LY28-0749).



## PROGRAM PRODUCTS

**OPERATIONS PLANNING and CONTROL (OPC)  
RELEASE 3.0 (5740-XT9)****PURPOSE**

OPC provides data processing management with a system for planning, controlling and automating the handling of batch production in the operations department. Both long range and short range planning may be automated for all pre-processor, processor and post-processor work stations, as required by each individual installation. The workflow through the data center is monitored in real time. The status at any work station, or of any application anywhere in the center, is immediately available to the production control personnel via color or monochrome terminals. Error prone and repetitive operator tasks, such as ensuring that jobs are run in the correct order, submitted at the right time, etc., are automated by OPC.

**PRODUCT HIGHLIGHTS**

Items OPC addresses are:

- **Operations Planning** - OPC can be used to automatically produce long range (typically monthly) and short range (typically daily or per shift) plans for the whole operations department. OPC takes into account dependencies on preparatory work, the processor jobs, and post processing. Long Range plans can be used to establish service level agreements with end user departments, as well as for capacity and peak load planning. The daily planning can be done at a detailed level. Uncompleted work will automatically be carried over from the previous daily plan. A detailed daily plan for each work station is available online.
- **Production Control** - OPC can provide up-to-the-minute status at any work station, and of any application anywhere in the production chain in the data center. Late applications are highlighted, as are critical operations. A list of all applications ending in error is available online. Run book information can be displayed online to each work station operator.
- **Automation** - OPC automates complex and/or repetitive operator tasks, by automatically controlling when a job is ready to be executed, dependent on, for example, the time of day or prerequisite preparation or jobs. When a job is ready to run, OPC is designed to automatically pick out the correct version of the JCL, submit the job (if not done beforehand), and release it.

**RELEASE 3 HIGHLIGHTS**

- **Use of current MVS/SP and MVS/SE2 Support.**  
In MVS/SP and MVS/SE2, a number of existing user exits have been made separate load modules instead of being linked into SMF modules. This design change is taken care of in OPC's installation procedures. The new SMF record type 30 is supported, which means that the old type 4 and 5 records are not required by OPC in an MVS/SE2 installation.
- **Automatic reporting of events.**  
OPC can now automatically handle events from general work stations, that is, a user program can automatically report to OPC when an operation has been started, completed successfully, or terminated in error. This function can be used in, for example, spooling, keypunching and remote job entry applications.
- **Enhanced diagnostic aids.**  
A number of additions and modifications have been made, aiming at a quicker and more automated error diagnosis:
  - An extended, formatted OPC minidump.
  - Explicit PTF-level clearly identified in object modules.
  - Extended diagnosis when problems occur in Job Tracking.
  - An APAR packaging program which can be submitted from OPC online or as standalone.
  - The OPC Status record now displayed.
- **The System Modification Program Release 4 (SMF4) is used to install and maintain OPC.**
- **Access to application data by job name.**  
OPC now allows a processor work station operator to check job status by job name.
- **Enhanced use of TSO terminal support.**  
Certain exceptional data in OPC is now highlighted, or, for a 3279 Color Display Station, displayed in a different color. This applies to error messages, lines for which incorrect data was entered, 'late' operations on a ready list, and occurrences that are considered 'critical'.
- **Listing an application's external dependencies.**  
OPC now allows you to get a listing in application order showing external predecessors and successors by application.

**CUSTOMER RESPONSIBILITIES**

In addition to fulfilling the specified operating environments shown below, it is the responsibility of the customer to install the program and to build and maintain the OPC data bases.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM machines:

S/370 mdl 148, 155II, 158, 165II, 168, 303X, 308X, 4361-5 or 4381 Processors.

For online plans and monitoring, suitable terminals must be available; all of the following, or equivalent, are supported by OPC:

- IBM 3275 Display Station - mdl 2
- IBM 3276 Control Unit Display Station - mdls 2, 3, 4, 12, 13 or 14
- IBM 3277 Display Station - mdl 2
- IBM 3278 Display Station - mdls 2, 3 or 4
- IBM 3279 Color Display Station - mdls 2A, 2B, 3A or 3B

OPC Terminals run under Multiple Console Support (MCS) and/or TSO.

The appropriate Control Units are required for the terminals.

OPC does not require any V=R storage.

**SOFTWARE REQUIREMENTS**

This licensed program requires the functions provided by the following IBM programs:

- OS/VS1 Release 7.0 and subsequent releases, unless otherwise identified.
- OS/VS2 (MVS) Release 3.8 and subsequent releases, unless otherwise identified, with any of the following:
  - JES2.
  - JES3.
  - MVS/SE Release 2.
  - MVS/SP Release 1 and subsequent releases, unless otherwise identified.
- VSAM for data base access.
- IBM OS/VS Sort/Merge program product (5740-SM1) or its equivalent
- System Modification Program Release 4 (SMP4) for installation.
- TSO for full use of the OPC online dialog.

**CONVERSION**

Users of OPC Release 2.0 can continue to use their existing data bases without any conversion.

**DOCUMENTATION  
(available from Mechanicsburg)**

*Operations Planning and Control General Information Manual (GH19-6120) ... Operations Planning and Control Licensed Program Specifications (GH19-6122).*

MVS System Integrity Applies: Yes

RPQs Accepted: No



## TELECOMMUNICATION CONTROL SYSTEM ADVANCED FUNCTION (TCS-AF) 5740-XXD

### PURPOSE

Telecommunications Control System - Advanced Function (TCS-AF), based on Telecommunications Access Method (TCAM), provides the user with the facilities to implement a high function single or multicomputer teleprocessing system. While TCS-AF capabilities can enhance a single CPU TCAM or TCAM/VTAM System, TCS-AF is primarily intended for users with multiple online VS systems, who need a multicomputer networking capability to communicate between terminals and applications in separate systems.

### DESCRIPTION

TCS-AF enables user migration to the SNA environment by either of two paths, depending on the base level of TCAM with which it is used: (1) TCAM Levels 8 and 9 for SNA device support using TCAM-through-VTAM, or (2) the announced level of TCAM for SNA support using TCAM direct control of NCP/VS, without VTAM.

Many of the TCS-AF facilities described below utilize functions provided by TCAM. TCAM through VTAM, the 3704/3705 Network Control Program (NCP) and/or the operating system. Facilities that depend heavily on TCAM are referred to as *TCS-AF/TCAM*, while those that are due to TCS-AF itself are so described.

In single and multicomputer TCS-AF/TCAM systems, there is terminal sharing (among TCAM applications) in either session or transaction modes of operation. Generally, a terminal or application program can communicate with any other terminal or application programs in the network, subject, in general, only to non-mapable device-dependent characteristics, to user-imposed constraints, and to the restrictions indicated below. Terminals need not be dedicated to a particular application environment, and even various types of terminal devices can be shared among different application programs; there can also be application-to-application and terminal-to-terminal traffic. Communication line use is also shared among different application programs and terminals. The terminal operator is effectively isolated from the intricacies of the network architecture, and deals with other network resources (terminals and/or applications) as logical entities, without regard for their actual physical location or hardware identity.

TCS-AF itself features high function facilities for large network configurations that incorporate more than one central processor and/or elaborate application program subsystems. It is practical to share the intercomputer links between interactive and bulk-type traffic because of extensive TCS-AF/TCAM message-priority recognition and queuing facilities. TCS-AF/TCAM capabilities for management of multicomputer links also include automatic load-balancing across multiple links, alternate path and indirect routing, and checkpoint/restart.

TCS-AF incorporates reliability, availability, and serviceability features, including an operator control facility especially tailored for ease in controlling large systems.

Message traffic is stored on main-storage and/or disk queues, the latter permitting checkpoint/restart reconstruction back to time-of-failure. A retrieval program is included to permit retrieval of disk-queued messages by user-authorized terminals. System support programs are provided for on-line monitoring of application status throughout a complete multicomputer network, and for synchronizing intercomputer transmissions to help provide message integrity. Facilities are supplied for manipulating the message queues for destinations, and for accumulating real-time traffic statistics.

A wide variety of application program environments can be supported by TCS-AF/TCAM. Generally, application programs are run in another region or partition than the TCS-AF/TCAM control programs, and application program failures will not affect other programs or network operation. TCS-AF can provide telecommunication control for application subsystem environments (CICS/VS, for example), making these application environments accessible, not only throughout the shared terminal network of a single computer, but also to other shared terminals connected to other computers in a multiprocessor network. Message transmission between terminals and application programs may be handled either in a transaction mode (where each message is routed to its destination(s) based on data in the message) or in a session mode (where routing information is developed once and then maintained during an extended interchange of messages).

User application programs written in Assembler language, in COBOL or PL/I can interface directly with TCS-AF. (For application programs written either in COBOL or PL/I to interface to TCS-AF/TCAM the following compiler must be used: OS/VS COBOL Compiler and Library (5740-CB1); OS Full American National Standard COBOL V4 Compiler and Libraries (5734-CB2); OS PL/I Optimizing Compiler (5734-PL1). The TCS-AF/TCAM/application program interface appears to the application program as a sequential access method (SAM) interface, so that many applications may be tested using sequential input/output devices, before they are run in the actual online system. Application program checkpoints can be coordinated with the checkpoint facilities of the TCS-AF/TCAM control program.

### TCS-AF FEATURES and CAPABILITIES

The lists which follow, although not exhaustive, summarize the principal features of a TCS-AF/TCAM system. Features of interest to both users of single computer networks and users of multiple interconnected networks are presented first, and then those features applicable only in a multicomputer network are described. The functions discussed include some that are performed entirely by TCS-AF, as well as others that are derived from facilities offered by TCAM (or TCAM through VTAM), 3704/3705 Network Control Program (NCP/VS) or the operating system. TCS-AF/TCAM is able to supply a range of services for control of complex networks because it communicates with other programming systems -- including the user's own application programs -- to utilize capabilities from these different sources to help satisfy each user's particular requirements.

#### Single and Multiple Processor Capabilities

Terminal sharing among diverse application programs or application program subsystems: each terminal device can access numerous programs, instead of having to be dedicated to a single application environment. In general, the only constraints in TCS-AF/TCAM terminal-sharing facilities are those that the user can specify -- to restrict access to critical or confidential data, according to the user's own security needs, or the restrictions stated below.

The TCS-AF/TCAM control program provides message *priority* and *queuing* facilities, as well as space (disk queues) for detaining low-priority transmission traffic while high-priority interactive application traffic is serviced. Communication lines, particularly intercomputer links, can therefore be shared among different types of application traffic, generally without significant response degradation of high priority (interactive) traffic.

As each message passes through the TCS-AF/TCAM message control program -- first, when it is sent from its origin to the message queue maintained for its destination, and later, when it is taken from the queue and sent to the destination station or application -- user-specified message handling code can be used to analyze, validate, and/or edit the message data, and to handle unusual and/or error conditions. These segments of code, called *message handlers*, are a powerful tool that permits access to the message at critical processing times. Each terminal or application environment is associated with a particular set of message handler (MH) code, designed to help satisfy the common telecommunication needs of similar terminals or applications.

Message handler code enables the user to manipulate messages both immediately after they arrive in the central processor, and, again, just before they are sent out to terminals or application programs. Message handlers, therefore, allow some application programs under TCS-AF/TCAM to maintain a high degree of *device independence*. Many device-dependent characteristics can be edited out before a message is passed to an application program, and messages can be formatted for necessary device peculiarities before they are passed to the line from TCS-AF/TCAM. For those users who want to use 3270-type devices with application programs that support a data stream from 2260-like devices, TCS-AF itself supplies an easy-to-use facility that provides this function, without, in most cases, requiring alteration of the application program code.

Message traffic can be routed in *session mode*, where a temporary bond is established between a terminal and an application program for a period of extended conversation. While this session bond is in effect, the control program will automatically recognize that any message entered by the terminal is intended for the application program. There are two session concepts in TCS-AF/TCAM environment; (1) an SNA session which is established between a Logical Unit (LU) and TCS-AF/TCAM, and (2) a logical TCS-AF/TCAM session which is established between a Logical Unit and a TCS-AF/TCAM application program.

Alternatively, traffic between terminals and application programs can, using the TCS-AF/TCAM message handlers, be routed in *transaction mode*, in which the destination of the message is implied by the message data itself. Transaction mode routing is intended for those environments where the message destination normally is different for each message.

TCS-AF/TCAM message handlers can also be used to support terminal-to-terminal *message switching* facilities. Messages can be analyzed and routed to the appropriate destination(s) on the basis of fields in the message header. A wide variety of message formats can be supported by using TCS-AF/TCAM facilities.

**Application-to-application routing:** Just as terminals can route traffic to other terminals (message switching), applications can route traffic to other TCS-AF/TCAM application programs. Thus, the output from an application can be routed directly, through the TCS-AF/TCAM control program, to another application program for further processing.

## TCS-AF (cont'd)

Message identification and format *validity* may be *checked prior to transmission/transfer* to the ultimate destination(s). Invalid messages can be detected and handled by user-designed error procedures without involving the destination application program.

TCS-AF operator control incorporates command language facilities (beyond TCAMs) especially suited for *large system management*: network resources can be addressed as groups, rather than individually; many system status information items are displayed only on an exceptions-to-normal basis; routine operator commands can be automatically generated by TCS-AF itself, freeing the system operator's attention for more important tasks.

By the use of operator control facilities the system control operator can *manipulate* the destination message *queues*. Unsent messages on the line/terminal queues can be redirected to alternate destinations, copied to another destination queue, or not sent to their destination, based on the operator's action.

A versatile message *retrieval support program* allows a single operator command to initiate the retrieval of one or number of messages. The selection of messages to be retrieved can be specified as message source/destination, as a range of message input/output sequence numbers, or as message entry date/time period. Only user-authorized terminals can enter TCS-AF retrieval commands.

TCS-AF supplies a *model Message Control Program (MCP)* to assist the user in implementing his single or multiple CPU network.

## TCS-AF Capabilities for Multicomputer Networking:

Diverse processor configurations are supported in a TCS-AF multicomputer network. Some (or all) of the processors in the network can control both terminals and applications; some can control terminals only, and some can control only application programs.

The TCS-AF multicomputer architecture can be *transparent* to the terminal operator, who need never even know which processor in the network is running the application program he is accessing or where any terminal he addresses is actually located.

Distributed application descriptions and status: Each active processor may know critical attributes (e.g., session or transaction mode, priority of input) for application programs with which its terminal set converses. Application program status information is dynamic (e.g., up, down for the day, or temporarily down); Dynamic data like this is continually exchanged among any processors involved, without operator involvement.

Indirect routing: Message traffic can be passed from one processor system to a destination in another processors system by way of one or more intermediate processors which serve as transmission links.

Alternate routing: In a multiple processor network, the normal path between any given pair of processors may become unavailable due to failure of an intercomputer link or of an intermediate processor; the user can specify alternate back-up paths to be used automatically when TCS-AF detects that a path is unusable. Using an alternate path does not disrupt ongoing application program sessions. *Response-time-sensitive* TCS-AF/TCAM priority and queuing logic may speed fast-response (interactive) traffic through bottlenecks that arise due to failures. The alternate routing logic used is present among the network processors which continually exchange *dynamically-updated* data -- a more reliable and rapidly-responding method than centralized control can provide. This flexible and reliable routing control is capable of detecting and handling dead-end, ping-pong, and looping error situations caused by critical line or CPU failures.

Load-balancing across multiple intercomputer links: If the user provides more than one line between two processors, TCS-AF can automatically, on a dynamic message-by-message basis, balance the inter-CPU traffic over as many links as are available.

Flexible centralization or decentralization: Although several functional areas (session management, transaction routing, operator control, alternate routing) have been described as decentralized, any of these can be centralized. This flexibility allows a TCS-AF/TCAM system to match geographic, technical, operational, or business organizational realities of the environment.

TCS-AF facilities allow a user to write a network *interface to non-TCS-AF systems*: Such an interface might range in complexity from a special message handler in the TCS-AF network coupled with some processing in the other system, to an application program that would relay messages in and out of TCS-AF. The user who wants to couple together two processors both containing TCS-AF/TCAM with the channel-to-channel adapter may interface the processors via a user-written application program residing in each processor to pass through the intercomputer traffic.

## RESTRICTIONS and CONSIDERATIONS

Access to a TSO subsystem is restricted to terminals directly attached to the processor in which the TSO subsystem is located.

Considerations attendant to TCAM operation in the VTAM environment remain when TCS-AF/TCAM is used with VTAM. These considerations are described in *OS/VS TCAM Concepts and Facilities* (GC30-2042).

## CUSTOMER RESPONSIBILITIES

To successfully install and use TCS-AF, the customer must first order and install all required communications equipment ... meet minimum machine configuration requirements ... generate OS/VS1 or OS/VS2 system with TCAM ... train all persons installing, operating, or maintaining TCS-AF in TCAM, TCS-AF, and OS/VS ... design the multicomputer networking functions ... design, code and test the MCP ... and develop conversion procedures and schedules. VTAM and/or NCP training and system generation is also required for those systems utilizing TCS-AF/TCAM with VTAM.

## SPECIFIED OPERATING ENVIRONMENT

## HARDWARE REQUIREMENTS

TCS-AF in conjunction with TCAM operates under OS/VS1 on a S/370 Mdl 135, 145, 158, 155II, 165II, 168, 3158-3, or 3168-3.

TCS-AF in conjunction with TCAM operates under OS/VS2 on a S/370 Model 145, 158, 155II, 165II, 168, 158MP, 168MP, 3158-3, 3168-3 and the 3031, 3032, 3033 or 3081 Processors. The MP systems are supported only under OS/VS2 Release 3.

For a system using the TCS-AF Model MCP, the recommended real main storage available to the TCS-AF/TCAM region should be not less than 140K. This includes space only for a 2-line, 5-terminal configuration, and is storage beyond that required by the host operating system and by VTAM. An increase in the size of the network, additional TCS-AF, TCAM, or VTAM functions, or additional message handlers will require more real main storage.

The *TCS-AF Operations Guide* must be used to estimate the real main storage requirements of TCS-AF for each specific customer system.

The data communication link between processors is comprised of one or more BSC lines. These links are controlled by TCAM and/or TCAM through VTAM.

PRPQs will not be accepted at this time.

**Terminal Support:** TCS-AF can operate with any device that is supported by the base level of TCAM used in the TCS-AF/TCAM system. Terminal devices using Systems Network Architecture may be supported through VTAM using TCAM levels 8 and 9, or Start-stop and binary-synchronous line control devices are supported by all TCAM levels. Details of device support and attachment are contained in the *TCAM Concepts and Facilities* manual (GC30-2042) for TCAM-through-VTAM, and the *TCAM Concepts and Applications* manual (GC30-2049) for TCAM with direct NCP/VS support. (Figures summarizing terminal support capabilities and attachment dependencies are also available in the sales manual pages for TCAM system control programming.)

TCS-AF provides enhanced support for the 3270 Information Display System. (local and BSC remote), including:

- Status and sense information interpretation
- Improved 3284/86 printer scheduling
- Printer copy request (remote attachment only)
- Device independence for applications written to support 2260 terminals

## SOFTWARE REQUIREMENTS

This program product is available to work with the following system control programming TCAM release levels:

TCAM 5F	OS/VS Releases 1.6 and 1.7
TCAM 8	OS/VS1 Release 4.0; OS/VS2 Releases 3.0, 3.6, 3.7
TCAM 9	OS/VS1 Releases 5.0 and 6.0; OS/VS2 Release 3.7

TCS-AF for TCAM/NCP/VS-Direct is available now.

When each TCAM release level is no longer considered to be current, programming support for TCS-AF on that release level will be discontinued; support for discontinued levels will be withdrawn and central programming services will no longer be provided.

## COMPATIBILITY

TCAM MCPs must be recoded to take advantage of TCS-AF presence in the system.

**TCS-AF (cont'd)****DATA SECURITY**

TCS-AF provides *authorization facilities* oriented towards permitting only user-authorized station devices to access certain user-specified application programs or subsystems or to utilize system facilities like TCS-AF operator control and retrieval. Further details on data security are contained in the TCS-AF Concepts and Facilities Manual (GH20-1735).

**PERFORMANCE CONSIDERATIONS**

As with other large virtual systems, the performance of TCS-AF in a virtual storage environment is highly dependent on the system resources available. Particular attention to ensuring the adequacy of real resources (main storage, processor computing capability, direct access devices and channels) is required to achieve satisfactory throughput and response time.

In addition to the system configuration, performance is influenced by many factors including:

- Paging characteristics of TCS-AF and other programs executing concurrently.

- The relative processor dispatching and I/O device scheduling priorities assigned to TCS-AF and other programs executing concurrently.

- User design and implementation of the message control program (MCP).

To verify specific performance, benchmarking the TCS-AF system may be appropriate.

The rate and efficiency with which data is transferred between processor nodes is extremely critical to achieving response time objectives. Internodal performance is dependent upon many factors including:

- The number of messages and data characters transferred between processor nodes.

- The number of data links available and the effective data rate which can be achieved by them.

- Conditioning of the data links and error conditions which may be encountered.

- The assignment of priority levels to maximize throughput and/or improve the response characteristics of critical data.

- The user's ability to utilize load-balancing across multiple links.

TCS-AF recognizes the response sensitivity of the internodal connection and permits accumulation of statistics related to data movement, which can be used in planning performance improvements.



PROGRAM PRODUCTS

**DB/DC DATA DICTIONARY  
DOS/VS (5746-XXC), OS/VS (5740-XXF)**

**PURPOSE**

The DB/DC Data Dictionary is a central collection of information about data resources that are needed for efficient data management. The DB/DC Data Dictionary improves the manageability of a data processing installation by storing, processing and reporting on definitions, descriptions and relationships of data. This document uses the name Dictionary when referring to either DB/DC Data Dictionary program product unless otherwise noted.

**DESCRIPTION**

The Dictionary deals with categories of subjects, the relationships between subjects, and the attributes which characterize subjects and relationships. Categories are families of items, such as data bases, programs or personnel. The data base category would, for example, contain individual data base descriptions as subjects. Relationships represent the interaction between subjects. For example, a relationship between a pair of subjects representing an application program and a data base might indicate that the program accesses that data base. Attributes describe properties of a subject or relationship such as size, frequency, or the date a relationship was established.

The name, DB/DC Data Dictionary, represents two products - one that operates in the OS/VS environment (program product 5740-XXF), and the other that operates in the DOS/VS environment (program product 5746-XXC). In the OS/VS environment the product operates with the following DB/DC systems: IMS/VS DB or IMS/VS DB/DC (5740-XX2), or CICS/OS/VS (5740-XX1) with IMS/VS DB. In the DOS/VS environment, the product operates with the following DB/DC systems: DL/I DOS/VS (5746-XX1) with or without CICS/DOS/VS (5746-XX3). If the Dictionary is to be used only in a batch environment, either the IMS/VS Data Base System or DL/I DOS/VS is required.

The Dictionary utilizes DL/I data bases to store definitions of data and data usage under these subject categories:

- data base - physical, logical, primary or secondary index DL/I data bases, or non-DL/I data sets
- segment - DL/I data base segments or non-DL/I records
- element - fields or group data items
- PCB - DL/I program communication blocks
- system definition - IMS/VS system definition information
- system - major application systems, such as a payroll system
- job - processing units corresponding to single jobs
- program - major programs or job steps
- modules - functional subsections of programs
- transaction - DL/I or non-DL/I transactions
- PSB - DL/I program specification blocks
- dduser - security information and passwords of all dictionary users
- category - installation-defined subject-category definition
- relationship type - installation-defined relationship types
- attribute type - installation-defined attributes of subject categories

A data definition is entered into the dictionary through either the dictionary command language or the interactive display form facility. The definitions may contain the following entry types:

- subject name - user name for this subject, plus dictionary qualifiers for the name
- aliases - other names by which this subject is known to the user
- attributes - anticipated entries of various characteristics for a given subject category
- description - text describing the subject, with user-specified format and content
- user data - for any user information that cannot be included as attribute data, with user-specified format and content
- relationships - cross references between this subject and other subjects in the same or other subject categories
- relationship data - information about the nature of the relationship between certain kinds of subjects

**DESCRIPTION OF RELEASE 1.0**

**Centralized Source of Information and Control:** The dictionary can be a central source of information about a company's data resources, including application data still in test stages.

**Automated Capture of Existing Definitions:** COBOL source either from sequential files or COBOL copy libraries can be read by the dictionary to obtain initial record definitions, as can the DBD (data base description) and PSB (program specification block) libraries. Additional information can be added by using dictionary commands, or copied from existing dictionary descriptions. For conversion from non-DL/I systems to DL/I data bases, the Data Base Design Aid (5748-XX4) assists in data base design and produces output in the form of dictionary commands which can be directly accepted by the dictionary.

**Flexibility of Use:** The command language lets the user add, change, relate or delete information in all subject categories, scan the information for selective retrieval, copy existing definitions and obtain varied

output in machine and human-readable form. Provisions are also made for storing non-DL/I data and user-unique data, thus enabling installations to integrate all their data definitions into one central dictionary.

**Interactive Display for IMS/VS:** Most dictionary commands can be executed online through the 3270 Display System. In addition, a task-oriented facility is provided that guides the user in entering specific definitions and displaying current dictionary contents. Each display form is designed for one specific DL/I definition. (For example, a different form is provided for defining a physical data base than for defining a primary index data base.) Each form has an associated explanation frame that provides information on how to use it. This method of entering definitions can help reduce errors by avoiding omissions, contradictions and misspellings. It can also be productive in that a single form may result in many dictionary commands being executed.

**Extensive Reporting Capability:** Users can obtain predefined reports on the complete contents of a subject category or full details of definitions and their relationships in printed or (online) display form. A SCAN facility provides for user-specified selective retrieval of information from the dictionary. Hierarchical data base structures can be printed out in indented formats. Common to both the OS/VS and DOS/VS dictionary versions are printed reports that are equivalent in content to most of the formatted display frames available with the online (IMS/VS) interactive displays. Additional custom reports, if desired, can be generated using GIS/VS. No GIS/VS data description tables (DDTs) for the Dictionary data bases will be provided in the licensed documentation.

**Systematized Control of Data Base Modifications:** If all data resources are described in the dictionary, it becomes a useful tool for controlling standards, versions and modifications. Its reports, naming conventions, search capability and cross-references help in studying the effect of proposed change. Until standardization is achieved, the dictionary assists in control of duplicate names by keeping track of multiple occurrences.

**DBD and PSB Generation:** Dictionary commands can process stored definitions to produce source statements for the generation of data base descriptions and program specification blocks suitable for host DL/I libraries.

**Data Structure Generation:** Another output of the dictionary is data declarations suitable for inclusion in COBOL, PL/I or Assembler Language programs.

**DESCRIPTION OF RELEASE 2.0**

Release 2.0 of the dictionary contains all the function of Release 1.0, except the REPORT\_ALL function which was dropped, and in addition provides the following new functions:

**Batch Forms Input:** The input capability of the DB/DC Data Dictionary has been enhanced in Release 2.0 by a batch forms input facility, which permits element and segment definitions and text information to be prepared on pre-printed forms and entered into the dictionary via a batch job stream. Segment and element definitions may include not only the usual set of subject attributes, but also the identities of elements and subelements contained within the subject, thus providing a definition of subject structure. Text information which may be entered consists of descriptions and user data for any subject category, and commentary for segments and elements. The forms may be used to create new subjects and to add data to existing subjects. A report is produced showing the data that was entered and any diagnostic messages produced. The facility provides an alternative to the COBOL\_IN command for capturing large amounts of segment and element information, and brings to the batch user the convenience of forms for bulk data entry.

**COBOL Input Enhancements:** The COBOL\_IN command in Release 1.0 has been enhanced by making the dictionary updating phase of the command a user option. With updating suppressed, the COBOL\_IN command produces a listing of the information that would be stored in the dictionary with updating selected, and optionally a punch data set containing the dictionary commands which would do this updating. In this way the user may verify the suitability of COBOL source statements before committing the information to the dictionary, and may use the punched commands, modified as necessary, to enter the correct definitions into the dictionary.

**IMS/VS System Definition Support:** The role of the dictionary as the centralized source of information and control has been enhanced through the addition of a facility for documenting the information contained in the IMS/VS DATABASE, APPLCTN and TRANSACT system definition macros. A subject category, the System Definition, has been added, along with new attributes for transactions and program specification blocks (PSBs), and relationship categories for relating system definitions to data bases, transactions, and PSBs. Existing commands and interactive display facilities have been extended to permit the entry and reporting of system definition information. A STAGE\_1\_OUT command permits system definition information to be produced in machine-readable records in the format of IMS/VS

## Data Dictionary (cont'd)

DATABASE, APPLCTN and TRANSACT macros, so that these records can be incorporated directly into IMS/VIS Stage 1 system definition job streams. The command includes an IMS/VIS release parameter, to permit the user to specify the release of IMS/VIS for which the macros are being produced. The support extends the control function of the dictionary to the system definition activity of the IMS/VIS DB/DC user, and provides documentation aid for the IMS/VIS DB and DL/I user migrating to IMS/VIS DB/DC.

**Extend Relationship Facility:** An EXTEND\_RELATIONSHIP command has been provided to relate each of the elements in a segment, or each of the first-level subelements in an element, to another subject. For example, a single EXTEND\_RELATIONSHIP command may be used to relate each of the fields in segment XYZ to program ABC. Previously, such relationships had to be established through individual ADD\_RELATIONSHIP commands. The new command provides a convenient way of making implied relationships explicit.

**Recalculate Segment Facility:** A RECALCULATE\_SEGMENT command has been provided to restore consistency to a set of related segment and element definitions whose lengths and other attributes have been updated independently of one another. The command uses current element and subelement lengths and justification attributes to recalculate segment lengths and element starting positions, and optionally updates the dictionary with the new information. With updating suppressed, a punch data set of the equivalent updating commands may optionally be produced. A report showing the old and new attributes is produced. The command makes it unnecessary to use individual CHANGE\_IN and CHANGE\_RELATIONSHIP\_DATA commands on the subjects and relationships in a structure in order to make the structure consistent.

**Reports Enhancements:** A report, the indirect subject reference report, has been provided to assist the user in locating references to elements, segments and data base subjects which have been stored as part of the dictionary data. The report is useful in maintaining dictionary consistency through its existing maintenance facilities.

The usability of the glossary report has been enhanced by permitting the user to specify the number of description lines to be shown for each subject, and to optionally suppress the printing of subject attributes. The user may also specify that the report be sorted on any combination of the four components of subject name (status code, subject code, user name and occurrence number). For example, if status code is selected as the major sort field, the report that results may be physically separated into sections each dealing with a different status code.

**Output Enhancements:** A PUNCH command is provided to create 80-character machine-readable records from user data segments previously entered through the dictionary updating facilities. User data segments are typically used for program source and job control language statements, and the PUNCH command makes it convenient to include these statements in the users' job streams.

The STRUCTURES\_OUT command is enhanced to permit the optional inclusion of comment records holding the dictionary attributes of the subjects from which the structures are generated. This provides a ready reference to these dictionary subjects, e.g., in case the structures must be modified. Also added is an installation option which permits the user to set the level number increment in generated structures so that it conforms to installation programming practices. For COBOL structures, the PICTURE clause has been aligned for readability.

### DESCRIPTION OF RELEASE 3.0

The following enhancements are provided in Release 3.0 of DB/DC Data Dictionary. The enhancements are available in both the OS/VIS and DOS/VIS products.

**CICS/VIS Interactive Display Forms Facility:** An interactive user interface for CICS/OS/VIS and CICS/DOS/VIS Dictionary installations is provided which is equivalent to the IMS/VIS Interactive Display Forms Facility including the Release 3.0 enhancements.

**Security Facility:** A Security Facility provided is available as an installation option. A 'signon' validation function allows the installation to determine the set of Dictionary users. A user profile security function can be used to partition the Dictionary according to status codes, subject categories and ability to update and/or view data.

- **Signon Security:** Users can be identified to the Dictionary, and IDs validated via passwords, to control access within the Dictionary. Users may use the signon validation provided by the Dictionary or in an online environment:
  - If the customer has IMS/VIS V1 R1.5 installed, then the IMS/VIS user identification security feature may be used to pass a validated user ID to the Dictionary.
  - MVS customers with both IMS/VIS V1 R1.5 and RACF Release 3 (5740-XXH) and subsequent releases installed may use the IMS/VIS supported RACF signon facility to pass a RACF validated user ID to the Dictionary.
  - If the customer has CICS/VIS installed, the operator identification may be passed by CICS/VIS to the Dictionary.

- **User Profile Security:** User profile security provides a means for restricting a user's access to the dictionary by status code and by subject category. The security check is applied during initial reference to a dictionary subject, for example, in batch prior to execution of each command and online prior to processing a request on the header display form or display forms where the REUSE action is allowed.

The status code portion of a subject name is used as the security key. A user's profile may allow read/write access, read-only access, or no access to subjects based on their status code.

Use of the Dictionary may also be restricted by subject category. Each user is able to access only that group of Dictionary categories identified in that user's profile.

**Enhanced PL/I Support:** PL/I data attributes may now be specified explicitly, replacing the PL/I text strings used previously. This enhanced support is comparable to that for COBOL data attributes. The command language, the Interactive Display Forms Facility, and the Batch Forms Input Facility have been extended to support the entry and maintenance of the new attributes.

A batch PLL\_IN function accepts PL/I structure declarations stored in %INCLUDE libraries or as sequential files, and creates the appropriate subjects and relationships in the Dictionary. Updating can optionally be suppressed, in which case only a report of the definitions that would have been stored in the Dictionary is produced.

The STRUCTURES\_OUT function generates PL/I data declarations directly from the new PL/I attributes, rather than from the current text strings. Output consists of a report and card images suitable for inclusion in a %INCLUDE library.

A conversion aid is supplied to assist in converting the PL/I information in an existing Release 2 Dictionary to the form required by the new PL/I support.

**GIS/VIS Descriptor Support:** The Dictionary has been enhanced to support attributes of the type used by query products such as GIS/VIS. The command language and the Interactive Display Forms Facility has been extended to support the entry and maintenance of the new attributes. A DDT\_OUT function is provided that generates statements which may be inserted into the installation's OS/VIS or DOS/VIS GIS Data Description Table (DDT) generation job stream.

**Extensibility Facility:** This facility permits an installation to extend its dictionary to include up to 200 new subject categories representing, for example, personnel, organizational entities, hardware devices, etc., of particular importance in its own data processing operations.

Similarly, the installation is able to define new *types* of relationships. One or more different types of relationships may be defined between installation-defined subject categories, or between an installation-defined subject category and a Dictionary-supplied category.

The installation may associate a set of attributes and validation rules with each defined subject category and relationship-type. In addition, the installation is able to supply its own installation written routines for subject name and attribute value validation.

Subjects and relationships in installation-defined categories may be created and maintained through the Dictionary update language, batch forms, or through the Interactive Display Forms Facility using a set of generalized display formats. Through any of these facilities, subjects and attributes may be referred to by their installation-defined names and keywords, just as are Dictionary-supplied subjects and attributes.

**Program Access Facility:** The Program Access Facility provides a means for programs to access the information contained in the Dictionary and to request services of the dictionary program. The data structures seen through the Program Access Facility are essentially those seen by the user of the current command language and Interactive Display Forms Facility: namely, subjects and relationships. Users of the Program Access Facility do not need to be aware of the Dictionary data base structure.

The Program Access Facility permits customer-written routines to request functions such as:

- Retrieve attributes of individual subjects and relationships.
- Retrieve lists of subjects in a specified category or related to a specific subject.
- Retrieve description and user-data text.
- Provide output to printer, terminal and punch.

The Program Access Facility supports routines written in COBOL, PL/I, and Assembler. These routines are started via Dictionary command, and execute in the Dictionary region. They request dictionary services through the CALL facilities in these languages.

A number of aids for writing programs that use the Program Access Facility are included. In addition, a sample program in each of the supported programming languages is included with Release 3.0.

## Data Dictionary (cont'd)

### Usability/Productivity/Performance Improvements

**STRUCTURES\_OUT Enhancements:** A user may specify a prefix or suffix (or both) which will be concatenated with each subject name in an output structure.

If only length, data type, and (optionally) number of decimal place attributes are provided for each field in a structure, then STRUCTURES\_OUT can generate equivalent structures for COBOL, PL/I, and Assembler.

**Dictionary Default Specification:** A new macro is provided that allows an installation to establish its own defaults for certain Dictionary parameters.

### Report and SCAN Enhancements

- The GLOSSARY report is modified to permit the reporting of individual subject categories or subsets.
- The SCAN report is similarly enhanced to permit limiting the scan to individual subject categories or subsets, plus a capability to specify starting positions for scanning. The installation will also be able to control the maximum number of subjects to be reported when operating in either online or batch environments.
- The formats of various reports have been modified to improve readability.

**Batch and BMP Checkpoint:** The Dictionary allows the installation to request that checkpoint calls be taken at periodic intervals when run in a BMP or Batch environment. A new command allows a user to request checkpoints at specific points in a batch input stream.

**Online Usability Enhancements:** With Release 3.0, the online user can:

- Switch conveniently between display forms and commands during the same interactive session.
- Reuse certain display-forms repeatedly (for example, to define many different elements), without having to return to the header form.
- Easily page through a list of data within a subject entry, using a default DOWN count.
- Take advantage of a processing default for the ENTER key. That is, pressing the ENTER key will, where applicable, be equivalent to selecting the process action.

### Text Data Enhancements

- The maximum length of a line of description text has been increased from 40 to 72 characters.
- The maximum number of lines of description and of the five sets of user-data text that can be stored in the Dictionary for a given subject have been increased from 255 to 999.
- A new USERDATA form that displays seven 80-character lines of text will be available, in addition to the current USERDATA display-form, which displays 15 lines of user-data text, each line truncated at 72 characters. Either form may be selected as an installation option. The maximum length of a line of user-data text remains unchanged at 80 characters.

**Element Type-Code Revised:** Release 2.0 element type-codes have been revised to be consistent with assembler conventions for data types. The Release 3.0 conversion package transforms Release 2.0 element type-codes to the revised Release 3.0 format.

### DESCRIPTION OF OS/VS RELEASE 4.0

DB/DC Data Dictionary OS/VS Release 4.0 (5740-XXF) contains support for the field level sensitivity function which is part of IMS/VS Version 1 Release 1.5 (5740-XX2) Data Base System and some additional usability/productivity enhancements. Release 4.0 of the Dictionary includes all of the functions of the OS/VS Release 3.0 product and adds new functions.

The field level sensitivity function of IMS/VS gives an installation the ability to limit the data which an application may view, not only at the segment level, but also at the field level within the segment. In IMS/VS DL/I, a PSB (view) for an application may now limit the application's sensitivity to only certain fields within a segment of a data base. Previously, a PSB (view) could only limit sensitivity to segments within a data base, not its fields. The Dictionary will now support this function.

#### Field Level Sensitivity Support

The IMS/VS Version 1 Release 1.5's field level sensitivity function is supported by a new Dictionary facility which provides the capability to define logical views of a given IMS/VS DL/I segment. Each logical view consists of an appropriate subset of the segment's fields which comprise that view. The following Dictionary functions will provide support for the new logical view:

- PSB\_IN recognizes the existence of SENFLD information and creates logical views.

- PSB\_OUT produces SENFLD statements when required.
- The COPY and DELETE\_STRUCTURE commands provide for copy and deletion of a logical view as part of a hierarchical structure.
- Dictionary update commands and Interactive Display Forms provide for the definition and modification of logical views and their associated relationships.
- Information on logical views is retrievable through the Program Access facility.
- Several of the Dictionary reports are enhanced to include information on logical views.
- The SCAN command is enhanced to retrieve logical views of a particular segment or the segment to which a logical view is related.
- The Segment Definition Form of the Batch Forms facility is redesigned to support definition of logical views.
- Usability/Productivity Enhancements
  - A new option on the DELETE command provides the ability to delete aliases of a subject whenever the subject itself is deleted.
  - A new DVALUES parameter is added to DBD\_OUT, PSB\_OUT, and DDT\_OUT. If DVALUES=YES is specified, a comment record will be included in the generated output to identify the Dictionary entry.
  - An enhancement to PSB\_OUT will allow the same PCB to be produced in different relative locations in different PSBs.
  - PSB\_IN is no longer restricted to a physical hierarchical segment order for sensitive segments.

### DESCRIPTION OF DOS/VS RELEASE 4

DOS/VS DB/DC Data Dictionary Release 4 (5746-XXC) contains support for the field-level sensitivity function and other enhancements. The name 'Dictionary' as used in this description refers to DOS/VS DB/DC Data Dictionary Release 4 unless otherwise noted. Release 4 of the Dictionary includes all of the functions of the DOS/VS DB/DC Data Dictionary Release 3 product and adds new functions.

The field-level sensitivity function of DL/I DOS/VS gives an installation the ability to limit the data which an application may view, not only at the segment level, but also at the field level within the segment. In DL/I DOS/VS, a Program Specification Block (PSB) for an application may now limit the application's view to only certain fields within a segment of a data base. Previously a PSB (view) could only limit sensitivity to certain segments within a data base, not its fields. The Dictionary will now support this function.

**FIELD-LEVEL SENSITIVITY SUPPORT:** The DL/I DOS/VS's field-level sensitivity function introduced in Version 1 Release 5 is supported by a new Dictionary facility which provides the capability to define logical views of a given DL/I DOS/VS segment. Each logical view consists of an appropriate subset of the segment's fields which comprise that view. The following Dictionary functions provide support for the new logical view:

- PSB\_IN recognizes the existence of SENFLD and VIRFLD information and creates logical views.
- PSB\_OUT produces SENFLD and VIRFLD statements when required.
- The COPY and DELETE\_STRUCTURE commands provide for copy and deletion of a logical view as part of a hierarchical structure.
- Dictionary update commands and interactive display forms provide for the definition and modification of logical views and their associated relationships.
- The STRUCTURES\_OUT command produces data structures for logical views.
- Information on logical views is retrievable through the Program Access Facility.
- Several of the Dictionary reports are enhanced to include information on logical views.
- The SCAN command is enhanced to retrieve logical views of a particular segment or the segment to which a logical view is related.
- The Segment Definition Form of the Batch Forms Facility is redesigned to support definition of logical views and their associated relationships.

**SUPPORT OF ADDITIONAL DL/I DOS/VS FUNCTIONS:** DL/I DOS/VS Version 1 Releases 5 and 6 have included other enhancements which are now supported by the Dictionary. Dictionary adds support for the following DL/I DOS/VS enhancements:

**Data Dictionary (cont'd)**

- PSB\_IN recognizes when the Automatic Definition Sequencing feature of DL/I DOS/V5 Version 1 Release 5 has been used and calculates field start positions.
- DBD\_IN and DBD\_OUT allow usage of the Automatic Segment Size Calculation features of DL/I DOS/V5 Version 1 Release 5.
- DBD\_IN recognizes and DBD\_OUT produces the POINTER=NOTWIN parameter introduced in DL/I DOS/V5 Version 1 Release 5.
- DBD\_IN recognizes and DBD\_OUT and STRUCTURES\_OUT produces the new element type codes introduced in DL/I DOS/V5 Version 1 Release 5.
- DBD\_IN recognizes and DBD\_OUT produces the IMS/V5 compatibility parameter introduced in DL/I DOS/V5 Version 1 Release 6.

**USABILITY/PRODUCTIVITY ENHANCEMENTS**

- A new option on the DELETE command provides the ability to delete aliases of a subject whenever the subject itself is desired.
- A new DVALUES parameter is added to DBD\_OUT, PSB\_OUT, and DDT\_OUT. If DVALUES=YES is specified, a comment record is included in the generated output to identify the Dictionary entry. These commands, as well as the STRUCTURES\_OUT command, provide the ability to request that the name used in the DVALUES command be the primary name rather than the alias.
- An enhancement to PSB\_OUT allows the same PCB to be produced in different relative locations in different PSBs.
- A time and date stamp is added to Dictionary log records.
- Printing the password is suppressed when logging the Dictionary SIGN\_ON command.

**CUSTOMER RESPONSIBILITIES**

A customer installing the DB/DC Data Dictionary must collect and record the descriptions and relationships concerning the data entities to be stored in the dictionary.

**AVAILABILITY**

DB/DC Data Dictionary OS/V5 Release 4.0 (5740-XXF) is available now. The planned availability date for DOS/V5 DB/DC Data Dictionary Release 4 is January 29, 1982.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The machine configuration required for DB/DC Data Dictionary is determined by the requirements of the host operating system, DB/DC system and objectives of the installation. A customer installing the DB/DC Data Dictionary must have at least the minimum machine configuration for IMS/V5, CICS/V5 and/or DL/I DOS/V5.

The disk storage requirement is a function of the specific number of descriptors stored by the installation.

For OS/V5 and DOS/V5 Dictionary Release 3: The DB/DC Data Dictionary product gives the customer the option of creating several dictionary load modules that perform subsets of the function provided by the Dictionary. This allows the customer to create smaller load modules when the installation does not need the full range of Dictionary function available for Release 3.0. The virtual storage requirement of each program will not exceed 550K for overlay configurations, exclusive of operating system and DB/DC system requirements. A virtual storage size of 900K to 1300K will be required for various non-overlay configurations.

For Dictionary OS/V5 Release 4.0: The virtual storage requirement of each program, exclusive of operating and DB/DC system requirements, requires approximately 1380K of storage for online operation (approximately 440K if the overlay structure is utilized), or approximately 1040K of storage for batch operation (approximately 420K if the overlay structure is utilized).

The Dictionary will support display terminals with at least 24 lines of 80 characters which are supported by the underlying IMS/V5 or CICS/OS/V5 system. These terminals will be required to operate the online (teleprocessing) version of the Dictionary and are handled through normal IMS/V5 and CICS/OS/V5 system support.

For DOS/V5 DB/DC Data Dictionary Release 4: The machine requirements for Dictionary Release 4 are determined by the requirements of the host operating system, DB/DC system, and objectives of the installation. A customer installing the Dictionary must have at least the minimum machine requirements as defined by IBM for DL/I DOS/V5 (5746-XX1) and/or CICS/DOS/V5 (5746-XX3).

The Dictionary gives the customer the option of creating several load modules that perform subsets of the function provided by the Dictionary. This allows the customer to create smaller load modules when the installation does not need the full range of function available. The full-function virtual storage requirements of each program,

exclusive of operating and DB/DC system requirements, is approximately 600K of storage for online operation, or approximately 1000K of storage for batch operation (approximately 600K if the overlay structure is utilized).

The Dictionary will support display terminals with at least 24 lines of 80 characters which are supported by the underlying CICS/DOS/V5 system. These terminals will be required to operate the online (teleprocessing) version of the Dictionary, and are handled through normal CICS/DOS/V5 system support.

The CICS/DOS/V5 Basic Mapping Support (BMS) source code furnished with the Dictionary will provide input/output formatting for all terminals that are supported by CICS/DOS/V5 and meet the above screen size requirements.

**SOFTWARE REQUIREMENTS**

Release 4.0 of the DB/DC Data Dictionary OS/V5 product (5740-XXF) operates as an application program under IMS/V5 V1 R1.5 (5740-XX2), or CICS/OS/V5 V1 R4.0/R4.1 (5740-XX1) with IMS/V5 V1 R1.5 DB (5740-XX2), and subsequent releases unless otherwise specified.

Note: DB/DC Data Dictionary OS/V5 Release 3.0 will not be supported on CICS/OS/V5 V1 R5.0.

For OS/V5 Dictionary, a System Modification Program Release 4 (SMP4) job stream will be provided as a file on the distribution tape for installation of the DB/DC Data Dictionary OS/V5 Release 4.0 using SMP4. Program service will be provided periodically in SMP4 format for object code. DB/DC Data Dictionary OS/V5 Release 3.0 provided an SMP3 or SMP4 job stream.

Release 3.0 of the DB/DC Data Dictionary DOS/V5 product (5746-XXC) operates with:

- DL/I DOS/V5 V1 R4.0 (5746-XX1) and
- CICS/DOS/V5 V1 R4.0 (5746-XX3), if Interactive Display Forms are used,

Release 4 of the DOS/V5 DB/DC Data Dictionary product (5746-XXC) operates with DL/I DOS/V5 (5746-XX1) Version 1 Release 5, DL/I DOS/V5 Version 1 Release 5 HLP1 ICR, DL/I DOS/V5 Version 1 Release 6, and subsequent releases unless otherwise specified. The Dictionary's Interactive Display Forms Facility operates with CICS/DOS/V5 (5746-XX3) Version 1 Release 5 with HLP1 ICR (ICR2) or subsequent releases unless otherwise specified.

For operating system requirements, see DL/I DOS/V5 or CICS/DOS/V5 programming systems support in the appropriate DL/I DOS/V5 or CICS/DOS/V5 documentation. Dictionary requires VSE/Advanced Function Release 2 and subsequent releases unless otherwise specified.

If the SORT option of the REPORT command is specified, use the DOS/VSE Sort/Merge Program, 5746-SM1, (or a SORT program with an equivalent program interface).

For operating system requirements, see IMS/V5, or DL/I DOS/V5, or CICS/V5 programming system support in the appropriate IMS/V5, or DL/I DOS/V5, or CICS/V5 documentation.

For DOS/V5 DB/DC Dictionary: A Maintain System History Program (MSHP) job stream will be provided for installation of the DOS/V5 DB/DC Data Dictionary Release 4.

The Dictionary source language is Basic Assembler Language (BAL) with the following exceptions:

- Three modules written using the CICS/V5 High Level Programming Interface and BAL.
- PL/I macros and sample program for PL/I users of the Program Access Facility.
- COBOL macros and sample program for COBOL users of the Program Access Facility.

The Dictionary is distributed primarily in object code format. Source code is available as optional machine readable material.

**Product Currency:** The following table shows the currency period of DB/DC Data Dictionary through the date shown:

DB/DC DATA DICTIONARY	CURRENCY DATE	
	5740-XXF OS/V5	5746-XXC DOS/V5
R3.0	5/81	*

\* Program Currency will be provided by IBM until discontinued upon 12 months written notice.

**COMPATIBILITY/CONVERSION**

## Data Dictionary (cont'd)

Release 1.0 of the DB/DC Data Dictionary was an evolutionary development of two IBM Field Developed Programs, the IMS Dictionary System (5798-BBA) and the IMS Dictionary Enhancements (5798-CEE). It incorporates the functions of these FDPs, plus:

- DOS/VS operation
- Interactive display forms facility (IMS/VS only)
- Enhancement of Report function
- COBOL Input Command
- Improved and enhanced Structures Out
- Hierarchical Delete capability
- Copy command
- Relocate command for modifying hierarchical structures
- Ten additional levels of test status

Release 2.0 includes all of the function of Release 1. Release 1.0 command streams and display terminal procedures are usable in Release 2, with two exceptions: The REPORT\_ALL command is no longer valid, since its function has been included in the enhanced glossary report; and the update option default for COBOL\_IN has been changed.

The internal format of the dictionary has been modified in Release 2 to incorporate a new subject category, new relationship categories, and new attributes. This means that dictionary data bases created under Release 1.0 must be converted to the new format to run under Release 2. A conversion procedure, which makes use of standard IMS/VS DB system or DL/I DOS/VS utilities, is provided in the documentation.

Release 2.0 also includes conversion aids to assist the user in converting to Release 2.0 from the IMS Dictionary System (5798-BBA) and the IMS Dictionary Enhancements (5798-CEE) Field Developed Programs.

Release 3.0 includes all of the function of Release 2.0. The internal format of the DB/DC Data Dictionary data bases is modified in Release 3.0. This means that the data bases created under Release 2.0 must be converted to the new format to run under Release 3.0. A conversion package is provided with Release 3.0 to:

- transform Release 2.0 element type-codes to revised Release 3.0 formats.
- convert Release 2.0 description text to the longer length supported in Release 3.0.
- aid in converting Release 2.0 PL/I data to Release 3.0 PL/I data formats.

**Note:** No conversion aid or support is provided to assist installations moving from the FDP or Release 1.0 Dictionary products to Release 3.0.

Dictionary OS/VS Release 1 includes all of the functions of Release 3.0. The internal format of the DB/DC Data Dictionary data bases is modified in Release 4.0. The IMS/VS DL/I Utilities can be used to convert Dictionary OS/VS Release 3.0 data bases to Release 4.0 format.

DOS/VS DB/DC Data Dictionary Release 4 includes all the functions of the DOS/VS DB/DC Data Dictionary Release 3. The internal format of the Dictionary data bases is modified in Release 4. The DL/I DOS/VS utilities can be used to convert Dictionary Release 3 data bases to Release 4 format.

**Note:** No conversion aid or support is provided to assist installations moving from the FDP or Release 1.0 and 2.0 Dictionary products to Release 4.0.

### AUDITABILITY

The dictionary is of interest to internal auditors, as well as others concerned with data integrity because of its data description and documentation capabilities, and its use as a vehicle for controlling and tracking data base changes. Dictionary use may be monitored through the standard logging facilities in IMS/VS, CICS/VS and DL/I DOS/VS, and through the optional logging of commands by the Dictionary.

### DATA SECURITY

The Dictionary operates as an application program under DL/I and its use is controlled with the standard security features of IMS/VS or CICS/OS/VS for OS/VS Dictionary, and the standard security features of DL/I DOS/VS or CICS/DOS/VS for DOS/VS Dictionary. Attempts to access Dictionary data in an MVS environment outside of IMS/VS can also be controlled through the use of RACF.

Dictionary provides a Security Facility composed of two functions: Signon validation and a user profile security.

### PERFORMANCE CONSIDERATIONS

The Release 3.0 interactive display enhancements may significantly reduce the number of transactions, region schedules, etc., required in support of the Dictionary online user.

For example, the Release 3.0 online enhancements permit the entry and editing of 10 different data element definitions with 33% fewer region schedules than Release 2.0.

There is no significant change in the performance of the DB/DC Data Dictionary OS/VS and DOS/VS Release 3.0 function in Release 4.0. CICS/OS/VS users should also refer to the note in the "Programming Requirements" section.

### MVS INTEGRITY

IBM will accept APARs describing situations where the installation of the DB/DC Data Dictionary program product causes an exposure to the system integrity of OS/VS2 MVS.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## OS/VS DB/DC DATA DICTIONARY VERSION 1 RELEASE 5 5740-XXF

### PURPOSE

The OS/VS DB/DC Data Dictionary is a central collection of information about data resources that are needed for efficient data management. The OS/VS DB/DC Data Dictionary improves the manageability of a data processing installation by storing, processing and reporting on definitions, descriptions and relationships of data. This document uses the name Dictionary when referring to either DB/DC Data Dictionary program product unless otherwise noted.

### DESCRIPTION

The Dictionary deals with categories of subjects, the relationships between subjects, and the attributes which characterize subjects and relationships. Categories are families of items, such as data bases, programs or personnel. The data base category would, for example, contain individual data base descriptions as subjects. Relationships represent the interaction between subjects. For example, a relationship between a pair of subjects representing an application program and a data base might indicate that the program accesses that data base. Attributes describe properties of a subject or relationship such as size, frequency, or the date a relationship was established.

The name, DB/DC Data Dictionary, represents two products - one that operates in the OS/VS environment (program product 5740-XXF), and the other that operates in the DOS/VS environment (program product 5746-XXC). In the OS/VS environment the product operates with the following DB/DC systems: IMS/VS DB or IMS/VS DB/DC (5740-XX2), or CICS/OS/VS (5740-XX1) with IMS/VS DB. In the DOS/VS environment, the product operates with the following DB/DC systems: DL/I DOS/VS (5746-XX1) with or without CICS/DOS/VS (5746-XX3). If the Dictionary is to be used only in a batch environment, either the IMS/VS Data Base System or DL/I DOS/VS is required. See the pages for DOS/VS Data Dictionary.

The Dictionary utilizes DL/I data bases to store definitions of data and data usage under these subject categories:

- DATA BASE - physical, logical, primary or secondary index DL/I data bases, or non-DL/I data sets
- SEGMENT - DL/I data base segments or non-DL/I records
- ELEMENT - fields or group data items
- PCB - DL/I program communication blocks
- SYSTEM DEFINITION - IMS/VS system definition information
- SYSTEM - major application systems, such as a payroll system
- JOB - processing units corresponding to single jobs
- PROGRAM - major programs or job steps
- MODULES - functional subsections of programs
- TRANSACTION - IMS or non-IMS transactions
- PSB - DL/I program specification blocks
- DDUSER - access control information and passwords of all dictionary users
- CATEGORY - installation-defined subject-category definition
- RELATIONSHIP TYPE (RELTYPE) - installation-defined relationship types
- ATTRIBUTE TYPE - installation-defined attributes of subject categories or relationship types
- STRUCTURE TYPE (STRTYPE) - installation-defined structure types

A data definition is entered into the dictionary through either the dictionary command language or the Interactive Display Form Facility. The definitions may contain the following entry types:

- subject name - user name for this subject, plus dictionary qualifiers for the name
- aliases - other names by which this subject is known to the user
- attributes - anticipated entries of various characteristics for a given subject category
- description - text describing the subject, with user-specified format and content
- user data - for any user information that cannot be included as attribute data, with user-specified format and content
- relationships - cross-references between this subject and other subjects in the same or other subject categories
- relationship data - information about the nature of the relationship between certain kinds of subjects

### HIGHLIGHTS

Release 1 contained:

Centralized Source of Information and Control  
Automated Capture of Existing Definitions  
Flexibility of Use  
Interactive Display for IMS/VS  
Extensive Reporting Capability  
Systemized Control of Data Base Modifications  
DBD and PSB Generation  
Data Structure Generation

Release 2 contained:

Batch Forms Input  
COBOL Input Enhancements  
IMS/VS System Definition Support  
Extend Relationship Facility  
Recalculate Segment Facility  
Reports Enhancements  
Output Enhancements

Release 3 contained:

CICS/OS/VS Interactive Display Forms Facility  
Security Facility (Access Control)  
Signon Authorization  
User Profiles  
Enhanced PL/I Support  
GIS/VS Descriptor Support  
Extensibility Facility  
Program Access Facility  
Usability/Productivity/Performance Improvements  
Structures\_OUT Enhancements  
Dictionary Default Specification  
Report and Scan Enhancements  
Batch and BMP Checkpoint  
Online Usability Enhancements  
Test Data Enhancements  
Element Type-Code Revised

Release 4 contained:

Field Level Sensitivity Support  
Usability/Productivity Enhancements

**Centralized Source of Information and Control:** The dictionary can be a central source of information about a company's data resources, including application data still in test stages.

**Automated Capture of Existing Definitions:** COBOL source either from sequential files or COBOL copy libraries can be read by the dictionary to obtain initial record definitions, as can the DBD (data base description) and PSB (program specification block) libraries. See "Enhanced PL/I Support" for a description of PL/I language support. Additional information can be added by using dictionary commands, or copied from existing dictionary descriptions.

**Flexibility of Use:** The command language lets the user add, change, relate or delete information in all subject categories, scan the information for selective retrieval, copy existing definitions and obtain varied output in machine and human-readable form. Provisions are also made for storing non-DL/I data and user-unique data, thus enabling installations to integrate all their data definitions into one central dictionary.

**Interactive Display for IMS/VS:** Most dictionary commands can be executed online through the 3270 Display System. In addition, a task-oriented facility is provided that guides the user in entering specific definitions and displaying current dictionary contents. Each display form is designed for one specific DL/I definition. (For example, a different form is provided for defining a physical data base than for defining a primary index data base.) Each form has an associated explanation frame that provides information on how to use it. This method of entering definitions can help reduce errors by avoiding omissions, contradictions and misspellings. It can also be productive in that a single form may result in many dictionary commands being executed.

**Extensive Reporting Capability:** Users can obtain predefined reports on the complete contents of a subject category or full details of definitions and their relationships in printed or (online) display form. A SCAN facility provides for user-specified selective retrieval of information from the dictionary. Hierarchical data base structures can be printed out in indented formats. Printed reports are equivalent in content to most of the formatted display frames available with the online (IMS/VS) interactive displays. Additional custom reports, if desired, can be generated using GIS/VS. No GIS/VS data description tables (DDTs) for the Dictionary data bases will be provided in the licensed documentation.

**Systemized Control of Data Base Modifications:** If all data resources are described in the dictionary, it becomes a useful tool for controlling standards, versions and modifications. Its reports, naming conventions, search capability and cross-references help in studying the effect of proposed change. Until standardization is achieved, the dictionary assists in control of duplicate names by keeping track of multiple occurrences.

**DBD and PSB Generation:** Dictionary commands can process stored definitions to produce source statements for the generation of data base descriptions and program specification blocks suitable for host DL/I libraries.

## OS/VS Data Dictionary V1R5 (cont'd)

**Data Structure Generation:** Another output of the dictionary is data declarations suitable for inclusion in COBOL, PL/I or Assembler language programs.

**Batch Forms Input:** The input capability of the Dictionary has been enhanced in Release 2 by a batch forms input facility, which permits element and segment definitions and text information to be prepared on pre-printed forms and entered into the dictionary via a batch job stream. Segment and element definitions may include not only the usual set of subject attributes, but also the identities of elements and subelements contained within the subject, thus providing a definition of subject structure. Text information which may be entered consists of descriptions and user data for any subject category, and commentary for segments and elements. The forms may be used to create new subjects and to add data to existing subjects. A report is produced showing the data that was entered and any diagnostic messages produced. The facility provides an alternative to the COBOL\_IN command for capturing large amounts of segment and element information, and brings to the batch user the convenience of forms for bulk data entry.

**COBOL Input Enhancements:** The COBOL\_IN command in Release 1 has been enhanced by making the dictionary updating phase of the command a user option. With updating suppressed, the COBOL\_IN command produces a listing of the information that would be stored in the dictionary with updating selected, and optionally a punch data set containing the dictionary commands which would do this updating. In this way the user may verify the suitability of COBOL source statements before committing the information to the dictionary, and may use the punched commands, modified as necessary, to enter the correct definitions into the dictionary.

**IMS/VS System Definition Support:** The role of the dictionary as the centralized source of information and control has been enhanced through the addition of a facility for documenting the information contained in the IMS/VS DATABASE, APPLCTN and TRANSACT system definition macros. A subject category, the System Definition, has been added, along with new attributes for transactions and program specification blocks (PSBs), and relationship categories for relating system definitions to data bases, transactions, and PSBs. Existing commands and interactive display facilities have been extended to permit the entry and reporting of system definition information. A STAGE\_1\_OUT command permits system definition information to be produced in machine-readable records in the format of IMS/VS DATABASE, APPLCTN and TRANSACT macros, so that these records can be incorporated directly into IMS/VS Stage 1 system definition job streams. The command includes an IMS/VS release parameter, to permit the user to specify the release of IMS/VS for which the macros are being produced. The support extends the control function of the dictionary to the system definition activity of the IMS/VS DB/DC user, and provides documentation aid for the IMS/VS DB and DL/I user migrating to IMS/VS DB/DC.

**Extend Relationship Facility:** An EXTEND\_RELATIONSHIP command has been provided to relate each of the elements in a segment, or each of the first-level subelements in an element, to another subject. For example, a single EXTEND\_RELATIONSHIP command may be used to relate each of the fields in segment XYZ to program ABC. Previously, such relationships had to be established through individual ADD\_RELATIONSHIP commands. The new command provides a convenient way of making implied relationships explicit.

**Recalculate Segment Facility:** A RECALCULATE\_SEGMENT command has been provided to restore consistency to a set of related segment and element definitions whose lengths and other attributes have been updated independently of one another. The command uses current element and subelement lengths and justification attributes to recalculate segment lengths and element starting positions, and optionally updates the dictionary with the new information. With updating suppressed, a punch data set of the equivalent updating commands may optionally be produced. A report showing the old and new attributes is produced. The command makes it unnecessary to use individual CHANGE\_IN and CHANGE\_RELATIONSHIP\_DATA commands on the subjects and relationships in a structure in order to make the structure consistent.

**Reports Enhancements:** A report, the indirect subject reference report, has been provided to assist the user in locating references to elements, segments and data base subjects which have been stored as part of the dictionary data. The report is useful in maintaining dictionary consistency through its existing maintenance facilities.

The usability of the glossary report has been enhanced by permitting the user to specify the number of description lines to be shown for each subject, and to optionally suppress the printing of subject attributes. The user may also specify that the report be sorted on any combination of the four components of subject name (status code, subject code, user name and occurrence number). For example, if status code is selected as the major sort field, the report that results may be physically separated into sections each dealing with a different status code.

**Output Enhancements:** A PUNCH command is provided to create 80-character machine-readable records from user data segments previously entered through the dictionary updating facilities. User data

segments are typically used for program source and job control language statements, and the PUNCH command makes it convenient to include these statements in the users' job streams.

The STRUCTURES\_OUT command is enhanced to permit the optional inclusion of comment records holding the dictionary attributes of the subjects from which the structures are generated. This provides a ready reference to these dictionary subjects, e.g., in case the structures must be modified. Also added is an installation option which permits the user to set the level number increment in generated structures so that it conforms to installation programming practices. For COBOL structures, the PICTURE clause has been aligned for readability.

**CICS/VS Interactive Display Forms Facility:** An interactive user interface for CICS/OS/VS Dictionary installations is provided which is equivalent to the IMS/VS Interactive Display Forms Facility including the Release 3 enhancements.

**Access Control Facility:** An Access Control Facility provided is available as an installation option. A 'signon' validation function allows the installation to determine the set of Dictionary users. A user profile security function can be used to partition the Dictionary according to status codes, subject categories and ability to update and/or view data.

- **Signon Authorization:** Users can be identified to the Dictionary, and IDs validated via passwords, to control access within the Dictionary. Users may use the signon validation provided by the Dictionary or in an online environment:

- If the customer has IMS/VS V1 R1.5 installed, then the IMS/VS user identification security feature may be used to pass a validated user ID to the Dictionary.

- MVS customers with both IMS/VS V1 R1.5 and RACF Release 3 (5740-XXH) and subsequent releases installed may use the IMS/VS-supported RACF signon facility to pass a RACF-validated user ID to the Dictionary.

- If the customer has CICS/OS/VS installed, the operator identification may be passed by CICS/OS/VS to the Dictionary.

- **User Profiles:** User profile security provides a means for restricting a user's access to the dictionary by status code and by subject category. The access check is applied during initial reference to a dictionary subject, for example, in batch prior to execution of each command and online prior to processing a request on the header display form, or display forms where the REUSE action is allowed.

The status code portion of a subject name is used as the security key. A user's profile may allow read/write access, read-only access, or no access to subjects based on their status code.

Use of the Dictionary may also be restricted by subject category. Each user is able to access only that group of Dictionary categories identified in that user's profile.

**Enhanced PL/I Support:** PL/I data attributes may now be specified explicitly, replacing the PL/I text strings used previously. This enhanced support is comparable to that for COBOL data attributes. The command language, the Interactive Display Forms Facility, and the Batch Forms Input Facility have been extended to support the entry and maintenance of the new attributes.

A batch PLI\_IN function accepts PL/I structure declarations stored in %INCLUDE libraries or as sequential files, and creates the appropriate subjects and relationships in the Dictionary. Updating can optionally be suppressed, in which case only a report of the definitions that would have been stored in the Dictionary is produced.

The STRUCTURES\_OUT function generates PL/I data declarations directly from the new PL/I attributes, rather than from the current text strings. Output consists of a report and card images suitable for inclusion in a %INCLUDE library.

A conversion aid is supplied to assist in converting the PL/I information in an existing Release 2 Dictionary to the form required by the new PL/I support.

**GIS/VS Descriptor Support:** The Dictionary has been enhanced to support attributes of the type used by query products such as GIS/VS. The command language and the Interactive Display Forms Facility have been extended to support the entry and maintenance of the new attributes. A DDT\_OUT function is provided that generates statements which may be inserted into the installation's OS/VS or Data Description Table (DDT) generation job stream.

**Extensibility Facility:** This facility permits an installation to extend its dictionary to include up to 200 new subject categories representing, for example, personnel, organizational entities, hardware devices, etc., of particular importance in its own data processing operations.

Similarly, the installation is able to define new types of relationships. One or more different types of relationships may be defined between installation-defined subject categories, or between an installation-defined subject category and a Dictionary-supplied category.

The installation may associate a set of attributes and validation rules with each defined subject category and relationship-type. In addition,

## OS/V S Data Dictionary V1R5 (cont'd)

the installation is able to supply its own installation-written routines for subject name and attribute value validation.

Subjects and relationships in installation-defined categories may be created and maintained through the Dictionary update language, batch forms, or through the Interactive Display Forms Facility using a set of generalized display formats. Through any of these facilities, subjects and attributes may be referred to by their installation-defined names and keywords, just as are Dictionary-supplied subjects and attributes.

**Program Access Facility:** The Program Access Facility provides a means for customer-written programs to access the information contained in the Dictionary and to request services of the dictionary program. The data structures seen through the Program Access Facility are essentially those seen by the user of the current command language and Interactive Display Forms Facility, namely, subjects and relationships. Users of the Program Access Facility do not need to be aware of the Dictionary data base structure.

The Program Access Facility permits customer-written routines to request functions such as:

- Retrieve attributes of individual subjects and relationships.
- Retrieve lists of subjects in a specified category or related to a specific subject.
- Retrieve description and user-data text.
- Provide output to printer, terminal and punch.

The Program Access Facility supports routines written in COBOL, PL/I, and Assembler. These routines are started via Dictionary command, and execute in the Dictionary region. They request dictionary services through the CALL facilities in these languages.

A number of aids for writing programs that use the Program Access Facility are included. In addition, a sample program in each of the supported programming languages is included with Release 3.0.

### Usability/Productivity/Performance Improvements

**STRUCTURES\_OUT Enhancements:** A user may specify a prefix or suffix (or both) which will be concatenated with each subject name in an output structure. If only length, data type, and (optionally) number of decimal place attributes are provided for each field in a structure, then STRUCTURES\_OUT can generate equivalent structures for COBOL, PL/I, and Assembler.

**Dictionary Default Specification:** A new macro is provided that allows an installation to establish its own defaults for certain Dictionary parameters.

### Report and SCAN Enhancements

- The GLOSSARY report is modified to permit the reporting of individual subject categories or subsets.
- The SCAN report is similarly enhanced to permit limiting the scan to individual subject categories or subsets, plus a capability to specify starting positions for scanning. The installation will also be able to control the maximum number of subjects to be reported when operating in either online or batch environments.
- The formats of various reports have been modified to improve readability.

**Batch and BMP Checkpoint:** The Dictionary allows the installation to request that checkpoint calls be taken at periodic intervals when run in a BMP or Batch environment. A new command allows a user to request checkpoints at specific points in a batch input stream.

**Online Usability Enhancements:** With Release 3.0, the online user can:

- Switch conveniently between display forms and commands during the same interactive session.
- Reuse certain display-forms repeatedly (for example, to define many different elements), without having to return to the header form.
- Easily page through a list of data within a subject entry, using a default DOWN count.
- Take advantage of a processing default for the ENTER key. That is, pressing the ENTER key will, where applicable, be equivalent to selecting the process action.

### Text Data Enhancements

- The maximum length of a line of description text has been increased from 40 to 72 characters.
- The maximum number of lines of description and of the five sets of user-data text that can be stored in the Dictionary for a given subject have been increased from 255 to 999.
- A new USERDATA form that displays seven 80-character lines of text will be available, in addition to the current USERDATA display-form, which displays 15 lines of user-data text, each line truncated at 72 characters. Either form may be selected as an

installation option. The maximum length of a line of user-data text remains unchanged at 80 characters.

**Element Type-Code Revised:** Release 2 element type-codes have been revised to be consistent with assembler conventions for data types. The Release 3 conversion package transforms Release 2 element type-codes to the revised Release 3 format.

**Field Level Sensitivity Support:** OS/V S DB/DC Data Dictionary Release 4 contains support for the field level sensitivity function which is part of IMS/V S Version 1 Release 1.5 (5740-XX2) Data Base System and some additional usability/productivity enhancements. Release 4 of the Dictionary includes all of the functions of the Release 3 product and adds new functions.

The field level sensitivity function of IMS/V S gives an installation the ability to limit the data which an application may view, not only at the segment level, but also at the field level within the segment. In IMS/V S DL/I, a PSB (view) for an application may now limit the application's sensitivity to only certain fields within a segment of a data base. Previously, a PSB (view) could only limit sensitivity to segments within a data base, not its fields. The Dictionary will now support this function.

The IMS/V S Version 1 Release 1.5's field level sensitivity function is supported by a new Dictionary facility which provides the capability to define logical views of a given IMS/V S DL/I segment. Each logical view consists of an appropriate subset of the segment's fields which comprise that view. The following Dictionary functions will provide support for the new logical view:

- PSB\_IN recognizes the existence of SENFLD information and creates logical views.
- PSB\_OUT produces SENFLD statements when required.
- The COPY and DELETE\_STRUCTURE commands provide for copy and deletion of a logical view as part of a hierarchical structure.
- Dictionary update commands and Interactive Display Forms provide for the definition and modification of logical views and their associated relationships.
- Information on logical views is retrievable through the Program Access facility.
- Several of the Dictionary reports are enhanced to include information on logical views.
- The SCAN command is enhanced to retrieve logical views of a particular segment or the segment to which a logical view is related.
- The Segment Definition Form of the Batch Forms facility is redesigned to support definition of logical views.

### Usability/Productivity Enhancements

- A new option on the DELETE command provides the ability to delete aliases of a subject whenever the subject itself is deleted.
- A new DVALUES parameter is added to DBD\_OUT, PSB\_OUT, and DDT\_OUT. If DVALUES=YES is specified, a comment record will be included in the generated output to identify the Dictionary entry.
- An enhancement to PSB\_OUT will allow the same PCB to be produced in different relative locations in different PSBs.
- PSB\_IN is no longer restricted to a physical hierarchical segment order for sensitive segments.

### DESCRIPTION of RELEASE 5

**Language Preprocessor:** The Release 5 Language Preprocessor Facility provides the capability to retrieve language data structures and other source code directly from the Dictionary. The Preprocessor accepts as input a source program in COBOL, PL/I or Assembler language. It modifies the source program by recognizing COPY statements (in COBOL or Assembler language) or %INCLUDE statements (in PL/I) and replacing them with the data retrieved from the Dictionary.

The status code of the data structures retrieved from the Dictionary may vary within one source program without a change to the program itself.

The output of the Preprocessor (i.e., the modified source program) is suitable for input to the host language compiler or assembler.

**Explicit Structures Facility:** A new facility provides the installation with the capability to define 'structures' over its Dictionary data (for example, subjects and relationships). A Dictionary structure can include subjects and relationships in 'standard' categories, in installation-defined categories or both. Structure definitions are recorded as structure-type subjects in a new STRTYPE category. An IBM-supplied default structure-type is provided which simulates the built-in structure used in previous releases. New and existing Dictionary facilities provide the capability to process structures of Dictionary data.

**OS/VS Data Dictionary V1R5 (cont'd)**
**Enhanced COPY and DELETE STRUCTURE Functions**

- The COPY and DELETE\_STRUCTURE commands are enhanced to process structures of Dictionary data (subjects and relationships) with reference to a particular structure-type definition. Thus, structures of subjects in 'standard' categories, in installation-defined categories or both can be copied and deleted.
- Additional enhancements to the COPY command include the capability to select the status of subjects to be copied, the capability to specify the action to be taken when the subject to be copied matches one already existing in the Dictionary, and the capability to preview the results of a copy without actually updating the Dictionary data bases.
- Additional enhancements to the DELETE\_STRUCTURE command include the capability to select the status of subjects to be deleted and the capability to preview the results of the command without updating the Dictionary data bases.

**Structure Reporting:** The new STRUCTURE\_REPORT command provides a report of a structure of Dictionary data. The structure to be processed can be identified with reference to a particular structure-type definition, or the path to be taken in reporting a structure can be explicitly specified within the command. This facility provides a 'where-used' report of subjects at any or all levels of a Dictionary structure.

**Portability Facility:** The Portability facility provides the capability to transfer Dictionary data from one Dictionary to another. Provision is made with the EXPORT command to extract selected Dictionary data and create output in a format (Dictionary commands and batch forms) which can be input to another Dictionary.

The exported output can then be previewed for its effect on the receiving Dictionary without updating its data bases, by using the PREVIEW command. When any potential conflicts have been resolved, the exported stream can be entered into the receiving Dictionary.

**Dictionary Customization Enhancements**

- A new facility is provided which will permit installations to modify the definitions of installed Extensibility subject categories and relationship-types. The modified definition replaces the existing installed definition. Within certain restrictions, changes and/or additions may be made to attribute definitions. Limited types of changes to subject name validation rules may also be made.

Data existing under the old definition is automatically converted to the new definition during the replacement processing. A processing report identifies data which may have been invalidated by the new definition.

- A subject name validation exit is provided for standard categories, in addition to the subject name validation exit already available for installation-defined categories.

**Enhanced IMS/VS System Definition Support:** The Dictionary support for the IMS/VS DATABASE and TRANSACT macros is enhanced to include all parameters present for IMS/VS Version 1 Releases 2 and 3.

**Interactive Display Forms Facility Enhancements:** Several enhancements have been made to the Interactive Display Forms Facility:

- New actions are provided on the ALIASES, DESCRIPTION, USER DATA and PL/I DATA forms to permit the user to transfer directly from one of these forms to another without having to return to the subject definition form.
- The display forms that are used to edit and display lists of relationships from one subject to other subjects are enhanced. New actions permit the user to 'mark' one of the relationships displayed on the form and directly transfer to the form displaying the definition of the related subject.
- The COMMAND form can now be accessed directly from any of the other display forms. It is no longer necessary to return to the Header form to access the COMMAND form.
- The RELATED ENTITIES form is replaced by the 'Selected' SUBJECT-RELATIONSHIPS form. This enhancement allows the display of related subjects in either standard or Extensibility categories with a common form.
- The 'Unselected' SUBJECT-RELATIONSHIP form is enhanced to display relationships to subjects in both standard and installation-defined categories.
- A 'mode' function is provided for most of the forms that are used to edit and display lists of relationships from one subject to other subjects. A default of 'old has been made consistent for these forms.
- A number of display forms are modified to provide the capability to display and edit the definition for a 'file' data base (DBTYPE=F). This capability provides equivalence to that previously available only via Dictionary commands.

**Enhanced Operational Characteristics**

- The new Output Routing Facility will provide users with more control over the destination of the output from Dictionary commands in both the batch and online environments:
  - Users can route output to an OS/VS sequential or partitioned data set.
  - IMS/VS users can specify the output destination as an IMS/VS logical terminal.
  - Facilities are also provided for imbedding Dictionary output within header and trailer data (such as JCL). One application of this function is that Dictionary output can include JCL and, under MVS/370 or MVS/XA, be directed to an MVS internal reader.
- Two new facilities provide enhanced command processing flexibility:
  - Provision is made for the repetitive execution of a single command for a group of Dictionary subjects. Individual category/subject name pairs are placed in a 'stack'. A stack may be located in a set of User Data within the Dictionary data bases, or in an OS/VS sequential or partitioned data set. One way to build a stack is with output from SCAN or STRUCTURE\_REPORT commands. The SETSTACK command identifies the location of the stack; the RUNSTACK command causes a specified Dictionary command to be repetitively executed for each member of the stack.
  - Dictionary commands themselves can be executed from a list stored in a specified subject's set of User Data. The location of the command list is specified with the SETCLIST command. The RUNCLIST command causes all the commands in the list to be executed in turn.
- The output page size option provides the capability to specify the number of lines on a page of printed output. This value is used by Dictionary commands that generate printed output.
- Two new serviceability functions are introduced:
  - A TRACE function permits users to obtain a trace of Dictionary execution, and
  - A SNAP dump function permits users to invoke snap dumps during Dictionary execution.

**Enhanced Dictionary Access Control:** Several enhancements have been made to the Dictionary's Access Control Facility:

- The access profiles established for individual Dictionary users can now contain a list of one or more groups of commands that are authorized for that user. Separate lists can be established for the batch and online environments. If a command is issued by a user for which authorization is not established in the access profile, the command is rejected.
- The action of the COPY and DELETE\_STRUCTURE commands is changed to prevent copying or deleting subjects to which the user is not authorized.
- A user can be authorized to establish a relationship between two subjects with different status codes when 'update' authorization exists for one of the status codes and 'view' authorization exists for the other status code, and authorization to both categories exists.

**Miscellaneous Usability/Productivity Enhancements**

- The subject name defaults (status code, subject code and occurrence number) can be established on a user-by-user basis within the access profile.
- The PUNCH command is enhanced to 'punch' lines of description text in addition to lines of User Data.
- The DELETE\_DATA and DELETE\_RELATIONSHIP\_DATA commands are enhanced to allow deletion of all data of a particular attribute group. The DELETE\_DATA command is enhanced to allow deletion of a range or all lines of Description or User Data text; this is helpful in managing text data which was updated outside the Dictionary environment.
- Changes to the CICS/OS/VS transaction environment achieve efficiencies in the use of storage when multiple screens of data have been presented.
- A capability has been added which allows multiple online Dictionary regions in the CICS/OS/VS environment.

**CUSTOMER RESPONSIBILITIES**

A customer installing the OS/VS DB/DC Data Dictionary should consider the following series of steps:

- Obtain management commitment.
- Implement Data Administration - Many new users already have a Data Administration function and thus, must only incorporate the Dictionary into the existing environment and procedures. For users without such function, it is important to establish one.

**OS/VS Data Dictionary V1R5 (cont'd)**

- Define Dictionary objectives - What are the services and benefits desired from the Dictionary?
- Develop a Dictionary implementation plan - Like all other projects, a plan for Dictionary implementation must be developed and approved. Since full implementation of the Dictionary objectives will usually require time, it is important that the plan be phased, implementing support on the basis of priority, effort and benefit.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The machine configuration required for IBM OS/VS DB/DC Data Dictionary is determined by the requirements of the host operating system, DB/DC system, and objectives of the installation. A customer installing the OS/VS DB/DC Data Dictionary Release 4 or Release 5 must have at least the minimum machine configuration as defined by IBM for IMS/VS or CICS/OS/VS. The disk storage requirement is a function of the specific number of descriptors stored by the installation.

The virtual storage requirement of the Dictionary Release 4 program, exclusive of operating and DB/DC system requirements, requires approximately 1,380K of storage for online operation (approximately 440K if the overlay structure is utilized), or approximately 1,040K of storage for batch operation (approximately 420K if the overlay structure is utilized).

The virtual storage requirement of the Dictionary Release 5 program, exclusive of operating and DB/DC system requirements, requires approximately 1,700K of storage for online operation (approximately 510K if the overlay structure is utilized), or approximately 1,400K of storage for batch operation (approximately 500K if the overlay structure is utilized).

The Dictionary will support any display terminals supported by IMS/VS or CICS/OS/VS with at least 24 lines of 80 characters. The Message Format Services (MFS) and Basic Mapping Support (BMS) code is furnished with the Dictionary and provides input/output formatting for the IBM 3270 displays.

**SOFTWARE REQUIREMENTS**

OS/VS DB/DC Data Dictionary Release 4 program product (5740-XXF) operates as an application program under:

- IMS/VS Version 1 Release 1.5 (5740-XX2).
- CICS/OS/VS Version 1 Release 4.0/R4.1 (5740-XX1) with IMS/VS Version 1 Release 1.5 Data Base System.
- and subsequent releases unless otherwise specified.

OS/VS DB/DC Data Dictionary Release 5 program product (5740-XXF) operates as an application program under:

- IMS/VS Version 1 Release 1.6, Release 2 and Release 3 (5740-XX2).
- CICS/OS/VS Version 1 Release 5 (5740-XX1) with IMS/VS Version 1 Release 1.6 or Release 2 Data Base System.
- CICS/OS/VS Version 1 Release 6 with IMS/VS Version 1 Release 2 or Release 3 Data Base System.
- and subsequent releases unless otherwise specified.

The following compilers/assemblers are supported by the Dictionary Release 5 Language Preprocessor facility:

- OS PL/I Optimizing Compiler and Libraries Release 4 (5734-PL1, 5734-LM4, 5734-LM5, 5734-PL3).
- OS/VS COBOL Release 2.3 (5740-CB1).
- VS Assembler H Release 5 (5734-AS1).
- Assembler H Version 2 Release 1 (5668-962).

A System Modification Program job stream will be provided as a file on the distribution tape for installation of the Dictionary Release 5 using SMP Release 4. Program service in SMP format will be provided periodically. Items shipped as object code in the basic material will be serviced in object code. Items shipped as source code will be serviced in source code. The MFS formats are serviced in source code only.

For operating system requirements, see IMS/VS or CICS/OS/VS programming system support in the appropriate IMS/VS or CICS/OS/VS documentation.

The Dictionary is distributed primarily in object code format. Source code is available as optional machine-readable material.

**COMPATIBILITY/CONVERSION**

Dictionary Release 4 includes all of the functions of Dictionary Release 3. The internal format of the Dictionary data bases is modified in Release 4. The IMS/VS V1 Utilities can be used to convert Dictionary Release 3 data bases to Dictionary Release 4 format. **Note:** No conversion aid or support is provided to assist installations moving from releases prior to Dictionary Release 3.

Dictionary Release 5 includes all of the functions of Dictionary Release 4. The internal format of the Dictionary data bases is modified in Release 5. The IMS/VS V1 Utilities can be used to convert Dictionary Release 4 data bases to Dictionary Release 5 format. **Note:** No conversion aid or support is provided to assist installations moving from releases prior to Dictionary Release 4.

**AUDITABILITY**

The dictionary is of interest to internal auditors, as well as others concerned with data integrity, because of its data description and documentation capabilities, and its use as a vehicle for controlling and tracking data base changes. Dictionary use may be monitored through the standard logging facilities in IMS/VS and CICS/OS/VS, and through the optional logging of commands by the Dictionary.

**DATA SECURITY**

The Dictionary operates as an application program under IMS/VS Version 1, and its use is controlled with the standard security features of IMS/VS or CICS/OS/VS for OS/VS Data Dictionary. The Dictionary provides an access control facility composed of signon validation and a user access profile function. A user's access to the Dictionary can be restricted by status code, subject category access, and command usage.

Attempts to access dictionary data in an MVS/370 and MVS/XA environment outside of IMS/VS can also be controlled through the use of RACF.

**PERFORMANCE**

In general, there is no significant change in the performance of Dictionary Release 4 function in Release 5. In certain circumstances, degradation may occur in the performance of the COPY and DELETE\_STRUCTURE functions. Dictionary Release 5 publications will contain guidelines on how to minimize any potential degradation.

**AVAILABILITY**

OS/VS DB/DC Data Dictionary Release 4 is available now. OS/VS DB/DC Data Dictionary Release 5 will be shipped to Early Support Program customers in May 1983. OS/VS DB/DC Data Dictionary Release 5 general availability date is planned to be 1st Quarter 1984.

**PROGRAM CURRENCY**

Program services previously announced for OS/VS DB/DC Data Dictionary Release 4 will be available until 12 months notification by IBM.

**MVS INTEGRITY**

IBM will accept APARs describing situations where the installation of the DB/DC Data Dictionary program product causes an exposure to the system integrity of OS/VS2 MVS/370 or MVS/XA. This program is intended to run authorized.

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**RESOURCE ACCESS CONTROL FACILITY  
RACF (5740-XXH)**

**PURPOSE**

RACF Release 4 provides the checking needed to assist an installation in controlling user access to applications, permanent DASD data sets, tape and DASD volumes, CICS/VS and IMS/VS transactions and transaction groups, TCAM, VTAM and BTAM terminals defined to TSO or IMS/VS and user-defined resources and resource groups. RACF will perform user identify verification when batch (JES2 or JES3), IMS and TSO users enter the system and check the authorization of users and user groups to DASD data sets and other protected resources based upon this verified identity. Access authorization information is maintained on one or more DASD data sets that can be shared between independent (MVS) operating systems for which RACF is licensed.

RACF extends the data security and auditability capabilities available in MVS, CICS/VS and IMS/VS. Users identify themselves at the time they enter the system through IMS SIGNON, TSO logon or the batch job initiator, and RACF verifies their identity. For IMS, RACF also checks the authorization of the user to the IMS program product. Once a user is accepted on the system, his ability to access data is controlled by information previously entered and maintained by a security administrator in the RACF data set. Access is either granted or denied automatically and operator intervention is not required. Messages describing detected unauthorized access attempts can be routed to a security console for immediate action. An audit trail of access information can be generated through SMF for later analysis. In addition, RACF can maintain detailed statistics about the objects in the RACF data set, such as access counts and date last referenced.

**SPECIAL SALES INFORMATION**

For an installation to safeguard its data, it must not only consider the functions provided through the system, but also provide the necessary physical protective measures and implement effective information management practices. Thus, while no guarantee can be made for complete security of any system, the installation goal of improved security at an appropriate cost can best be attained through consideration of

the full spectrum of available measures. Installation security is the customer's responsibility. The capabilities of RACF have been designed to help the customer attain his data security goals.

The customer should use RACF as a part of his overall, comprehensive security and auditability plan. He should be encouraged to consider all facets of security (e.g., physical aspects, systems, procedures, controls, backup, recovery, organization, vital records, data classification and data disposal) when developing his plan.

**HIGHLIGHTS**

- Positive identification of system users for batch, IMS and TSO by password [ or for TSO (including TSO through VTAM) and IMS/VS by Operator Identification Card (OID) ].
- Automatic authorization checking for users to the IMS program product, DASD data sets, CICS/VS and IMS/VS transactions and transaction groups, tape volumes, DASD volumes and terminals, according to installation rules.
- Provision for installation definition of resources and resource groups to be protected by RACF (with appropriate installation written resource manager calls).
- Five rules of allowable access to data sets.
- Grouping of related users and related resources for administrative convenience.
- Provide for different levels of user authority within a group.
- Automatic access authorization capability.
- Optional establishment of resource ownership.
- Enforcement of DASD data set naming conventions.
- User controlled audit trail generation through SMF.
- Exits provided for installation tailoring.
- Support for more than one RACF data set, so that profiles for protected resources can be spread across DASD devices.
- Support for simultaneous update of a backup RACF data set.
- Installation controlled statistics for management and systems maintenance personnel that aid in identifying low usage resources.
- TSO commands for creation and maintenance of the RACF data set entries.
- Utilities for manipulating the RACF data set.
- Installation definition and control of RACF invocation by programs not executing in an authorized state.
- Profile Modeling - RACF automatically creates new individual profiles through the use of this optional modeling function for ADSP users and groups.
- Generation Data Group (GDG) Data Set Support provides a means by which each member of a GDG uses a common model profile derived from the GDG base name.
- List Checking for Groups - permits users connected to a given group to access resources available to another group to which the user is defined, without requiring a reconnection.
- Password Processing Improvements - provides for greater control of password processing through the use of new installation exits and new built-in options for monitoring and approving user assigned passwords.

- Fail Soft Processing - deactivates RACF and continues IPL when RACF failure occurs at system initialization. In the event of RACF failure or deactivation by authorized operator intervention after IPL, the installation may continue operating without stopping all normal job processing through required operator intervention upon access of a RACF-protected resource.
- RACF Command Improvements - improvements to make RACF parameters consistent across RACF commands and improve RACF usability.
- Installation Exit Parameter List Extensions.
- Profile Installation Data Field - new installation data field INSTDATA, 255 bytes long, added to the RACF group and data set profile. Existing RACF commands supporting this data field were modified to handle a 255-character data field.
- New IMS and CICS class descriptor table entries. Sample table in SAMPLIB and ICHERCDE macro in MAACLIB.
- RACF/HSM support improvements.
- Documentation and Support of RACF ICHEINTY Macro.
- Generic Profile Support - Allows the consolidation of the security requirements of several similarly named and similarly used resources with a single generic profile definition.
- Global Access Checking - Provides the ability to bypass RACHECK profile processing for selected data sets with selected generalized access levels.
- RACF Logging Enhancements - Provides the capability to selectively audit resource accesses based on access level.
- Single-level Data Set Name Support - Provides the capability to RACF-protect data sets whose names consist of a single qualifier.
- Always Call Support - Provides support for resource managers that will call RACF for all access attempts of all data sets, whether or not they are RACF-indicated.
- Report Writer Facility Enhancements - Provides the ability to produce a report which selectively includes records created because of the GLOBALAUDIT option rather than just the AUDIT option.
- RACDEF Post-processing Installation Exit - New exit which may be used to improve installation control by altering the outcome of RACF processing or performing additional checking.

**HIGHLIGHTS of RELEASE 6**

In addition to the features of Release 5, Release 6 encompasses the following enhancements:

- ISPF panels are provided to simplify the use of the RACF commands. A comprehensive set of tutorials is also provided through the ISPF 'Help' facility.
- Authorities by Group allows an installation to extend its delegation of RACF authorities, on a non-global basis.
- Group ownership of profiles is provided as an alternative to user ownership.
- A grace period facility provides an option to allow access on a selected basis to a user who would normally be denied access to the resource(s). A warning message is given to the unauthorized user, and optionally, a record is written to SMF. This facility will assist the installation in implementing an orderly transition to a secure system.
- User passwords and OI CARD data may now be encrypted using the Data Encryption Standard (DES) algorithm. A corresponding decryption capability is not provided, in order to preserve the security of passwords. A user installation exit is provided which permits the installation to enter its own encryption key or to substitute a different encryption algorithm.
- Data Set Naming Convention Support allows an installation to specify their own naming convention via a table. This will eliminate the need for many installations to code RACF exits for the function.
- The automatic revoke feature is enhanced to allow the security administrator to intervene when a SPECIAL user is about to be revoked.
- Generic Resource Profile Enhancements:
  - Volume generic profiles can be defined for fully-qualified data set names which relate to data sets of the same name on different volumes, for example, SYS1.LINKLIB.
  - Generic profile names may now contain a percent sign and/or an asterisk to represent a portion of a node/qualifier.
  - Generic profiles stored in all user address spaces may be dynamically refreshed or updated through the use of a RACF command available to the security administrator.
- Failsoft Enhancements:
  - The Global Access Checking facility will be used, if available, during failsoft processing.
  - Control will be passed to the RACHECK and RACDEF pre-processing exits before the system operator is informed of the access or prompted for a decision.
  - All resource accesses that are allowed or denied by the operator or failsoft processing will be logged.

**RACF (cont'd)**

- The PERMIT command supports a RESET option; this allows an access list to be emptied of users and groups.
- The LISTDSD command is extended to include a volume parameter; this allows a profile for one or more data sets on a specific volume to be listed, without listing all other profiles of the same name on other volumes.
- A new FRACHECK post-processing installation exit is provided.
- The password exit is enhanced to provide the exit with the current and historical user passwords, in addition to the current parameters.
- The Started Procedures Table is now a discrete load module. Selected started procedures may be considered as privileged, meaning that all RACHECKs will be accepted unconditionally. In addition, the table may include a generic entry.
- Support for multi-tasking environments has been enhanced. This support allows the RACF ACEE control block to be associated with individual tasks within the same address space.
- RACF publications are restructured to correspond to different user responsibilities such as: RACF Planner, Security Administrator, Systems Programmer, Auditor, End-User.

**AUDITABILITY ENHANCEMENTS**

- A Data Security Monitor offers the installation a new auditing tool. This facility enables an installation to monitor the status of various control mechanisms against previously established norms. Reports summarize the MVS/RACF system security status.
- At an installation's option, real data set names are logged to SMF.
- The RACF Report Writer is enhanced to provide a new report which summarizes resource events by owner.
- The SMF records generated by the new grace period facility may be selected and reported by the Report Writer.
- A RACF auditor now has the capability to list any RACF profile.

**PERFORMANCE ENHANCEMENT**

- RACF Buffer Management is enhanced to retain RACF profiles in memory for re-use on a most recently referenced basis.

**SECURITY MANAGEMENT RESPONSIBILITIES**

The MVS user environment under RACF is not significantly different from conventional TSO and batch environments. The user creates, uses and deletes his data in the normal manner. The differences appear in sharing of data between users, formulating rules for this data sharing and, in the absence of password, prompting when accessing protected data sets.

In the IMS/VS environment, the security administrator can, through the use of RACF/TSO commands, define users who are authorized access to IMS/VS. He can also define IMS/VS transactions and transaction groups to RACF, and authorize users to these protected transactions.

When the user population is large and access to sensitive resources is possible through several applications, the administration of the rules to control access can become burdensome and difficult to enforce in a conventional system. Through the use of RACF, the installation can define, and automatically or manually, implement and maintain access rules in a centralized manner. This approach has the added benefit of removing redundancies and inaccuracies that arise from associating these control rules with each application.

The administrator of RACF may assume a wide variety of duties, depending on the installation requirements. These duties include:

- Defining users and groups of users and delegating administrative authority to define new users and resources.
- Maintenance of user definitions, including addition and deletion of users and groups for all or part of the user community.
- Structuring resource groups to facilitate the defining of user/resource access relationships.
- Conversion of existing resources to protected status.
- Using RACF/TSO commands to define the authority of users and groups to access resources that have been covered.
- Handling user problems and questions.

**DIRECT SYSTEM SUPPORT for RACF**

The RACF function consists of two parts; the RACF program product (described in the opening text and highlights) and the System Support for RACF. Based on RACF checking, selected software resource managers provide control over their protected resources. The direct system support for RACF consists of the following five macro instructions which may be used for installation coding of data security functions:

RACINIT	Identifies a user and verifies that the user who is entering the system is defined to RACF, has supplied a valid password and/or OID card and, where applicable, has the required terminal authorization.
RACHECK	Determines if a user's request to obtain use of a RACF-protected resource is authorized by RACF.
RACDEF	Defines, modifies and deletes DASD data set and tape volume profiles.

- RACLIST Constructs in-storage profiles for use by fast path RACHECK, and for use in implementing installation-defined resource groups.
- FRACHECK A RACHECK-like function, using in-storage profiles (built by RACLIST). It is designed for performance-oriented applications.

These macros are used by the system, RACF, IMS/VS, CICS/VS, the TSO Command Package program product and the TSO Extensions (TSO/E) program product. They are documented in the appropriate MVS publications.

**Report Writer:** By use of the Report Writer, a RACF installation can display RACF-generated SMF records and statistics generated from these records.

Specifically the Report Writer allows a user to:

1. Specify criteria to select a subset of the RACF SMF records (Types 20, 30, 80 and 81) to be processed.
2. Request that selected records be displayed, and in what order.
3. Request various reports summarizing system and resource access.
4. Provide an installation-written routine to handle additional record selection criteria, and to generate additional output.
5. Save the records selected in a data set for future access by the Report Writer.

An installation can use the Report Writer to:

- Convert RACF SMF records into readable form.
- Understand how RACF protected resources are being accessed in terms of activity and authorization level.
- Generate specialized reports for distribution to appropriate personnel.
- Examine security violation attempts which have been detected by RACF.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

For TSO operator identification card support, RACF Release 5 or Release 6 can be used with the following subset of the IBM devices supported by TSO:

- Operator identification card reader on the IBM 3270 Information Display System (SNA and non-SNA devices).
- ID Reader on the IBM 3771 Communication Terminal (mdls 1, 2, 3), 3773 Communication Terminal (mdls 1, 2, 3), 3774 Communication Terminal (mdls 1, 2), and 3775 Communication Terminal (mdl 1).
- Magnetic stripe reader on the IBM 3767 Communication Terminal (SNA devices only).
- Magnetic Slot Reader and Magnetic Hand Scanner on an IBM 3278 or a 3279 attached to an IBM 3274 with the 10/63 alphameric character set.

RACF Release 6 is designed to operate on the IBM processors supported by OS/VS2 MVS Release 3.8 or the MVS/System Product or the MVS/System Extension program product. There are no special hardware requirements in addition to those normally required by these products.

For IMS/VS operator identification card support, RACF has no unique dependencies.

An optional, dedicated security console is supported by RACF. RACF routes messages to this console for detected unauthorized access attempts. The console may be any of the terminals supported by MVS that have console capabilities.

Performance considerations may necessitate the addition of DASD systems (IBM 3330, 3340, 3350, 3375 or 3380), an additional DASD controller or an additional channel. See the Performance section for a further discussion of these considerations.

Also, the various RACF logging options selected by the installation and the number of protected resources for which logging is selected as well as the frequency of RACHECK of these resources will determine the volume of SMF data generated by RACF. The installation should review this additional volume of SMF data to determine the possible need for additional DASD capacity.

The approximate space required for the system libraries (based on the IBM 3330 disk storage and track size of 13,030 bytes) for RACF is:

Library	Tracks for Release 4	Tracks for Release 5
SYS1.LINKLIB	70	71
SYS1.LPALIB	13	14
SYS1.MACLIB	3	3
SYS1.HELP	13	13
SYS1.SAMPLER	1	1

RACF requires the allocation of one or more non-VSAM data sets on direct access storage for all RACF access control information. The

PROGRAM PRODUCTS

**RACF (cont'd)**

RACF data set should be on a permanently resident volume and, if it is to be shared between systems that have RACF installed, it must be on a shared direct access device. The direct access space needed for the RACF data set depends mainly on the number of users, groups, user-group connections, and resources defined to RACF. The size also depends on the name lengths of the entities defined to RACF and on how well the space within the RACF data set is utilized. On the average, a RACF data set requires approximately 320K bytes for each 1,000 entities defined to RACF.

**Storage Estimates:** The approximate virtual storage requirements for RACF Version 1, Release 6 are:

FLPA	6,800 bytes
PLPA	130,000 bytes
SCA	412 bytes
LSQA*	4,200 bytes
Private Area	8,200 bytes

**CSA\*\*** Variable (Variable between 5,000 and 270,000 bytes depending upon installation control of resident indexes; the default is 15,400 bytes)

- \* Minimum use is 4,200 bytes. This will increase with the number of Generic Profiles used by each user during a session or job.
- \*\* When RACF-protected VSAM catalogs are being used by jobs in the system, the amount of storage increases by approximately 100-200 bytes per catalog in use. The precise storage used depends on the number of users authorized to the catalog.

To use the RACF ISPF Panels, ISPF (5668-960) must be installed.

**SOFTWARE REQUIREMENTS**

The RACF Release 4 program product requires the MVS/System Product or MVS/System Extensions or MVS Release 3.8.

RACF is supported by TSO in a current TCAM or VTAM environment.

Additionally, the MVS TSO Command Package program product (or equivalent), must be available if the installation wishes to use SUBMIT command parameters to facilitate the submission of batch jobs that access RACF-protected resources.

If the installation wishes to use RACF for IMS/VS user identification and resource authorization, it must have installed IMS/VS Version 1, Release 1.5.

If the additional RACF facilities of CICS/VS are to be used, CICS/VS Version 1 Release 5 (or later release) must be installed.

If the installation uses Hierarchical Storage Manager (HSM) and plans to use the RACF Release 4 GDG Modeling and/or naming convention exit, HSM Release 3 (or later release) must be installed.

Current data management offerings, including Hierarchical Storage Manager (HSM) Releases 3.0 and 3.1, do not support the always call interface. If the Global Access Checking and the Generic Profile facilities are elected for use with the current data management and HSM offerings, the data sets protected or using these facilities will not be protected for the execution of the data management or HSM functions.

The OS/VS Sort/Merge program product (5740-SM1) or equivalent must be available if the Report Writer is to be used.

**CONVERSION**

RACF Release 4 is upward compatible from Release 3.

RACF Release 5 is upward compatible from RACF Release 3 or 4.

RACF Release 6 is upward compatible from RACF Release 4 or 5.

The RACF data set initialization utility must be executed to convert from Release 4 to Release 5. Following the execution of the utility, Release 4 and Release 5 can share the same RACF data set.

The RACF data set initialization utility must be executed to convert from Release 5 to Release 6. Following the execution of the utility, Release 5 and Release 6 can share the same RACF data set.

**PERFORMANCE**

Use of RACF adds both processor and I/O activity to the system. Additional activity is performed in the following areas:

- Each TSO logon, IMS SIGNON and job initiation.
- Each RACHECK of a protected resource (FRACHECK, not RACHECK, is used for IMS transaction authorization).

There is additional processing associated with the administrative use of RACF commands and the automatic protection and deletion of protected DASD data sets and tape volumes. Additional contention may be caused by the serialization of RACF processing and the I/O to the RACF data set.

The primary performance cost depends on the number of protected resources and how often these resources are accessed. Installation controllable RACF options that can affect this performance include:

- The logging selected for protected resources.
- The recording of statistical information about RACF-defined users, groups and resources.
- The number of resident RACF data set index blocks.

Performance can also be influenced by the placement of the RACF data set. The RACF data set should be placed on a less frequently used channel and volume to minimize contention with other high usage data sets. The use of multiple RACF data sets can reduce this contention.

The use of resident index blocks enhances the performance of RACF by reducing the number of I/O operations required to the RACF data set. The installation can control the number of index blocks in the RACF data set that are to be made resident in the CSA.

Sharing the RACF data set between processors may further affect performance. RACF data index blocks can be made resident when the RACF data set resides on a shared device.

If a backup RACF data set is to be updated simultaneously with the primary RACF data set, the performance cost will increase accordingly. This cost will depend upon the options selected in maintaining the backup copy.

The ASP/JES3 licensing exception does not apply to new programs, features or versions.

For Program Support purposes the prior release of RACF, (Release 3), will be considered current until six months after FCS of Release 4.

**DOCUMENTATION**

(available from Mechanicsburg)

*RACF Program Product Design Objectives (GC28-0729) ... RACF General Information Manual (GC28-0722) ... RACF Program Product Specifications (GC28-0732)\* ... RACF Command Language Reference (SC28-0733)\* ... RACF Installation Reference Manual (SC28-0734)\* ... RACF Messages and Codes (SC38-1014)\* ... RACF Program Logic Manual (LY28-0730)\* ... Sales Flyer (G520-3081) ... Slide Set (GV20-0635).*

\* Release 5 Level available at program availability.

**SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where the installation of RACF causes an exposure to the System Integrity of MVS.

**RPOs ACCEPTED:** No

PROGRAM PRODUCTS

**5740-XX1 - CICS/OS/VS  
5746-XX3 - CICS/DOS/VS  
CUSTOMER INFORMATION CONTROL SYSTEM**

**PURPOSE**

These programs, together with the previous versions of CICS (CICS/DOS-ENTRY (5736-XX6), CICS/DOS-STANDARD (5736-XX7) and CICS/OS STANDARD VERSION 2 (5734-XX7)), form an upward compatible family of data base/data communication (DB/DC) products providing a common application interface. They facilitate the implementation of terminal-oriented applications and together provide an upward migration path between versions and releases of CICS on the same operating system and between operating systems.

**SPECIAL SALES INFORMATION**

Data base/data communication systems are applicable to a wide range of uses. Some of the functional applications that are most frequently encountered are:

**Inquiry** - Selective prestructured retrieval of information from a data base (master file). Inquiry is characterized by a small amount of keyed input with output returned to the requesting terminal.

**Browsing** - Special case of inquiry where the terminal operator does not have a complete or explicit key to the desired data. Browsing is characterized by selectively displaying generic portions of the data base until the desired information is found.

**Order Entry** - Input of data base-oriented information interactively from terminals. Order Entry is characterized by extensive immediate validation (editing).

**Data Entry** - Essentially the replacement of keypunch operations by direct entry of keyed data from terminals into the computing system, thereby reducing the exposure to transcription errors. Data Entry is characterized by high volume and limited editing.

**Data Collection** - Entry of data usually from terminals, not key driven, that may or may not interact immediately with the data base. Data Collection is characterized by moderate editing and batch control.

**Message Switching/Broadcasting** - The routing of information entered from any valid terminal to one or more destinations (terminals) without data base interaction. Message Switching/Broadcasting characterized by, but not limited to, administrative (text-type) data.

**Order Distribution** - Input of data base-oriented information from one terminal on the system to trigger the distribution of (potentially) different information to one or more hardcopy terminals. Order Distribution is characterized by the application logic (program) which, for example, routes a shipping order to the most appropriate location where the inventory is available. This application is almost invariably an extension of Order Entry.

CICS/VS is a general purpose system applicable to a wide variety of applications and customers. It can be used on all S/370, 308X and 43XX processors under the appropriate system configurations and VS operating systems, and will be most productive in an installation where the workload is mixed, varying in size, complexity and type. In addition to the above general functional applications, CICS/VS now provides support for many particular advanced application areas.

The marketing representative should be cautioned that the development of an online system can be a large and complex undertaking. A complete understanding of the applications, programming system and data communications environment is essential and the key to a successful installation of CICS/VS is the development of a comprehensive and effective implementation plan by the branch office and the customer. A simple application should be implemented first, preferably in a test environment. The power of CICS/VS can be appreciated and effectively employed only as experience is gained in the use of its basic capabilities. Particular emphasis should be placed on system design to allow future growth by the addition of new applications and extension to allow future growth by the enhancements, with minimum disruption to already implemented online applications. In addition, application program design, data base organization and access techniques require thorough analysis.

Although CICS/VS itself provides a comprehensive file handling capability, which is satisfactory for many applications, the full capabilities of a data base/data communication system can only be obtained by use of DL/I with CICS/VS.

**DESCRIPTION**

CICS/VS is a general-purpose DB/DC interface between the operating system and application programs written in COBOL, RPG II, PL/I or Assembler. A high level programming interface is provided to allow the application programs to request CICS/VS facilities such as task and terminal management, to format data to terminals and to interface to system service programs. Many of the same facilities may also be invoked by using a macro-level interface. The user can generate a CICS/VS system configuration applicable to the needs of the installation and define the environment in which the system is to execute. User exits are provided for optional processing as required. Although CICS/VS itself provides comprehensive file handling that is satisfactory for many applications, fuller capabilities can be obtained by use of DL/I with CICS/VS.

CICS/VS provides an option for the user to run multiple connected CICS/VS regions within a system. Use of multiple CICS/VS regions can simplify testing of user application programs, improve integrity and system utilization.

CICS/VS includes intersystem communication facilities for communication between connected systems. CICS/VS-managed resources, for example files and data bases, may be distributed between connected CICS/VS systems and accessed by application programs without awareness of the location of these resources. Alternatively, a CICS/VS transaction may communicate directly with a CICS/VS or IMS/VS transaction on another system, so supporting distributed transaction processing. CICS/VS Intersystem Communication uses SNA multi-system networking facilities and transaction-to-transaction communication requires ACF/VTAM Version 1 Release 2 or its equivalent or ACF/VTAM Version 2.

In the area of security, CICS/VS provides facilities to help prevent unauthorized access of information. Through an optional sign-on facility, terminal operators who are authorized to access the online applications, first identify themselves to the system. By the use of security codes allocated by the user to each operator, CICS/VS determines which functions may be performed by the operator. The master terminal operator is warned of attempted unauthorized access and the event can be logged by CICS/VS. These security facilities can be extended through an interface to a separate security management program, in particular to OS/VS2 (MVS) Resource Access Control Facility (RACF). RACF can be used to control a user's access to CICS/OS/VS and its transactions, and access to a CICS/VS address space from another.

CICS/VS provides many of the facilities necessary for the standard data communication applications of inquiry, order entry, data entry, data collection, message switching, broadcasting, order distribution and data base browsing. The functions needed to support these applications are provided through the following CICS/VS logical components:

- System Management.
- System Service.
- System Monitoring.
- System Reliability.
- System Support.
- Application Services.
- Intersystem Services.

Each of these components contain one or more functions which provide services to the user-written application programs. Most services are requested directly by the application programs through use of the high level programming interface or via the CICS/VS macro instructions, but some are performed automatically by CICS/VS to support certain functions basic to a DB/DC environment.

**The System Management component contains**

**Task Management** - Provides the dynamic multi-tasking facilities necessary for effective, concurrent transaction processing. The functions performed by this component include priority scheduling, transaction synchronization and control of serially reusable resources.

**Storage Management** - Controls main storage allocated to CICS/VS, taking advantage of virtual storage architecture. The functions performed by this component include storage acquisition, disposition, initialization and request queuing.

**Program Management** - Provides a multiprogramming capability through dynamic program management while offering a real-time program fetch capability.

**Time Management** - Provides control of various time-dependent task control functions (system stall detection, runaway task control, task synchronization, etc.) and allows tasks to be initiated, based on specified intervals of time or time of day. The intersystem communication facilities and Multi-Region Operation of CICS/VS allow such a transaction to be initiated on a connected CICS/VS system or region.

## CICS/VS (cont'd)

**Terminal Management** - Provides for communication between terminals and user-written application programs through the Terminal Control program. The Virtual Telecommunications Access Method/Network Control Program (VTAM/NCP), the Basic Telecommunications Access Method (BTAM) and the Telecommunications Access Method (TCAM, CICS/OS/VS only) are used for terminal management and line control services. The High Performance Option (HPO) of CICS/OS/VS on MVS can utilize the VTAM authorized (fast) path. Other access methods, such as the Graphics Access Method (GAM, CICS/OS/VS only), can be utilized by the Terminal Control Program. Terminal Management provides for the coexistence of the various access methods through the Terminal Control Program. Communication is normally initiated from the terminal for the processing of applications, however, automatic task initiation from the host is also supported.

The testing of application programs may be performed by the simulation of terminals through sequential devices such as card readers, line printers, disk, tape, etc.

**File Management** - Provides data set support using direct or keyed access through VSAM, ISAM and BDAM. For VSAM, ISAM and BDAM, this function supports updates, additions, random retrieval and sequential retrieval (browsing) of logical data from the data set. For VSAM only, this function supports alternate indexes, reusable data sets, relative record data sets, physical record deletion, LOCATE mode (read-only retrieval), mass record insertion, get previous record and skip sequential processing.

The High Performance Option (HPO) of CICS/OS/VS on MVS provides support for VSAM 'improved control interval processing' (ICIP). Changes and accesses to data sets and DL/I data bases, defined as recoverable, can be automatically logged for use during an Emergency Restart or by Dynamic Transaction Backout. CICS/OS/VS provides access to the Data Language/I (DL/I) facilities of IMS/VS (5740-XX2). CICS/DOS/VS application programs can access DL/I data bases by using the interface to DL/I DOS/VS (5746-XX1).

Intersystem communication and Multi-Region Operation facilities allow files or DL/I data bases on a connected CICS/VS system to be accessed. CICS/VS also allows sharing of a DL/I data base (either OS/VS or DOS/VS) between concurrently active batch regions and CICS/VS with optionally, program isolation scheduling.

**Transient Data Management** - Provides an optional queuing facility for the management of data in transit to and from user-defined destinations, either intrapartition or extrapartition. Intrapartition destinations are queues of data on direct access devices developed for input to one or more CICS/VS transactions and are accessible only by CICS/VS transactions within the CICS/VS address space. Extrapartition destinations are data sets that are external to the CICS/VS address space and reside on tapes or direct access devices. The intersystem communication facilities and multi-region operation of CICS/VS allow transient data queue destinations to be on connected CICS/VS systems or regions. Changes made to intrapartition queues, defined as recoverable, can be automatically logged for subsequent use following an abnormal termination by Emergency Restart or Dynamic Transaction Backout. Intrapartition queues can use either BDAM or VSAM.

**Temporary Storage Management** - Provides an optional general purpose "scratch pad" facility, allowing an application program to temporarily store data in program storage or on a direct access device. This facility is used for Basic Mapping Support terminal paging, message switching (broadcasting), data queuing, retention of control information, and so on. The intersystem communication facilities and multi-region operation of CICS/VS allow temporary storage to be defined as on a connected CICS/VS system or region. Changes made to auxiliary temporary storage data, defined as recoverable, can be automatically logged for subsequent use following an abnormal termination by Emergency Restart or Dynamic Transaction Backout (DTB).

**Journal Management** - Provides facilities to create, manage and retrieve special-purpose sequential data sets known as journals during real-time execution of CICS/VS. Journals can be created to contain user-requested output as well as data automatically logged by other CICS/VS management facilities. Automatically logged data is required as input by the Restart and Dynamic Transaction Backout functions of the System Reliability component of CICS/VS.

**Sync-point Management** - Works in conjunction with other CICS/VS components, such as Transient Data Management, Temporary Storage Management and File Management, to provide the facilities needed for an Emergency Restart or Dynamic Transaction Backout following abnormal termination. The intersystem communication facilities and multi-region operation of CICS/VS will, where possible, ensure the protection of resources and synchronization needed to enable recovery in a connected CICS/VS system environment. In an emergency restart, changes made to protected resources (e.g., Transient Data intrapartition queues, auxiliary temporary storage data, data sets and data bases)

can be backed out for those tasks which were in-flight at the time of failure of the CICS/VS system. With Dynamic Transaction Backout, changes to the protected resources can be backed out on an individual transaction basis, in the event of abnormal termination of that transaction, while the rest of the CICS/VS system operates normally. The protected resources can alternatively be backed out by calling for Rollback. This is the way users can cancel the changes made to the protected resource back to what they were at previous sync-point or task initiation. These backouts are based on system information about the tasks, recorded (logged) during online execution of CICS/VS; for Restart the information is recorded on the system log and for Dynamic Transaction Backout it is recorded on a dynamic log, which may reside in main storage with possible overflow to disk. Some transactions backed out by DTB may, optionally, be restarted automatically.

The System Service component contains

**Signon/Signoff** - Provides terminal operator identification (security). It optionally interfaces with an external security manager, including RACF on OS/VS2 (MVS).

**Master Terminal Function** - Provides dynamic user control of the system. A master terminal operator can change the status and values of parameters used by CICS/VS and thereby alter the operation of the system. The operator may enable/disable entries in several CICS/VS tables and terminate any task currently in the system. When a table entry is disabled, it is not accessible for normal processing. CICS/VS provides a display-oriented master terminal transaction, CEMT, for user control of CICS/VS.

**Supervisory Terminal Function** - Performs a subset of the services available to the master terminal. They are limited to terminals under a given supervisor's jurisdiction.

**Operator Terminal Function** - Terminal operators who are neither supervisory nor Master Terminal operators are only able to control the Service status and processing of their own terminal using the CSOT transaction. Operator terminal requests are checked for validity and processed by the Master Terminal program.

**System Statistics** - Provides the capability to either specifically request or automatically log system statistics. A facility exists to request statistics either for the complete system operation or for a subset involving terminal usage. The capability is available to optionally reset the counters after requested statistics have been output, thereby allowing extended continuous operation. An automatic statistics facility allows CICS/VS system statistics to be recorded on a sequential data set at regular intervals as defined by the user, and for detailed and/or summary reports to be printed offline via a utility program. Counters are not reset after output of automatic statistics.

**Asynchronous Transaction Processing (ATP)** - Provides the capability to read and queue (store) batched input from an appropriate device and to dequeue and write to an appropriate device the resulting output data. ATP is performed concurrently with other terminal activity. Although designed specifically for batch terminals this facility can also be used with certain interactive terminals (i.e., 2740, 2741). ATP is not available through VTAM.

**Dynamic Open/Close** - Allows the user to dynamically Open/Close data sets during the real-time execution of CICS/VS.

**Time of Day Control** - CICS/VS adjusts the expiration times it maintains in response to changes in the time of day maintained by the operating system, and then resets its date and time of day to the date and time of day maintained by the operating system.

**Customer Engineering Support** - A terminal test facility primarily designed to assist the customer engineer in installing new terminals during real-time execution of CICS/VS, transmits all printable characters or echoes a message upon request. Additionally, the VTAM Teleprocessing Online Test Executive Program (TOLTEP) may be utilized to test Start/Stop, BSC and SDLC lines. Testing of SDLC teleprocessing subsystems is not conducted by VTAM; such testing is a function of the subsystems themselves. For devices supported through BTAM-ES, CICS/DOS/VS includes facilities similar to those provided by the service aid Facility Error Recognition System (FERS).

**Message Switching** - Provides the user with a general-purpose message switching capability during real-time execution of CICS/VS. Messages may be routed to one or more terminals by specifying the transaction code CMSG along with optional parameters and message text.

The System Monitoring component contains

**Trace Management** - Provides a program debugging facility that reflects the execution of CICS/VS macro instructions and HPLI commands by CICS/VS management programs and service programs and by user-written application programs. The auxiliary trace facility provides the ability to record trace entries on sequential data sets and permits selective printing via a utility program.

## PROGRAM PRODUCTS

**CICS/VS (cont'd)**

**Dump Management** - Provides a facility to assist in analysis of programs and transactions undergoing development or modification. Specified areas of main storage are dumped onto a sequential data set, either tape or disk, for subsequent offline formatting and printing using a CICS/VS utility program. This facility is independent of other similar purpose facilities available under the operating systems, access methods or special purpose packages.

**Monitoring Facilities** - Provides an integrated data gathering mechanism in CICS/VS, offering the user improved facilities for monitoring the performance of the CICS/VS system, and for providing accounting data on an individual user basis. The mechanism consolidates and extends data previously available in CICS/VS, offering a single interface on which analysis routines can be based. The user may dynamically choose the level of recording, dependent on his needs for accounting, performance or exception data. In this way, he has granularity in the level of information recording, yet a common mechanism for analysis programs to process and extract relevant information. Monitoring data can optionally be written to System Management Facility (SMF) files in CICS/OS/VS. Monitoring data on SMF is intended for use on MVS.

**The System Reliability component contains**

**System Recovery Management** - Provides for the interception of program interrupts and operating system ABENDs to allow, where possible, the transaction or CICS/VS, respectively, to continue processing. In the case of a program interrupt, control may be passed to a user error handling routine to attempt recovery; otherwise the individual transaction may be terminated. In the case of a system ABEND, an attempt may be made by CICS/VS or by the user to recover from the ABEND. It may be possible for the user-handling procedure to simply terminate the individual transaction rather than ABEND the whole of CICS/VS. In the event of a single transaction being abended, for whatever reason, CICS/VS can backout any changes made by that transaction to recoverable resources, as described under Dynamic Transaction Backout below. This includes recoverable resources being accessed from a connected CICS/VS system or region, using the intersystem communication facilities or multi-region operation of CICS/VS.

**Dynamic Transaction Backout (DTB)** - Performs online backing-out of the effects of a transaction, which abnormally terminates, while the rest of the CICS/VS system operates normally, thus providing immediate recovery of data base integrity following a transaction failure. DTB will backout to the last user-defined "sync" point, or the start of the task, the changes made to protected CICS/VS resources (e.g., Native Files, DL/I Data Bases, Intrapartition Transient Data, Auxiliary Temporary Storage, VTAM Terminal Messages). The ABEND may be initiated either by the application program or by CICS/VS; backout will follow automatically if DTB was specified in the appropriate CICS/VS tables at system (table) generation time. This includes those transactions accessing resources managed by a connected CICS/VS system or region, using the intersystem communication facilities or multi-region operation of CICS/VS.

**Transaction Restart** - This option allows certain transactions which have been abnormally terminated and backed out by Dynamic Transaction Backout to be restarted. It is particularly appropriate where program isolation is being used with the CICS/VS-DL/I interface, where deadlock resolution may result in a transaction being abnormally terminated. Transaction Restart enables certain such transactions to be restarted immediately, so that in many circumstances the terminal operator need not be aware of the abnormal termination and restart.

**Emergency Restart** - Allows the user to re-establish the status of features, such as Intrapartition Transient Data queues, auxiliary temporary storage data, selected data bases and selected data sets, to a predefined point in the event of an abnormal termination of the CICS/VS system. This function is performed by recovery modules which are invoked by System Initialization during an emergency restart. This recovery function reads data from the system log onto which management functions have logged control information during the previous online operation. Logged data from changes made to protected resources (e.g., protected data sets, data bases, auxiliary temporary storage queues, and Transient Data intrapartition destinations) are collected during emergency restart and those changes made by in-flight transactions are automatically backed-out (e.g., previous data restored). This includes transactions accessing such resources from a connected CICS/VS system using the intersystem communication facilities or multi-region operation of CICS/VS. Exits are available during emergency restart to allow user participation.

**Abnormal Condition Program** - Is used by program control to analyze the abnormal condition (except those associated with a terminal or node (SNA Logical Unit)) and to take appropriate action for those not handled directly by the operating system.

**Program Error Program** - Allows the user to provide his own corrective action in response to a programming error by coding his own error program. If provided, this program is linked to by the abnormal condition program. CICS/VS provides the option of disabling the transaction code associated with the program in error, thus preventing the recurrence of the error until it can be corrected.

**Terminal/Node Abnormal Condition Program** - Is used by terminal control to analyze abnormal conditions that are not handled directly by the operating system. It links to a user-written error program (see below) to attempt recovery from transmission errors and to allow tasks to continue processing. For BTAM, TCAM and GAM applications, a Terminal Abnormal Condition Program is used and for VTAM applications a Node Abnormal Condition Program is used.

**Terminal/Node Error Program** - Allows the user to provide his own corrective action in response to a terminal I/O error. It is linked to by the Terminal/Node Abnormal Condition Program (see above) when a terminal error occurs. For BTAM, TCAM and GAM applications, a Terminal Error Program is provided by the user and for VTAM applications the user provides a Node Error Program.

**The System Support component contains**

**System Generation** - Allows the user to define and structure CICS/VS to meet unique real-time, teleprocessing and, with DL/I, data base requirements. This is accomplished through the use of CICS/VS system generation macro instructions. For all CICS/VS users a preassembled version of the full function system, based on the sample system, is available.

**Environment Definition** - Allows the user to create system control tables and system service tables that define and control the environment in which CICS/VS is to operate.

**System Initialization** - Allows the user to initialize CICS/VS, using specific tables and modules, to meet his unique real-time, teleprocessing and, with DL/I, data base requirements. The user is also able to override any of the parameters specified in the System Initialization Table through the Master terminal console or system input device. This facility is both flexible and dynamic and is resident only long enough to bring CICS/VS into real-time execution.

**System Termination** - Allows the user to terminate operation of CICS/VS in an orderly manner by gathering information for restart, closing data sets and returning control to the operating system.

**Program Preparation** - A translator is provided for the High Level Programming (Command Level) Interface and a preprocessor is provided for CICS/VS macro instructions included in high level language (ANS COBOL, COBOL/VS or PL/I) application programs. For the High Level Programming Interface a single-step translator converts the EXECUTE statements into the appropriate source language for subsequent compilation and performs checking during the process. The EXEC interface supports commands written in PL/I, ANS COBOL, COBOL/VS, RPG II or Assembler language application programs. For CICS/VS macro instructions included in high level language application programs a three-step preprocessor is available.

**Trace Utility** - The Offline Trace Utility program formats and prints the output from Trace Management. Control cards may be used to select trace entries; e.g., those associated with specific terminals, tasks or time of day.

**Dump Utility** - Formats and prints output of the CICS/VS Dump Control program. Operating in batch mode with a dump data set that is not online to CICS/VS, this utility allows each storage area, program and table entry to be identified, formatted and printed separately with actual and relative addresses for faster diagnostic analysis.

**Formatted Dump Program** - Produces a dump of the CICS/VS partition or region with various CICS/VS control tables and areas identified. Each control block is printed separately, preceded by a heading, important fields within them are printed by name. It is invoked by abnormal termination of CICS/VS, by specifying DUMP at CICS/VS shutdown, or by Master Terminal Operator SNAP command.

**System Log/Journal Utilities** - Preformat magnetic tape or disk extents to be used as system log or journals. Allows the user to place an end-of-file mark on magnetic tapes used by journals after an abnormal system termination.

**The Application Services component contains**

**Basic Mapping Support** - Provides message routing, terminal paging, and device independence services. Message Routing allows application programs to send output messages to one or more terminals not in direct control of the transaction. Terminal Paging allows the user to prepare output without regard to the physical size of the output terminal; the output can then be retrieved by pages in any order. Device Independence allows the user to prepare output without regard to the required control

## CICS/VS (cont'd)

characters; CICS/VS automatically inserts the required control characters and eliminates trailing blanks from each line.

**Execution (Command Level) Diagnostic Facility** - Permits the interception of application program EXEC commands before and after their execution. It therefore allows the application programmer to test an application program written using the EXEC commands in an online interactive manner at source level. It enables the user to step through the CICS/VS commands in the application, checking their validity, and making temporary modifications to argument values and responses as required. Information is displayed on a 3270 terminal, with 1920 character screen size or above, which may be the one being used to run the application under test.

**Command Interpreter** - The command interpreter is a display oriented program designed to assist in the writing, syntax checking and execution of an EXEC command. It enables an operator of a display (with screen size of at least 1920 characters and supporting the 3270 data stream) to enter a command for CICS/VS to check and optionally execute. Default options are indicated by CICS/VS, together with diagnosis of missing or incorrect parameters. Once a command has been developed to the satisfaction of the user, he may request its execution. This enables the user to check the operation of the command and inspection of the user's screen resulting from the operation. The facility can also be used to create or inspect test data (e.g., transient data) for use with the testing of application programs.

**Built-in Functions** - Provide additional functions for the application programmer through the use of CICS/VS macro instructions. **Table Search** provides the means of conveniently searching a table for a specific entry and having some value within that entry returned; if the desired entry is not in the table, the user can elect to have a fault value returned. **Phonetic Conversion** provides the means of converting a source name into a key, based upon the phonetic sound of the name, which can then be used to access a data base name file; this function allows the organizing and accessing of data set names based on names that might be misspelled, mispronounced or misunderstood. **Field Verify** enables the contents of a data field to be verified as entirely numeric, alphabetic or packed decimal data; a branch to the appropriate routine can then be taken accordingly. **Field Edit** provides the means of removing alphabetic or special characters from numeric fields and converting the result to EBCDIC or packed decimal format. **Bit Manipulation** allows the high-level language application program to test for a bit on/bit off condition and branch accordingly. **Input Formatting** provides the means of converting free-form input from the terminal operator into a predefined fixed format more easily manipulated; the free-form input may be positional or keyword-oriented. **Weighted Retrieval** allows the user to search a specified group of records on a VSAM data set on the basis of fixed and/or variable selection criteria. No built-in functions are available through the High Level Programming Interface.

### The Intersystem Services component contains

**Function Shipping Support** - Manages the sending and receiving of CICS/VS requests relating to resources on remote CICS/VS systems. The requests may be shipped over an ISC link using SNA networking or between CICS/VS regions using multi-region operation. The support uses a mirror transaction in the remote CICS/VS system in order to execute the request on behalf of the originating application program and return appropriate information, including sync-point data.

**Transaction Routing Support** - Routes messages between CICS/VS regions using multi-region operation so that operators on terminals associated with one region may use transactions running on a connected region.

**Transaction-to-Transaction Support** - Provides a mechanism for a transaction on a CICS/VS system to converse with a transaction on a remote system over an ISC link using SNA networking facilities or between CICS/VS regions using multi-region operation. This enables the user to write an application as two complementary transactions, one executing in a system local to the originating terminal, and the other in a remote system.

### CICS/VS VERSION 1

**Currency:** CICS/DOS/VS Version 1 Releases 4.1, 5.0 and 6.0 and CICS/OS/VS Releases 5.0, 6.0 and 6.1 are supported. Program services for these releases will be available until discontinued by IBM upon twelve months written notice.

Of the previous releases of CICS/DOS/VS Version 1, Releases 0.0, 0.1, 1.0, 1.1, 2.0, 3.0 and 4.0 are no longer supported.

Of the previous releases of CICS/OS/VS Version 1, Releases 0.0, 0.1, 1.0, 1.1, 2.0, 3.0, 4.0 and 4.1 are no longer supported.

### Compatibility:

**Application Programming:** CICS/OS/VS V1R1.6 provides upward compatibility with V1R5 and V1R6.0 at both source and object level for

CICS application programs, subject to the exceptions summarized below. Any other exceptions which are identified will be documented. This means that CICS applications which execute correctly under CICS/OS/VS V1R5 and V1R6.0 will execute correctly under CICS/OS/VS V1R6.1 without requiring retranslation and re-assembly or re-compilation.

- Command level programs are upwards compatible at both source and object level provided they conform to the interface as defined in the *Application Programmer's Reference Manual (Command Level)* (SC33-0077).
- Macro level programs are upwards compatible at both source and object level providing they conform to the interfaces as defined in the *Applications Programmer's Reference Manual (Macro Level)* (SC33-0079).
- Exceptions: The following functions are not supported by CICS/OS/VS V1R6.0 or V1R6.1:
  - CICS Version 1 compatibility options.
  - The 2260 compatibility option (note: 2260 displays are supported as in CICS/OS/VS V1R5).
  - FASTER Language Facility.

**System Programming:** The following functions are not supported by CICS/OS/VS V1R6.1:

- Static user exits in transient data and temporary storage management modules.
- BDAM for intra-partition transient data file.

Users migrating from MVS/370 to MVS/XA must order and install the MVS/XA feature.

**Intercommunication:** CICS/OS/VS V1R6.1 supports Intersystem Communication links to CICS/VS V1R5.0 and CICS/VS V1R6.0. CICS/VS V1R5 supports Intersystem Communication links to CICS/VS V1R4.0 and 4.1. CICS/OS/VS V1R6.1 supports MRO links to CICS/OS/VS V1R5 and CICS/OS/VS V1R6.0.

### HIGHLIGHTS OF CICS/OS/VS VERSION 1 RELEASE 6 MODIFICATION 1

**Multi-Region Operation (MRO) Improvements:** Changes have been made in CICS/OS/VS V1R6.1 to improve the performance of the multi-region operation (MRO) of CICS/VS.

- A new version of the mirror program is provided which will reduce the overhead for most function-shipped requests on an inter-region communication link.
- A new transformer routine is provided to reduce the path length required to transform CICS/VS requests and replies from a parameter list form into an address-free form and back again.
- MVS cross-memory services can be selected and used for transferring data. This will not require the issuing of an SVC nor the scheduling of a service request block (SRB).

Use of cross-memory services will improve the acceptability of MRO as a virtual storage relief alternative, since it eliminates most of the overhead in the original design. Customers who use MRO primarily for security reasons will have a trade-off to make because they will lose the total separation between systems normally provided by separate address spaces.

- Changes have been made to the function shipping code with the objective of optimizing it for MRO.

### Installability Improvements:

- CICS/OS/VS V1R6.1 may be ordered with an MVS/370 option or an MVS/XA option. MVS/XA specific materials are excluded from the MVS/370 option and vice-versa. Both options are functionally equivalent and include a pre-generated CICS system which is appropriate for most users. This simplifies the CICS installation process by reducing the need for users to perform CICS module assemblies. Migration from MVS/370 to MVS/XA will require re-installation using the MVS/XA feature tape. IMS users will still need to do a partial CICS generation after installing IMS/VS.
- This modification to CICS/OS/VS V1R6.0 includes the VTAM variant of the high performance option (HPO) within the basic CICS/VS system. Its activation will be via system initialization (rather than system generation) options. This VTAM variant of HPO is enabled independently, either in the system initialization table or by parameter override.

The specification of the two CICS SVC numbers is also completed at initialization time.

- Transient data customization is modified by:
  - Elimination of static user exits.
  - Automatic generation of full function support for input from, and output to extra-partition data sets.
  - Automatic generation of full function support for intra-partition queues, automatic transaction initiation and full recovery.

PROGRAM PRODUCTS

CICS/VS (cont'd)

- Removal of support for BDAM intra-partition transient data. The intra-partition transient data file will need to be changed to VSAM.
- Temporary storage customization is modified by:
  - Elimination of static user exits.
  - Automatic generation of full function support.

**Performance Enhancements:** The following performance enhancements are provided:

**Transient Data and Temporary Storage Performance Improvements:** CICS/OS/VS V1R6.1 will provide significant improvements to the performance of VSAM intra-partition transient data, and to the performance of auxiliary temporary storage requests through:

- Support for multiple buffers.
- Support of concurrent I/O operations.
- Support for subtasking.

These performance improvements for VSAM intra-partition transient data and to temporary storage performance are achieved as follows:

**Multiple Buffers:** The provision of multiple buffers will allow CICS/VS to reduce the number of VSAM requests that have to be executed, and thus reduce a possible bottleneck, by retaining more control intervals in virtual storage. The provision of multiple buffers will reduce the amount of I/O required by:

- Reducing the number of READs since the required control interval may already be in main storage.
- Reducing the number of WRITES since the temporary storage record or queue may be deleted before shortage of buffers forces I/O.

VSAM requests will continue to be executed as dictated by the requirements of physical and logical recovery.

**Concurrent I/O Operations:** Concurrent I/O operations will be achieved through:

- Use of multiple buffers.
- Use of multiple VSAM strings.
- Replacement of queue global serialization by queue local serialization.

**System Initialization table (SIT) options** will allow the user to control the number of VSAM strings and the number of buffers used for I/O. The number of strings may not exceed the number of buffers.

Increasing the number of strings will increase the potential for concurrent I/O and hence affect channel activity. Increasing the number of buffers will tend to reduce the total amount of I/O.

The customer has statistics to evaluate the effects of increasing the number of buffers. Improved performance and reduced bottlenecks must be traded against the virtual storage required for the additional buffers.

**Subtasking:** VSAM intra-partition transient data requests or auxiliary temporary storage requests will be passed to an operating system subtask to increase the ability of a single CICS system to make better use of a tightly-coupled multiprocessor.

The MVS subtask that handles VSAM requests from file control has been extended to handle VSAM requests from transient data and auxiliary temporary storage. Each request will be placed on a work queue from which it will be dequeued by the subtask. The subtask will pass the request to VSAM and, following completion of the I/O, will notify the main task (CICS) that the relevant transaction may be redispached.

**Journal Control Performance Improvements:** CICS/OS/VS V1R6.1 has changed the environment in which journal output requests are made so that BSAM I/O requests made by journal control can be executed under a separate MVS subtask. This is intended to increase the ability of a single CICS system to make better use of a tightly-coupled multiprocessor.

With this support, a BSAM request for journal control will be placed on a work queue from which it will be dequeued by code running under an MVS subtask. The subtask will issue the request and synchronize with the main task (CICS) to allow the transactions requiring the work to continue when they are able.

This support is provided only for journal output requests from the journal control program.

The same MVS subtask that handles VSAM requests from file control (and now transient data and auxiliary temporary storage), has been extended to handle BSAM requests from journal control. Use of the subtask is optional and is controlled at initialization.

**Virtual Storage Constraint Relief (VSCR):** The following improvements in file control are provided in CICS/OS/VS V1R6.1:

- Support providing for the use of VSAM (DFP) buffers above 16MB (MVS/XA).

- Support providing for the use of VSAM (DFP) record management code above 16MB (MVS/XA). (This is also available with CICS/OS/VS V1R5 and V1R6.0.)
- Support for separate local shared resources (LSR) pools for CICS and IMS.
- Use of local shared resources (LSRs) by alternate index paths and base clusters with an upgrade set.

MVS/XA Data Facility Product (MVS/XA DFP) Release 1.1 is required for the support of the first three of these improvements.

**VSAM buffers above 16MB:** With this support, buffers for all VSAM files defined in the FCT together with the local shared resource pool will automatically be allocated above the 16MB line (subject to minor restrictions below).

There are no options associated with this improvement. The support is transparent to both macro- and command-level application programs. Programs do not have to be in 31-bit addressing mode in order to access files having buffers above 16MB.

This will provide substantial virtual storage constraint relief (VSCR) for MVS/XA customers with large VSAM buffer areas.

There are three types of files which will not have their buffers allocated above 16MB, namely, improved control interval processing files, indirect access files, and segmented record files.

**VSAM Record Management Code above 16MB:** The ability to place VSAM record management code above 16MB will provide further VSCR for MVS/XA users.

**Separate LSR Pools for CICS and IMS:** For MVS/XA users with CICS, this support will allow CICS to build a separate LSR pool above 16MB (SHRPOOL=1). The LSR pool for IMS will be built below 16MB (using the default SHRPOOL=0).

**Use of LSR with Alternate Index Paths:** This support will allow alternate index paths and base clusters with an upgrade set to use Local Shared Resources, thus removing a current restriction and providing further VSCR for many users.

**Command Level Enhancements:**

- The high-level (EXEC DL/I) command language for processing DL/I data bases, already announced for CICS/OS/VS users for COBOL and PL/I application programs running in a CICS online, shared data base (SDB), or IMS batch environment, is now announced for CICS/OS/VS for applications written in Assembler language.

- 31-Bit mode application support for command level DL/I transactions is also supported by CICS/OS/VS V1R6.1 for applications written in Assembler language.

This support, which requires the function provided by IMS/VS V1R3, is an aid to the migration of application programs to allow use of MVS/XA extended storage. This gives virtual storage constraint relief (VSCR) for applications using DL/I services without requiring any change to DL/I data bases. Command level DL/I applications can now be written to run in 31-bit addressing mode. The CICS Execution Diagnostic Facility for DL/I is available in this environment. No support is planned for call-interface programs (CICS services or DL/I services) to run in 31-bit addressing mode.

- In addition, a language improvement is provided whereby it is possible to specify a character string literal for the compared value in the WHERE clause, instead of a program data area. This capability is provided for Assembler language and PL/I application programs which use OS EXEC DL/I.

**Application Program Enhancements:** The command level (EXEC) programming interface was introduced in CICS/VS V1R3 and has been enhanced in subsequent releases. It is designed to simplify the CICS application programmer's task, isolate application code from CICS internal code dependencies, and through EDF and CECL, simplify the program test and debug tasks.

CICS users are encouraged to use the command level programming interface for all application program development. The macro level interface continues to be supported for program compatibility and maintenance purposes.

All enhancements to the application programming interface, and in particular, the CICS support for MVS/XA in CICS/OS/VS V1R6.0 and CICS/OS/VS V1R6.1, are provided at the command level interface and are supported by EDF.

**CICS/VS Monitoring Enhancements:**

- The sample program DFHXMOLS has been enhanced to provide assistance in verifying that CICS monitoring function has been installed correctly.
- Additional performance class data is captured:
  - Message lengths by transaction - will be collected such that input-lengths and output-lengths are separately identifiable.

PROGRAM PRODUCTS

CICS/VS (cont'd)

- Program storage by transaction, and program deletion value.
- Short-on-storage condition and/or maxtask indications are recorded for each task that experiences either.
- The usability of journaling operations for CICS monitoring facilities has been improved by retaining the journal position following a CICS restart, and by ensuring that a dictionary record is available on each volume or extent.
- Online access to the global performance records produced by the CICS/VS monitoring facility is provided. Access to the three types of task-related records was provided in V1R6.0; this facility is now being extended to the global performance record.

**CICS/VS Library:** This release of CICS/OS/VS is accompanied by updates to the CICS library provided with CICS/OS/VS V1R6.0.

Customers are advised to update their CICS SLSS (System Library Subscription Service) profiles to include the new manuals introduced with this release.

Customers will require the CICS/OS/VS V1R6.0 manuals as a base set.

All the information about the changes and enhancements in the new release is contained in the new books. These books are:

- *CICS/OS/VS V1R6.1 Release Guide* (GC33-0171)
- *CICS/OS/VS V1R6.1 Installation and Operations Guide* (SC33-0172)
- *CICS/OS/VS V1R6.1 Messages and Codes* (SC33-0173)
- *CICS/OS/VS V1R6.1 Data Areas* (LC33-0174).

The *Data Areas* book will also contain diagnosis reference and problem determination information.

Planned availability for the *Release Guide* is July 1983. Planned availability of the other manuals is August 1983.

**IMS/VS DB Data-Sharing and Data Base Recovery Control (DBRC)**

**Support:** The key points of the CICS/OS/VS V1R6.1 support for IMS/VS DB data-sharing and DBRC (Data Base Recovery Control), in conjunction with IMS V1R3 are:

- Data-sharing support will allow data bases to be shared among CICS/VS, IMS/VS DC, and batch IMS/VS DB subsystems under control of the same MVS system (or on VTAM-connected processors with the data bases on shared DASD). The sharing is performed with full integrity.

Block level or data base level sharing is provided with this support.

- DBRC support will allow the user to take advantage of the Data Base Recovery Control (DBRC) facility of IMS/VS. This facility simplifies the procedures which the user has to employ when performing recovery operations on data bases. DBRC support will be available to the CICS/VS user who uses IMS/VS V1R3, and has a CICS system disk log or standard labelled tape system log. In the case of the disk log user, an offline utility will be supplied by IMS which will allow the disk extents to be copied to standard labelled tape under DBRC control.
- Intra-host block level data sharing can provide better performance than multi-region operation (MRO) DL/I function shipping. The greater the proportion of DL/I function shipping calls to the total number of data base requests, the greater the potential for performance improvement.

This support offers improved performance for batch programs sharing data bases with CICS/VS, compared to the CICS/VS shared DB support available with CICS V1R5.0, V1R6.0 or V1R6.1. It allows the full use of IMS/VS DB batch function (including GSAM and extended checkpoint/restart) thus avoiding the restrictions imposed by 'shared DB'.

This support also improves the usability of multiple CICS subsystems with DL/I applications by providing equal access to physical and logical data bases, while still appearing as 'local' data bases to all sharing subsystems. This will make the use of MRO more attractive in order to gain MP transaction throughput improvements and virtual storage constraint relief by splitting applications into more than one address space.

In addition to these enhancements, CICS/VS data-sharing will enable the IMS DC user to access data bases used by CICS/VS (via COPICS, for example).

- CICS supports the IMS option of 'open for input'. Sharing of a data base, with integrity, is provided by allowing a data base to be defined as either 'read only' or as 'open for update' for a given CICS system. This state can be changed dynamically. A single updater can share the data base with multiple readers (including IMS/VS DB and IMS/DC) running in different address spaces on the same MVS system.

This is available without requiring either CICS shared data base support or IMS DBRC and data-sharing.

**HIGHLIGHTS of CICS/VS VERSION 1 RELEASE 6**

**MVS/XA SUPPORT:** CICS/OS/VS V1R6 and V1R5 may be used in the MVS/XA environment as well as the MVS/370 and VS1 environments. CICS applications which conform to the interfaces defined in the *CICS/VS Application Programmer's Reference Manuals* and which execute correctly under CICS/OS/VS should require no change to execute as 24-bit programs in an MVS/XA environment.

In addition, CICS/OS/VS V1R6 supports the 31-bit addressing and extended virtual storage facilities of MVS/XA in a number of ways:

- In the MVS/XA environment, CICS/OS/VS V1R6 will use the extended virtual storage area to store Temporary Storage records written to main storage. This applies for both 24-bit mode and 31-bit mode programs.
- Support is provided for command-level (EXEC CICS) application programs assembled with Assembler H V2, to use 31-bit addressing. This support enables such programs to be loaded in extended virtual storage rather than in the CICS dynamic storage area.
- CICS/OS/VS V1R6 supports command-level requests for remote as well as local resources from programs executing in 31-bit addressing mode. Macro level requests and DL/I calls from 31-bit programs are not supported.
- Full Execution Diagnostic Facility (EDF) support is provided for 31-bit programs. Extended virtual storage areas may be displayed and altered using EDF.
- CICS DUMP and TRACE provide equivalent support to both 31-bit and 24-bit programs.
- The EXEC CICS GETMAIN command is enhanced by the addition of a FLENGTH keyword. For programs executing in 31-bit mode, FLENGTH will allow the allocation of up to 1,024 megabytes (1 gigabyte) of virtual storage via the MVS/XA GETMAIN command. For 24-bit mode programs, irrespective of the operating system environment, FLENGTH will allow allocation of up to 65,520 bytes of virtual storage. FLENGTH is supported by both CICS/DOS/VS V1R6 and CICS/OS/VS V1R6.
- CICS/OS/VS V1R6 will support the execution of transactions which consist of a combination of 24-bit and 31-bit command level programs. This support may be used to extend existing applications and to support program-by-program conversion of existing 24-bit transactions to the 31-bit mode of operation.

**IMPROVED IMS/VS SUPPORT:** Support for the IMS/VS DB user has been enhanced in CICS/OS/VS V1R6 and can offer improved usability and data base integrity.

With IMS/VS V1 Release 2 or 3:

- DL/I data base integrity is improved in the event of CICS dynamic transaction backout failure or emergency restart failure. DL/I data bases which fail to be backed out will be automatically closed by CICS.
- The CICS CEMT RECOVERDB command has been improved to give better usability and increased data base integrity. The command will now force end-of-volume on the system log only once for a group of data bases, thus avoiding fragmentation of the log and the loss of log data that previously occurred through excessive switching between disk log extents.
- The CICS DL/I trace has been improved to include response codes on exit from the CICS-IMS interface.

With IMS/VS V1 Release 3:

- CICS/OS/VS Command Level Programming Interface Support:
  - The CICS/OS/VS COBOL or PL/I programmer is provided with a new set of EXEC DLI commands for processing of IMS/VS data bases in a CICS/OS/VS environment including online, CICS/VS shared data base, and IMS/VS DL/I batch applications. The EXEC DLI language is supported by the CICS Execution Diagnostic Facility (CEDF), is upwards compatible with the DL/I DOS/VS language, and is extended for IMS/VS functions.
- In the OS/VS2 MVS or MVS/XA environments, the number of concurrent DL/I transactions supported by CICS/OS/VS V1R6 is increased from 31 to 255.
- New initialization options available to CICS/OS/VS V1R6 enable the IMS/VS R3 user:
  1. To hold and access IMS modules in the LPA, for improved systems integrity.
  2. To pagefix ISAM/OSAM buffers for performance tuning.
- IMS/VS V1R3 users will not need to create a CICS PSB for configuring the IMS/VS nucleus at CICS initialization.
- CICS modules do not have to be link-edited with IMS/VS V1R3 modules. Therefore, the IMS/VS load library is not required during

PROGRAM PRODUCTS

CICS/VS (cont'd)

CICS V1R6 generation, and, in addition, application of IMS maintenance to a CICS-DL/I system is simplified.

- CICS/OS/VS-DL/I Primer Sample Programs - Code will be provided to support the CICS/OS/VS-DL/I Primer sample programs. This code will be integrated with the IMS/VS Primer code from previous releases of IMS/VS and will be distributed as a part of the IMS/VS V1R3 Data Base System.

INSTALLABILITY IMPROVEMENTS

- CICS/OS/VS V1R6 may be ordered with a VS1 option or an MVS option. VS1 specific materials are excluded from the MVS option and vice-versa. Both options include a pregenerated CICS system. Previously this was available only for VS1 systems. This simplifies the CICS installation process by reducing the need for users to perform CICS module assemblies.
- The CICS/OS/VS-supplied installation job stream has been simplified by dividing it into a number of smaller jobs for separate installation tasks.
- Installation and Operation Guides for CICS/OS/VS and CICS/DOS/VS are included in the new CICS library. These manuals guide users through the tasks of installing and operating the CICS system.
- For users performing their own system generation, this task has been simplified. For example, the number of BMS operands has been reduced from twenty-three to three, allowing users to generate, or, in CICS/DOS/VS, select one of three BMS systems (full, standard or minimum) as desired. The twenty-four options of the FILSERV keyword of File Control have been replaced by the three options VSAM, ISAM and DAM.
- To help simplify the tasks of installation and service application for CICS/DOS/VS, machine-readable material in this release is provided in two parts: Basic material and optional material.

The basic material includes fewer library files than V1R5, simplifying service application using MSHP. The files include a core-image library, a relocateable library, and source libraries. The core-image library contains a comprehensive set of pregenerated CICS modules, tables and sample programs such that, for many users, the need to perform their own system generation will be eliminated. The relocateable library includes modules required for link-editing with user applications. The source includes that required for user resource definition, and for those CICS modules for which system generation is supported in this release.

Optional material is provided as a separately orderable feature, and comprises source code for CICS modules (in the basic material) only in pregenerated form. Optional material is not supported for system generation. Local program support, corrective and preventive service are not provided for licensed optional source material.

**APPLICATION PROGRAMMING ENHANCEMENTS:** The command level (EXEC) programming interface was introduced in CICS/VS V1R3 and has been enhanced in subsequent releases. It is designed to simplify the CICS application programmer's task, isolate application code from CICS internal code dependencies, and through EDF and CECL, simplify the program test and debug tasks.

CICS users are recommended to use the command level programming interface for all application program development. The macro level interface continues to be supported for program compatibility and maintenance purposes.

All enhancements to the application programming interface in CICS/VS V1R6 are provided at the Command level interface and are supported by EDF. Enhancements for the application programmer include:

- A new CICS transaction, CEBR, enables a user to display the contents of individual temporary storage queues. This capability can be useful in program development and problem determination.
- In CICS/VS V1R6, BMS can process both aligned and unaligned BMS maps interchangeably.
- Support is provided for BMS input maps containing fields which are not ordered in ascending sequence by position. This can be useful during application development. Field layouts on a screen may be varied without the need to modify associated application code.
- Two new CICS commands, PUSH and POP, allow all current HANDLE CONDITION specifications to be suspended if these are not appropriate to a called subroutine or program, and to be restored when control is returned to the calling program.
- New keywords MAXLENGTH and NOTRUNCATE can be specified on RECEIVE or CONVERSE commands. MAXLENGTH specifies the minimum amount of data to be received at a given time. Unlike the LENGTH field, it is not overwritten during program execution. NOTRUNCATE specifies that when the data available exceeds the length requested by an application program, the remaining data will

not be discarded, but retained for retrieval with subsequent commands.

SECURITY ENHANCEMENTS

- Users of the MVS external security management program, Resource Access Control Facility (RACF, 5740-XXH), may take advantage of the following additional security enhancements:
  - APPLID validation - This may be used by RACF to restrict sign-on to a specific CICS system to specific operator groups.
  - TERMINAL validation - The terminal validation facilities of RACF may be used in the CICS environment to restrict use of particular terminals to specific operator groups.
  - Local DL/I PSB validation - RACF may be used to validate a DL/I PSB from applications executing in a local CICS system. This is in addition to the facility introduced in CICS/VS V1R5 to validate DL/I PSBs originating from batch programs using the CICS/VS shared DB interface or from a connected CICS/VS region.
- User exit security is improved to ensure that any program invoked from a user exit is authorized as a CICS program.
- In CICS/VS V1R6, the number of transaction security values available with the CICS sign-on program and sign-on table is increased from 24 to 64.
- A new resource level security value of PUBLIC is introduced. When assigned to a resource, it makes that resource available to any transaction requiring it, irrespective of the resource level check value associated with the transaction.
- User management is responsible for evaluating, selecting, applying and implementing security features, and for the appropriate administrative and application controls.

JOURNAL MANAGEMENT and RESTART ENHANCEMENTS

- CICS/OS/VS V1R6 introduces support of IBM standard label tapes for use as CICS or user journals. This provides a more secure and usable alternative to present tape journal control procedures which remain available.
- CICS standard label tape journals may be either linear or cyclic.
  - A cyclic tape journal comprises a finite number of tape volumes which are reused in sequence. Such a journal could serve for the CICS System Log.
  - A linear journal may comprise an indefinite number of tape volumes and re-use of any volume is under user control. Linear journals may be appropriate for accumulating long audit trails.
- For each standard label journal, CICS/OS/VS maintains a list in chronological order of the tapes used, and keeps a record of which volumes have been written to and closed. This information persists across all restarts including cold starts of the CICS system.
- For standard label tape journals, CICS communicates tape mounting requirements to the system operator using the tape volume identifiers.
- CICS statistics in the CICS/VS shutdown summary are enhanced to report the identification of the last tape in each journal.
- CICS/VS V1R6 includes new master terminal (CEMT) commands for disk and tape journals to control opening and closing of individual journals, and a CEMT command (SWITCH) to allow a user to choose when the end-of-volume occurs.
- A new CICS START option, AUTOMATIC, allows CICS to determine which type of restart (warm or emergency) to perform by reference to the state of the system as maintained on the restart data set. This offers improved reliability and reduced operator interaction in system shutdown/restart operations.

CICS RESOURCE DEFINITION ONLINE

- CICS/VS V1R6 introduces a new, interactive process for defining groups of CICS transactions, programs, mapsets, partition sets and profiles, and the capability to dynamically add or alter these resources (PPT and PCT entries) on a running CICS system.
  - These new facilities are provided in a CICS-supplied transaction called CEDA which includes: A set of commands for the management of groups of related resources; a set of commands for the management of lists of groups; a command to manage dynamic reconfiguration of a running CICS system; and a command to perform cross-checking within a group of resources or within a list of groups.
- Resources defined using CEDA are held on a VSAM file called the CSD (CICS System Definition). Related resource definitions are held on the CSD in named groups. A group may comprise, for example, all definitions of the resources, like programs, maps, and transactions constituting one application. The CSD also contains lists of groups defined using CEDA.

PROGRAM PRODUCTS

CICS/VS (cont'd)

- Groups from the CSD can be installed on a CICS system at initialization time. In addition, dynamic modification to a running CICS system may be made using the INSTALL GROUP command of the CEDA transaction. This command causes all definitions in the specified group to be added dynamically to the CICS system.
- Facilities are provided to allow coexistence with and staged migration from the present offline methods of CICS resource definition for those resource types supported by CEDA. Users may use some definitions from the CSD and some from PPTs and PCTs created by existing procedures.
- An offline utility is provided to initialize and create or extend a CSD. A MIGRATE command creates transaction, program, mapset, partition set and profile definitions on the CSD from PPTs and PCTs which have been assembled and link-edited to a load library using CICS/VS Version 1 Release 6 table macros. A COPY command allows definitions to be copied from the same or another CSD.
- All CEDA commands which modify a CSD or a running CICS system may be logged to provide an activity audit trail.

**SYSTEM AVAILABILITY ENHANCEMENTS:** The capability to add and modify CICS PPT and PCT entries online can contribute to improved system availability. Further support in CICS/VS V1R6 which can help improve system availability includes:

- CICS/VS V1R6 will support Session Outage Notification, an SNA facility supported in ACF/VTAM V1R3, ACF/VTAM V2R1 and ACF/TCAM V2 Releases 3 and 4. This support will enable automatic recovery from session failure to be attempted by CICS in some cases depending upon the nature of the session failure.
- Support is provided so that modules or programs with PPT entries may reside in the operating system link pack area (LPA) or shared virtual area (SVA) provided they have the read-only attribute. Many CICS-supplied modules are read-only and eligible for inclusion in the LPA. Such modules and programs are protected from being overwritten, thus improving availability and integrity characteristics in both MRO and single region environments.

**PERFORMANCE and TUNING IMPROVEMENTS**

- VSAM subtasking, introduced via a PTF to CICS/OS/VS V1R5, is included in CICS/OS/VS V1R6. It is an option applicable to MVS only. It enables VSAM file control requests from CICS to be handled by an operating system subtask. This allows parallel execution of the subtask with the main CICS task on MP, AP or dyadic processors with consequent improvement in system utilization.
- In this release, Basic Mapping Support (BMS) may be generated, or in the case of CICS/DOS/VS V1R6, selected as a minimum, standard or full function version. The minimum version has substantially shorter path length and storage requirements than the other two versions. The minimum version code is automatically invoked in the other two BMS options for certain commonly used command level SEND and RECEIVE MAP requests to and from 3270 displays and printers.
- CICS/VS V1R6 supports the SNA large message processing enhancements of ACF/VTAM V2R1. This allows messages comprising multiple request units (RUs) to be transmitted to SNA devices in a single SEND request from CICS to VTAM, thereby reducing operating system task switches. CICS will also be able to send data from discontinuous buffers, thus avoiding the data moves associated with building single buffers.
- CICS management of temporary storage is improved. A user now has more scope to adjust the control interval size of the VSAM temporary storage file to tune system performance. Temporary storage records may now exceed the size of the control interval.
- The address space for a CICS system running under MVS can now be made swappable. With this, it is possible to run multiple separate CICS systems in the same processor by allowing the operating system to swap out CICS address spaces which have been inactive for some predefined period of time. This facility may be particularly useful in a system with multiple low activity CICS address spaces to help optimize overall system utilization.

**INTERCOMMUNICATION ENHANCEMENTS**

- Multi-Region Operation (MRO) was introduced in CICS/VS V1R5 and offers transaction routing and function shipping. These facilities, where appropriate, enable users to organize their CICS workload into multiple connected CICS regions for improved testing, integrity and, in multiprocessing environments, overall system utilization. CICS/VS V1R6 extends MRO to include support for distributed transaction processing where an application may be written as complementary transactions, each executing in an MRO connected region.
- CICS/VS V1R6 introduces new support for CICS-to-CICS program-to-program communication in an SNA environment. This new support requires ACF/VTAM V2R1. It includes the existing

CICS-to-CICS application programming facilities and offers the following additional functions:

- Program-to-program error notification.
  - A new command enables a pair of user programs to inform each other of errors, to synchronize processing and to exchange data to recover from application-detected errors without transactionabend.
- Application program selection of synchronization level.
  - An application is able to select whether or not an SNA session is to participate in CICS synchpoint processing. As an example, an inquiry-only application may be designed to run without CICS synchpoint processing. A further option allows the user to perform resynchronization under application program control rather than via CICS synchpoint processing.
- Resynchronization improvement.
  - If a session failure occurs during the execution of a CICS synchpoint request, resynchronization of the session partners will be attempted to establish the state of protected resources at the point of session failure. This is done before any local resources are committed or backed out.
- User control of allocation of work across a set of parallel sessions.
  - This allows work to be allocated to specific routes between systems and also allows different types of transactions to be managed so that they do not interfere with each other. For example, a user can associate low data volume, fast response transactions with one set of sessions and high data volume, slow response transactions with another set of sessions.
- Synchpoint rollback.
  - This may include an ISC session. This means that a remote program may be notified when the partner program issues synchpoint rollback and both may continue processing instead of being abnormally terminated.

The new support is based on SNA extensions and involves new SNA session definitions. The SNA extensions are designed to provide common session protocols for document interchange and distributed data processing. This provides the base for CICS users to establish a single network definition for distributed office and distributed data applications. A new publication, *Systems Network Architecture: Transaction Programmer's Reference Manual LU Type 6.2* (GC30-3084) provides general guidance for programmers writing transaction programs based on the SNA extensions.

CICS users who are implementing CICS program-to-program applications for the first time should use the new support and SNA extensions.

Users with existing CICS program-to-program applications are recommended to implement the session definition changes. Existing applications should, in general, require no change to execute on sessions using the SNA extensions. Users who do not plan to implement the new support until later may continue to run existing CICS program-to-program applications without change on CICS/VS V1R6.

Applications based on CICS to IMS program-to-program communication are unaffected by the SNA extensions. The existing CICS to IMS support is the base for the development of user program-to-program communication between these subsystems.

- A new publication, the *Intercommunication Facilities Guide*, will be available with CICS/VS V1R6. It presents a comprehensive description of intersystem communication (both CICS/VS to CICS/VS and CICS/VS to IMS/VS) and multi-region operation for system programmers, application designers and developers and technical support personnel.

**DEVICE SUPPORT ENHANCEMENTS**

- The sharing of a 3270 display screen between BMS and GDDM Release 2 is simplified. CICS will allow the definition of BMS maps which have size and position but which contain no fields. New options on the CICS ASSIGN statement enable the size and position of a map to be passed as input to a GDDM call. This information may be used by GDDM to position graphic fields in areas of the display screen which contain no BMS fields.
- CICS/VS V1R6 supports the attachment of 3270 SNA terminal devices which can send/receive ASCII-7 or ASCII-8 data streams. CICS converts the ASCII data to and from EBCDIC for application programs. The ASCII-7 support is confined to the 3274 mdls 1C or 51C, 3276 mdl 12, 3278 and 3287 devices using basic 3270 data streams only. The ASCII-8 support applies to 3270 displays and printers with basic or extended 3270 or SCS data streams.
- Support of extended attributes (e.g., color and highlighting) was provided in CICS/VS V1R5 for devices which supported the 3270 extended data stream. CICS/VS V1R6 adds support of extended attributes for printers which support the extended SCS (SNA

PROGRAM PRODUCTS

CICS/VS (cont'd)

- Character String) data stream and for 3270 printers using the NLEOM mode of operation.
- A BMS statement, SEND CONTROL, allows an application program to build and transmit device controls, such as cursor position and alarm set, without associated display data.
- Program control is provided for the 10/63 Magnetic Stripe Reader (MSR) in command level programs via a new keyword, MSR, on the BMS SEND MAP, SEND TEXT, and SEND CONTROL commands. The new option applies to 10/63 Magnetic Stripe Readers attached to 8775 or 3643 terminals.
- Support for vertical forms control is extended to all 3270 printers through the addition of a FORMFEED keyword on BMS SEND commands.
- The use of the trigger field validation attribute of 8775 displays to initiate input to a CICS application program is supported. A new option of the HANDLE AID command allows the application program to pass control to a handling routine upon receiving input from a trigger field.
- In CICS/VS V1R5, basic terminal control support of 8775 display screen partitioning facilities was provided. Enhancements to this support are included in this release. Applications may be designed to exploit multiple partitions on appropriately featured displays via extensions to the CICS command level program interface. A new CICS mapset-like object, the partition-set, is introduced. A partition-set defines a screen layout in terms of one or more partitions. It has a name, it may be suffixed, and is stored as a CICS program like a BMS mapset. The command level enhancements allow an application program to load a predefined partition-set onto a display and to set the current output partition and expected input partition for outbound and inbound data respectively.
- A new option, Katakana, is provided in the CICS terminal control table (TCT) macro for 3270 devices with the Katakana feature. When specified, output from the CICS-supplied transactions such as CEMT will be displayed in upper case characters only. This is necessary because the codes normally used for lower case characters are used for Katakana characters in 3270 Katakana devices.
- Input from non-Katakana 3270 display terminals to CEMT and CECI may now optionally be in lower case characters for command keywords as well as for data.
- Support is provided for 8100 DPCX DXAM files in CICS command level programs. DXAM files may be accessed via the CICS batch data interchange programs using the ADD, REPLACE and ERASE commands.

PROBLEM DIAGNOSIS/SERVICEABILITY AIDS

- CICS transaction dumps and formatted dumps will include a short explanatory header (symptom string) for use by the user and the IBM service representative in problem diagnosis via SSF (Software Support Facility). The header will contain the abend code and associated component and module identifiers.
- User-supplied titles may be inserted at the top of operator-requested dumps.
- CICS transaction dumps will include the latest command level COMMAREA.
- The diagnostic information available with storage violation dumps is improved.
- A new option enables users to suppress on a transaction basis the generation of entries in the CICS trace table.
- The CICS trace utility program will support the printing of trace data for a particular occurrence of a transaction.
- The size of the trace entry has been enlarged to 32 bytes. Each entry now includes a time stamp and user trace entries may optionally include an 8-character resource name.
- New system messages indicating storage violation and short-storage conditions are provided for system operator guidance.

**ADDITIONAL USER EXIT FACILITIES:** In addition to the improved user exit security (see "Security Enhancements") other user exit facilities in CICS/VS V1R6 are:

- A user exit in the CICS terminal control program gives the user access to output messages before they are transmitted.
- The task-related user exit, which was provided in CICS/DOS/VS V1R5, is included in this release of CICS/OS/VS V1R6 and CICS/DOS/VS V1R6. It is so called because it can be invoked directly by a user-written Assembler language program within a task; it does not have to be driven by a CICS management program. This type of exit may be useful where a CICS system is to communicate with a non-CICS program which manages recoverable resources.

- A user exit in the CICS monitoring control program enables a user to access monitoring data as it is about to be written to a journal.

**REVISED CICS/VS LIBRARY:** This release of CICS/VS is accompanied by extensive changes and improvements to the CICS library designed to make information more task related as well as easier to find and understand.

The additions to the CICS library include:

- CICS/OS/VS V1R6 Release Guide
- CICS/DOS/VS V1R6 Release Guide

These are designed primarily for current users and describes the new releases including installation, operation and customization considerations.

- Installation and Operations Guide (OS/VS)
- Installation and Operations Guide (DOS/VS)
- Customization Guide
- Resource Definition Guide
- Recovery and Restart Guide
- Performance Guide
- Intercommunication Facilities Guide

HIGHLIGHTS of VERSION 1 RELEASE 5

**Availability Dates:** Version 1 Release 5 is available.

**Multi-region Operation:** CICS/VS Multi-region Operation (MRO) provides the ability to run multiple connected CICS/VS regions within a system (partitions in DOS/VSE and OS/VS1, address spaces in OS/VS2) while sharing terminals, transactions and other resources. Terminal users normally perceive a single CICS/VS image. Individual CICS/VS regions can be started and stopped without interrupting other regions.

Three major facilities are offered in MRO:

- Transaction routing between CICS/VS regions, so that operators at terminals of one CICS/VS region can run transactions in any connected CICS/VS region. This applies to application programs written to the High Level Programming (EXEC) Interface or to the macro interface.
- Function shipping, so that application programs written to the High Level Programming Interface (or the DL/I CALL interface) can also access resources of any connected CICS/VS region, without requiring knowledge of the placement of these resources. The resources are accessed through the File Control, Transient Data, Temporary Storage, Interval Control Transaction Initiation and DL/I functions of CICS/VS.
- Shared CICS/VS management modules, providing a mechanism for placing CICS/VS management modules in the system Link Pack Area (CICS/OS/VS) or Shared Virtual Area (CICS/DOS/VS). This allows the code to be shared between regions and thus offers reduced paging. It also offers increased integrity in both MRO and single region environments.

These facilities have numerous potential uses. The user may choose two CICS/VS regions or many, and each region may run many applications or one. For example, new CICS/VS application programs can be tested concurrently with production operation of CICS/VS, using a separate test region and so reducing possible impact on production without inhibiting access to existing resources and without requiring terminals to be dedicated to the test region. CICS/VS operation in a multiprocessor system can be improved by running CICS/VS in multiple OS/VS MVS address spaces. A CICS/VS system can be divided on a departmental basis, providing independent operation for one department while maintaining controlled access to resources of another department.

User specification of the CICS/VS region to be associated with terminals, transactions and other resources enables the overall CICS/VS system to be optimized across the CICS/VS regions. Terminals and other resources normally associated with a production application should be defined in the same region as the applications programs so that the overheads associated with inter-region communication are minimized. The ability to define the number of CICS/VS regions and the resources to be controlled by each region, enables the user to choose the appropriate level of performance, integrity and ease of operation.

A CICS/VS transaction, CRTE, is provided which enables a terminal operator with appropriate security access to invoke from one region a transaction in a connected CICS/VS region without the need for any transaction table modifications in the first CICS/VS region. This facility is useful for testing transactions on MRO connected systems, and is particularly useful for invoking the master terminal transaction in a specific connected CICS/VS region.

## PROGRAM PRODUCTS

**CICS/VS (cont'd)**

Most existing application programs require no change in order to be invoked via transaction routing. Most HLP1 programs can also use data resources defined in a different region without requiring change in the application program. A case where transaction routing may not be transparent to the application program is where an application communicates with a user exit; full details of changes to existing programs required for multi-region operation will be documented at the time of availability.

**Intersystem Communication Extensions:** Intersystem communication support provides the capability for two or more CICS/VS or IMS/VS systems to communicate using SNA multi-system networking facilities. The existing support allows CICS/VS function requests to be shipped between CICS/VS systems. In CICS/VS V1R5 ISC is extended by providing use of SNA parallel sessions to offer throughput improvements and an ISC communications facility is provided for a direct transaction to transaction interface to CICS/VS and IMS/VS-MSC.

Direct transaction-to-transaction communication supports distributed transaction processing, where an application may be written as two complementary transactions, one executing in the system local to the originating terminal, the other in a remote system. User function can therefore be distributed between CICS/VS and/or IMS/VS-MSC systems in an SNA network, to complement the existing support where CICS/VS functions are distributed only between CICS/VS systems. An application program uses High Level Programming Interface commands in PL/I, COBOL or Assembler Language to initiate, maintain and terminate a conversation with an application program across a ISC link.

Often, direct communication between CICS/VS transactions can offer greater efficiency of data transfer than CICS/VS function shipping since several data records can be placed in each message instead of needing a message for each CICS/VS command. However, CICS/VS function shipping requires no special user programming for many applications. For transaction-to-transaction communication, CICS/VS provides sample programs to provide guidance on application programming techniques, to give access to some standard CICS/VS or IMS/VS transactions in remote systems and to provide a base on which user applications can be built.

CICS/VS transaction-to-transaction communication uses SNA protocols and is dependent on functions introduced in ACF/VTAM Version 1 Release 2. All CICS/VS Intersystem Communication functions depend on the facilities of ACF/VTAM Version 1, with its Multi-system Networking Facility for cross-domain links, or ACF/VTAM Version 2. Access methods offering compatible interfaces, ACF/TCAM V2 (R2 and subsequent) and ACF/VTAME, can also be used.

A queuing facility allows EXEC START requests to be queued on a local CICS/VS system if an ISC link is unavailable. This gives a batch capability in that many EXEC STARTS may be queued locally on temporary storage until an ISC session is acquired.

CICS/VS Version 1 Release 5 introduces further use of SNA facilities for all CICS/VS Intersystem Communication functions. The parallel session capability introduced in ACF/VTAM Version 1 Release 2 is used to offer the user a choice of the number of concurrent sessions allowed between systems. This can offer improvements across an ISC link. Use of negotiable session initialization parameters introduced in ACF/VTAM Version 1 Release 2 enables CICS/VS to adapt, where appropriate, to the capability of other subsystems in the SNA network.

**Enhanced Master Terminal:** Users of displays can use a new interactive interface for controlling the CICS/VS system. The Enhanced Master Terminal transaction, CEMT, offers a command syntax similar to that of the High Level Programming Interface, and allows abbreviations and defaulting of keywords. CICS/VS interprets the command and diagnoses errors and inconsistencies. This mechanism can therefore be used to construct commands interactively to inquire about, or change, the operation of CICS/VS. It is possible with a single command to inquire about or change the status of groups of resources (e.g., programs with names beginning ABC or terminals that are out of service). CEMT supports displays with screen size of at least 1920 characters and supporting the 3270 data stream. CEMT also supports use of the system console. The existing master terminal transaction, CSMT, continues to be available in Release 5 of CICS/VS Version 1.

The functions provided by the enhanced master terminal transaction can with some restrictions be invoked by a user program. This enables the system programmer to program certain operations which would otherwise have required action by the master terminal operator.

**High-level Programming Interface Enhancements:** CICS/VS Version 1 Release 5 further develops the High-level Programming (EXEC) Interface introduced in CICS/VS V1R3.0.

The Command Interpreter is a display-oriented program designed to assist in the writing, syntax checking and execution of an EXEC command. It enables an operator of a display (with screen size of at least 1920 characters and supporting the 3270 data stream) to enter a command for CICS/VS to check, and optionally execute. An application programmer can construct an EXEC command interactively, so using the Command Interpreter to complement the Execution Diagnostic Facility which enables an existing HLP1 program to be interactively

tested. The Command Interpreter takes the command, complete or partial, and checks its syntax. Default options are indicated by CICS/VS, together with diagnosis of missing or incorrect parameters. Once a command has been developed to the satisfaction of the user, he may request its execution. This enables the user to check the operation of the command and inspect diagnostic messages and the results of the operation, including inspection of the user's screen resulting from the operation. The facility can also be used to create or inspect test data (e.g., transient data) for use with the testing of application programs.

Further extensions to the high level programming interface include the ability to IGNORE specific error conditions completely and the ability to prevent the HANDLE condition from taking effect on specified EXEC commands.

CICS/DOS/VS supports a new High-level Programming (EXEC) Interface to DL/I DOS/VS for application programs written in COBOL or PL/I.

The CICS/DOS/VS Execution Diagnostic Facility is extended to support the EXEC DL/I DOS/VS interface in addition to the CICS/VS commands.

**Security Enhancements:** CICS/VS Version 1 R5 introduces an interface to external security management programs for verification of a user's access to CICS/VS and to check the user's authority to use transactions. This interface is available in CICS/DOS/VS and CICS/OS/VS and coexists with the internal CICS/VS facility. The new interface is designed to interface to the Resource Access Control Facility (RACF) (5740-XXH) on MVS so that RACF Release 3 facilities can be used to control user access to CICS/VS and its transactions. RACF can also be used to authorize access to a CICS/VS address space from another (e.g., when using the CICS/OS/VS Shared Data Base facility on MVS).

Extensions are also made to the authorization checking available to application programs using the High Level Programming Interface. In addition to the existing check of user access to a transaction, there is a new option to specify that authorization at a resource level should be checked for a transaction. This option is particularly relevant to generalized transactions which may access many different resources (e.g., files) according to user input. The option is used by CICS/VS provided transactions for Intersystem Communication, Execution Diagnostic Facility and Command Interpreter. For transactions specifying resource level authorization checking, the user specifies security keys for the resources to be protected in this way, for example in File Control Table entries.

Improvements to the CICS/VS signon procedure offer increased flexibility in signon, with passwords entered from a non-display field on a 3270 or from an over-struck field on terminals such as the 3767, use of an operator ID card in addition to keyed input and optional logging of all sign-on and sign-off actions. Non-display password and logging of sign-on/off were first made available in PTFs on CICS/VS V1R4.0.

**Improved Monitoring Facilities:** A data gathering mechanism in CICS/VS Version 1 Release 5 offers the user improved facilities for monitoring the performance of the CICS/VS system, and for providing accounting data on an individual user basis. The mechanism consolidates and extends data previously available in CICS/VS, offering a single interface on which analysis routines can be based. The user may dynamically choose the level of recording, dependent on his needs for accounting, performance or exception data. In this way he has granularity in the level of information recording, yet a common mechanism for analysis programs to process and extract relevant information. Monitoring data can optionally be written to System Management Facility (SMF) files in CICS/OS/VS. Monitoring data on SMF is intended for use on MVS in conjunction with MVS/System Extension Release 2.

**New Device Support:** CICS/VS supports the Network Terminal Option (NTO) program product (5735-XX7) so that additional terminals can be used with CICS/VS through ACF/VTAM or ACF/TCAM Version 2 with ACF/NCP/VS. Support through NTO offers an alternative to the existing support through BTAM and allows these terminals to use SNA networking facilities. CICS/VS support is specifically for Western Union Teletypewriter Exchange Service (TWX mdl 33/35) terminals and World Trade Teletypewriter Terminals (WTTY) and is designed so that existing TWX/WTTY application programs require minimal change for use with NTO. Physical attachment of terminals is as specified by NTO. The 3101 Display Terminal and the 3232 mdl 51 keyboard printer are supported as a TWX 33/35 substitute. The 6733 Communication Module is supported as a TWX 33/35 substitute.

CICS/VS supports the alphameric character set for magnetics on 3270 systems. Basic Mapping Support is extended so that application programs can use maps to support multiple 3270 screen sizes, including new sizes such as on the 3278 mdl 5, while remaining independent of screen size. Applications can also route messages to such displays, independent of screen size. BMS provides support of the extended attributes of color, extended highlighting and programmed symbols for 3270-type devices including the 3279 Color Display. BMS also supports additional functions of terminals attached to 8100 processors via the Data Stream Compatibility facility of 8100/DPCX or 8100/DPPX or DPPX/SP. Extended attributes for Extended Highlighting

PROGRAM PRODUCTS

**CICS/VS (cont'd)**

(underscore, blink and reverse video) and Field Validation (mandatory enter and mandatory fill) and programmed symbols can be specified on a field basis in output maps and modified dynamically by application programs.

**Enhanced IMS/VS Support:** The number of concurrent DL/I threads supported by CICS/OS/VS when used with IMS/VS Version 1 Release 1.6 or subsequent compatible releases is increased from 15 to 31.

Transaction dumps of CICS/OS/VS transactions which access IMS/VS DL/I will be extended to include DL/I control blocks.

The IMS/VS DB monitor is supported in the CICS/OS/VS environment through a new SIT option.

CICS/OS/VS Version 1 Release 5 introduces support of the OS/VS console as a CICS/VS terminal. This enables CICS/VS transactions to be invoked from the console and allows other CICS/VS operators to communicate with the console operator. In particular, the console can be used for CICS/VS Master Terminal functions to control CICS/VS terminals or to control several CICS/VS regions in conjunction with the Multi-region Operation. Normal operating system use of the console is not inhibited, and CICS/OS/VS supports multiple consoles where present. Console support is already available for CICS/DOS/VS.

**Usability and Serviceability Aids:** A new user exit mechanism, which in CICS/VS V1R5.0 coexists with existing exits, offers easier customization of CICS/VS. New user exit code can be incorporated without reassembly of CICS/VS management modules, aiding use of CICS/VS pregenerated modules. The new mechanism encompasses most of the existing customization points and is designed so that logical groups of exits can be controlled dynamically and independently. New user exit programs are written in Assembler Language, but have an improved interface with CICS/VS modules. Several exit programs can coexist at a single exit point, without requiring knowledge of each other and most existing exits can easily be converted to the new mechanism.

CICS/DOS/VS includes facilities designed to improve serviceability in a DOS/VSE environment. It includes functions similar to those provided to the CICS/DOS/VS user by the service aid Facility Error Recognition System (FERS). This provides problem determination data for communications problems associated with 3270 displays supported through BTAM-ES. The user can display statistics and details of communication problems related to BTAM-ES terminals and lines, individually or globally.

The DOS/VSE SYSDMP file can be used for CICS/DOS/VS problem data (e.g., partition dumps) so that this data can be accessed through VSE/Interactive Problem Control System (VSE/IPCS).

CICS/DOS/VS supports the Maintain System History Program in DOS/VSE (MSHP) for use in installing CICS/DOS/VS and its service updates. This enables a history file to be maintained with service level information on CICS/DOS/VS.

CICS/OS/VS supports the System Modification Program Release 4 (SMP4) for use in installing CICS/OS/VS and its service updates.

Auxiliary trace is enhanced by the provision of support for a second auxiliary trace file. This enables the installation to analyze one trace file while continuing to record on the other. Further, additional entries are now included in the CICS/VS trace table to record the interactions between CICS/VS and ACF/VTAM Version 1 or ACF/VTAM Version 2 or ACF/VTAME.

A new error message option for error messages written to 3270 displays by the message generation program (MGP) is provided. This allows such messages to be displayed on the last n lines of the screen (n lines is the length of the error message) instead of at the current cursor position. These messages may be displayed in this screen position with specified attributes such as color and extended highlighting.

New terminal status options are available which enable the user to prevent CICS/VS from automatically acquiring terminals.

SYSGEN parameters have been simplified by a reduction on the number of operands requiring consideration by the system programmer. This should reduce the number of times CICS/VS modules require to be regenerated.

In CICS/OS/VS the number of type 2 SVCs has been reduced to one. In addition, the SVC number can be provided in the SIT so that the user does not need to reassemble CICS/VS service modules if the SVC number is changed.

**CUSTOMER RESPONSIBILITIES**

To successfully install CICS/VS the customer must:

- Have installed at least the minimum required machine configuration.
- Have installed the correct level of operating system required by the CICS/VS product to be used.
- Ensure that appropriate training has been given to systems analysts, systems programmers, application programmers and

operators in CICS/VS and terminal-oriented applications and operations.

- Have a knowledge of data base concepts in order to design and create a data base or data files.
- Design and create formats and maps for terminals using the Basic Mapping Support.
- Have a knowledge of data communications applications in order to design and implement user application programs.
- Develop procedures to ensure adequate protection against accidental or deliberate loss or misuse of data.
- Develop appropriate backup procedures for vital applications.
- Plan for installation and operation of any remote terminals.
- Develop detailed schedules and procedures for conversion to an online environment.
- Ensure, for SNA terminals, that the appropriate personnel are proficient in VTAM or TCAM and 3704/3705 NCP/VS.
- Ensure, for intelligent subsystems, that the systems analysts and programmers are proficient in coding programs for the controllers and in understanding the interactions with the host.
- Be capable of generating the various CICS/VS control program modules and tables which satisfy the unique requirements of the installation.

**BRANCH OFFICE RESPONSIBILITIES**

Successful implementation of a CICS/VS system is a complex undertaking. The branch office must recognize and understand the tasks to be performed. Customer assistance may be required in areas such as education, systems design, application design, data base design, terminal network design and operations control.

To satisfy the potential requirements of the customer, the branch must have, or have ready access to, personnel who are skilled and knowledgeable in CICS/VS and the appropriate operating system together with BTAM, VTAM, TCAM, NCP/VS, VSAM, DL/I and industry-oriented subsystems as appropriate. While ultimate responsibility for the installation rests with the customer, IBM requires that the branch and marketing representative ensure that:

- The customer implementation plan is comprehensive and realistic.
- The programming system and hardware configuration selected for the CICS/VS environment will satisfy the requirements of the customer's application requirements.
- Appropriate education and training are offered to the customer management and technical personnel who will be involved in the implementation of the system.
- The customer is provided with appropriate qualified application planning assistance.
- Any requirements established under the Systems Assurance Program.
- The appropriate FE branch office is notified at the earliest possible opportunity to involve them in the planning and to ensure that they provide the required Class A service to the account.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

CICS/VS will operate on the IBM S/370, 308X or 4300 System given sufficient real storage to satisfy the combined requirements of CICS/VS, the host operating system, appropriate access methods, batch requirements and other customer-required applications. CICS/VS storage requirements are discussed under "Storage Considerations" below. The configuration must include sufficient I/O devices to support the requirements for system output, system residence and system data sets. Sufficient direct access storage must be available to satisfy the user information storage requirements and may consist of any direct access facility supported by the system configuration and the programming system. See also the documentation for the host operating system for details of any features and engineering change levels that are required.

Distribution and support of CICS/VS requires the availability of one 9-track tape drive.

CICS/VS does not save, restore or dump floating point registers and does not provide support for program checks resulting from floating point operations. For Assembler language programs this may result in unpredictable results when using floating point operations; the problem may be reduced by the Assembler programmer saving the floating point registers across CICS/VS EXEC commands or macro calls but unpredictable results may still occur in the event of a task switch during program check handling. This problem will not arise when application programs are written in ANS COBOL, COBOL VS, RPG II DOS/VS or PL/I.

PROGRAM PRODUCTS

CICS/VS (cont'd)

IBM DEVICE SUPPORT

CICS/VS support of terminals and programmable special features is shown at two levels. Table 1 below gives an overview, showing the terminal/system type and an indication of the access method supported. Table 2 gives further detail including relevant units and physical attachment where appropriate.

Two access method interfaces are shown in Table 1. Support of SNA networks was first introduced through VTAM. It is available through ACF/VTAM and, for devices also supported by these access methods, ACF/VTAME (CICS/DOS/VS) and the Record Interface introduced in ACF/TCAM Version 2 Release 2 (CICS/OS/VS). Table 1 shows this support under the column headed VTAM-type. The second interface is shown in the BTAM-type column. This support is available through BTAM (CICS/OS/VS) or BTAM-ES (CICS/DOS/VS).

The user should be aware that many terminals and control unit special features are transparent to programming and are therefore readily usable even though not specifically identified. In all cases, the appropriate line adapters or telecommunications control units must be used, as specified by the access method in use.

Another interface is available in CICS/OS/VS, supporting the use of TCAM with a Message Control Program. This, the TCAM GET/PUT interface, supports data stream rather than specific terminal types. CICS/OS/VS accepts any data stream from a TCAM or ACF/TCAM-supported terminal that can be edited in the message handler portion of the TCAM MCP to appear as an EBCDIC, basic SCS or IBM 3270 data stream. IBM 7770 support is not available through this interface. CICS/OS/VS BMS data stream support for IBM 3600, 3767, 3770 and 3790 logical units is also available through the TCAM direct interface to NCP/VS introduced in TCAM 10.

Table 2 gives detail of device support, including some units supported. In general, devices and features supported by systems and programmable controllers are transparent to CICS/VS but where CICS/VS provides specific device support the units are listed in Table 2. The column headed "attachment" provides further information on physical attachment. When using the VTAM interface, the attachment is a function of the access method, and the Network Control Program (where appropriate). Therefore the mode of connection of a terminal - local, SDLC, BSC, switched or nonswitched - is transparent to CICS/VS and CICS/VS support is dependent on the capabilities of the terminal, the Network Control Program and the access method. CICS/VS does not participate in the connection process and so switched/nonswitched is not shown in Table 2 for VTAM level support. When using the BTAM interface, the attachment is shown in detail. CICS/VS supports host initiated switch connections where appropriate autocall hardware is installed, but does not support manually established connections for call-out. CICS/OS/VS support of locally attached 2260s uses GAM and its support of 7770s is "BTAM-like".

Some devices are listed as being "supported as" a named device, meaning that the level of CICS/VS support is that offered to the named device. Other devices are listed as being "attached as" a named device, meaning that they are defined to CICS/VS as being the named device but they may operate with restrictions where they differ from the named device.

Where specific detail applies in Table 2, it is given in the notes. The following abbreviations are used:

- local = Channel- or adapter-attached
- SDLC = Synchronous data link control
- BSC = Binary synchronous communications
- s/s = Start/Stop transmission
- sw = Switched
- nonsw = Nonswitched

TABLE 1

IBM Terminal/System Type	Access Method*	
	VTAM Type	BTAM Type
1050 Data Communication System		X
2260/5 Display Station		X
2740 Communication Terminal		X
2741 Communication Terminal		X
2770 Data Communication System		X
2780 Data Transmission Terminal		X
2980 General Banking System		X
3101 Display Terminal (TWX 33/35)	X	X
3230 Printer	X	X
3232 mdl 1	X	-
3232-51 Keyboard Printer	X	X
3270 Information Display System	X	X
3268 printer	X	
3287 Printer	X	
3600 Finance Communication System	X	X
3630 Plant Communication System	X	X
3640 Plant Communication System	X	
3650 Retail Store System	X	
3660 Supermarket System		X
3680 Programmable Store System	X	X
3694 Document Processing System	X	X
3730 Distributed Office Communication System	X	
3735 Programmable Buffered Terminal		X
3740 Data Entry System		X
3767 Communication Terminal	X	X
3770 Data Communication System	X	X
3780 Data Communications Terminal		X
3790 Communication System	X	
4300 Processors	X	X
4700 Finance Communication System	X	X
5100 Portable Computer		X
5110 Portable Computer		X
5230 Data Collection System		X
5260 Retail System		X
5280	X	X
5520 Administrative System	X	X
5937 Rugged Terminal	X	X
6580 Displaywriter	X	X
6670 Information Distributor	X	X
6733 Typewriter Communication Module (as a CPT-TWX 33/35)	X	X
7770 Audio Response System		X
8100 Information System	X	X
8775 Display Terminal	X	
Communicating Magnetic Card Selectric Typewriter		X
Office System/6		X
Series/1	X	X
System/3		X
System/7		X
System/23		X
System/32	X	X
System/34	X	X
System/36	X	X
System/38	X	X
S/370 (including 303X processors)	X	X
Teletypewriter Exchange Service (TWX 33/35)	X	X
World Trade Typewriter Terminal (WTTY)	X	X

\* For explanation of these of these entries, see text above.

TABLE 2

IBM Terminal/System Type	Units	Attachment	Notes
1050	1051,1052,1053,1056	s/s, sw or nonsw	
2260/5	2260,2848,1053 2265,2845,1053	local, s/s nonsw s/s nonsw	1
2740		s/s, sw or nonsw	
2741		s/s, sw or nonsw	2
2770	2772,0545,1053 2213,2265,2502	BSC, sw or nonsw	3
2780		BSC, sw or nonsw	4
2980	2972,2980	BSC nonsw	5
3101		supported as TWX 33/35	15
3232-1		supported as INTLU (VTAM)	
3232-1		SDLC	
3232-11		SDLC	20
3232 mdl 51		supported as TWX 33/35	15
3270	3230,3262,3268,3271, 3272,3274,3275 3276,3277,3278, 3279,3284 3286,3287,3288,3289	local, SDLC, BSC nonsw	6
3287	mdls 11, 12	SDLC supported as SCSPT	20
3600	3601,3602,3604,3610 3612,3618,3614,3624 3690	SDLC, BSC nonsw	7,8
3630	3631,3632,3643,3604	attached as 3600	7,18
3640	3641,3644,3646,3647	SDLC attached as INTLU	20,21
	3642	SDLC attached as SCSPT	20,21
	3643	SDLC supported as LUTYPE2	20,21
	3645	SDLC supported as SCSPT	20,21
3650	3651,3653,3275,3284	SDLC	7
3660	3651,3661	BSC sw	7
3680	3684	supported as 3790/3650	7
3730	3791	supported as 3790	7
3735		BSC sw	
3740	3741	BSC, sw or nonsw	16
3767		SDLC	
3770	3771,3773,3774, 3775,3776,3777	s/s supported as 2740/2741 SDLC	7,9
3780		BSC supported as 2770	
3790	3791	BSC, sw or nonsw	17
4300	4331,4341, 4361,4381	SDLC or local BSC or SDLC	7,10 7,11
4700	4701-1,-2	supported as 3600 attached as 3600	7,8

PROGRAM PRODUCTS

CICS/VS (cont'd)

5100		s/s supported as 2741	7
5110		BSC attached as 2770	7
5230	5231	BSC supported as 3741	
5260	5265	BSC attached as 3741	
5280		supported as 3741 (BSC/BTAM) or 3270 (BTAM or VTAM)	
5520		SDLC supported as 3790 full function LU. BSC supported as 2770	
5937		SDLC/BSC attached as 3270	6
6580		supported as LUTYPE 2 attached as 2741 (S/S) or 3780 (BSC)	
6670		SDLC BSC supported as 2770	
6733		supported as TWX 33/35	15
7770		local	12
8100	8130/8140 processors with DPCX DPPX/BASE or DPPX/SP using Host Presentation Services or Host Transaction Facility DPPX/DSC or DPPX/SP/DSC or DPCX/DSC (incl. 8775 attach)	supported as 3790 attached as 3790	7 7
8775		Supported as 3270 SDLC supported as LUTYPE2 Supported as 2741	7,19
CMCST Office Sys/6 Series/1	6640,6670	Attached as 2770 Attached as S/3 supported as 3650 pipeline (VTAM) or 3790 (full function LU)	7
System/3	406,5408,5410,5415	BSC, sw or nonsw	7
System/7	5010	s/s or BSC, sw or nonsw	7 7,13
System/23		attached as 3741 (BSC)	
Sys./32	5320	SDLC supported as 3770	7,14
Sys./34	5320	BSC supported as 2770 SDLC supported as 3770	7 7,14
Sys./36	5360	BSC attached as S/3 SDLC attached as 3770	7 7,14
Sys./38		BSC attached as S/3 SDLC attached as 3770	7 7,14
S/370, 3031, 3032, 3033, 308X, 4300		BSC attached as S/3 BSC attached as 3271-2	7 7
TWX 33/35			
WTTY		s/s	15
		s/s	15

Notes:

1. CICS/OS/VS provides support of the 2848 through GAM. CICS/DOS/VS provides support through BTAM.
2. For CICS/DOS/VS, using BTAM-ES, the Transmission Control Unit or ICA must be equipped as follows:
  - 2703-2741 Break feature (#8055) required
  - 3704/3705 - UNITXC = NO required in Emulator Generation or equivalent
  - ICA on mdl 135 - Unit Exception Suppression Feature (#9729-#9736) required
  - ICA on mdl 115 or 125 - Line Mode must be specified with Unit Exception Suppression
  - The Receive Interrupt (#4708) is supported under CICS/OS/VS only.
3. CICS/VS 2770 support includes optional 2772 feature #3650 (EBCDIC Transparency), #9936 (WACK response), #1490 (Buffer Expansion), #1910 (Conversational Mode), #1340 (Automatic Answering), #4610 (Identification), or #6310 (Security Identification) and #5010 (Multipoint).
4. 6-bit transcode is not supported. Support includes optional features #8030 (EBCDIC transparency) and #1340 (Automatic Answering) or #5020 (Multipoint).
5. 2980 support is for 2972 mdl 8 (RPQ 858160) or mdl 11 (RPQ 8582311) with 2980 mdl 1 (RPQ 835504), mdl 2 (RPQ 835505) or

6. SDLC 3270s are supported only at the VTAM level, and the switched BSC 3275 (feature #3440) is supported only at the BTAM level. Printers attached to local or SDLC 3274s and SDLC 3276s are supported through the VTAM interface either as LU type 3 using 3270 printer data streams or as LU type 1 using SCS data streams (which is a subset of that used for SDLC 3767, 3770 and 3790 printers). The 3288 is supported as 3286 mdl 2. CICS/VS supports the 3270 Copy feature (#1550).
7. Devices and features supported by system/programmable controller are generally transparent to CICS/VS. In some cases CICS/VS provides specific device support, in which case the units are listed.
8. SDLC is supported at the VTAM level. 3600 BSC attachment (RPQ 8K0598) is supported at the BTAM level. The 3614 is supported both for loop attachment to the 3601 and SDLC attachment to the host via a 3704/3705 Communications Controller. The 3614 is supported by CICS/VS via BSC only when loop attached to the 3601/3602 Controllers. 3624 is supported as a 3614. The 3690 is supported as a 3602. BSC support is an integral function of 4700.
9. CICS/VS provides support for the Data Transfer Function of the SDLC Programmable mdls of the 3770 Data Communication System. The user is responsible for allocating data sets and managing the program library.
10. CICS/VS does not support the 3790/Data Entry Configuration using 3760s. The #9165 or #9169 configuration is required to support the CICS/VS enhancement first made available in Version 1 Release 3.0. Printers on 3790 systems are supported with a user provided function program or 3270 data stream compatibility with a 3270 printer data stream (LU3) or an SCS data stream supporting a subset of that for SDLC 3767 (LU1). The 3288 mdl 2 is supported as a 3286 mdl 2 when operating in 3270 mode.
11. S/370 and 4300 attachment by BSC requires a suitable telecommunications program (for example the VSE/3270 Bisync Pass Through Program) in the system connected to CICS/VS. Attachment by SDLC is supported by CICS/VS Intersystem Communication.
12. CICS/OS/VS provides support through GAM. CICS/DOS/VS provides support through BTAM.
13. Nonswitched as a multipoint device: System/7 Remote IPL is supported. Switched and as a Point-to-point Device: Remote IPL is not supported.
14. The System/32 with its SNA/SDLC workstation system utility program, and the System/34 and System/38, are supported as compatible versions of an appropriately featured 3770 Communication System operating as a batch logical unit. See Programming Announcement letters. The System/34, System/36 or System/38 user-written program is responsible for supporting the correct SNA sequences of the attached subsystem.
15. TWX and WTTY are supported by ACF/VTAM and ACF/TCAM via the Network Terminal Option program product (5735-XX7), with attachments as defined by NTO. At the BTAM level, TWX (Line Control Type) is attached on 8-level code at 110 bps on common carrier switched 150 bps networks. WTTY is attached at 50 bps on common carrier switched network where the terminals supported are those interfacing through IBM WT Corporation Telegraph Terminal Control with Telegraph Line Adapter. Transmission code used is International Telegraph Alphabet No. 2 (CCITT No. 2). Automatic host disconnect via WRITE break is not supported for OS. Autocall is not supported for DOS or OS.
16. 3740 support includes optional features #7850 (Terminal Identification) or #1685 (Multipoint), #5450 (Operator ID Card Reader), #1680 (Expanded Communications).
17. 3780 support includes features #3601 (EBCDIC Transparency), #9936 (WACK), #5010 (Multipoint) or #7651 (Switched), #1601 (Component Selection).
18. The 3643 is supported as a 3604.
19. 8775 support includes mandatory fill and mandatory enter field validation attributes.
20. Attachment is via the Loop Adapter #4830, #4831 and Data Link Adapter #4840 of the 4331 processor.
21. Under CICS/DOS/VS only.

**CICS/VS (cont'd)**

**SOFTWARE REQUIREMENTS**

**SOFTWARE REQUIREMENTS FOR CICS/DOS/VS**

CICS/DOS/VS V1R6 is designed to run with DOS/VSE with AF3.

CICS/DOS/VS V1R5 is also supported in this environment.

CICS/DOS/VS V1R6 will run on any subsequent release or modification of the above operating system unless otherwise stated. CICS/DOS/VS V1R6 does not support prior releases of the above operating system.

A current release of VSE/VSAM which supports the above operating system is required for CICS/DOS/VS V1R6 system generation and by certain CICS/VS options such as recovery/restart.

MSHP is required for use in installing CICS/DOS/VS V1R6 and its service updates.

CICS/DOS/VS V1R6 will run with the following TP access method programs at the current release level(s) supported by the above operating system releases. (Note: Some functions in CICS/DOS/VS V1R6 require ACF/VTAM V2).

BTAM/ES  
ACF/VTAME  
ACF/VTAM V1  
ACF/VTAM V2

CICS/DOS/VS V1R6 will run with DL/I DOS/VS Release 1.6 or SQL/DS Release 1.

**SOFTWARE REQUIREMENTS for CICS/OS/VS**

CICS/OS/VS V1R6.1 is designed to run with the following operating system releases:

- MVS/SP V1R3 and above.
- MVS/SP V2R1.0 with MVS/XA Data Facility Product Release 1.0.
- MVS/SP V2R1.1 with MVS/XA Data Facility Product Release 1.1 (required for virtual storage constraint relief improvements).

CICS/OS/VS V1R6.1 will also run on subsequent releases or modifications of these operating systems unless otherwise stated. CICS/OS/VS V1R6.1 does not support prior releases of these operating systems.

CICS/OS/VS V1R5 and V1R6.0 are supported in these environments and also run with OS/VS1 Release 7.0 or OS/VS2 MVS Release 3.8 with SE2.

A current release of VSAM, or a program offering equivalent function, which supports the above operating system releases is required for CICS/OS/VS V1R6.1 system generation and by certain CICS/VS options such as recovery/restart.

SMP Release 4 (with PTF UR03129 if on an MVS/XA system) is required for use in installing CICS/OS/VS V1R6.1 and its service updates. System Modification Program Extended (SMP/E) (5668-949) can not be used with CICS/OS/VS.

CICS/OS/VS V1R6.1 will run with the following TP access method programs at the current release level(s) supported by the above operating system releases:

BTAM  
BTAM/SP  
TCAM10  
ACF/TCAM V1  
ACF/TCAM V2  
ACF/VTAM V1  
ACF/VTAM V2

CICS/OS/VS V1R6.1 will run with IMS/VS Version 1 Release 2 or 3.

Command Level DL/I requires the functions provided by IMS/VS Version 1 Release 3.

The DBRC (Data Base Recovery Control) facility, as available with IMS/VS Version 1 Release 3, may optionally be used to provide CICS system log management.

The data-sharing support requires the functions provided by IMS/VS Version 1 Release 3 and the DBRC facility.

For details of availability of IMS/VS Version 1 Release 3, refer to Programming Announcement dated November 5, 1982.

**CICS/VS UNDER VM/370:** CICS/OS/VS and CICS/DOS/VS may be run in a VM/370 virtual machine under control of DOS/VSE, OS/VS1 or OS/VS2 subject to the following considerations.

CICS/VS operating in a virtual machine has the same requirements as CICS/VS operating in a real machine. Other software components (e.g., Access Methods, Compilers and the release of OS/VS, DOS/VS or DOS/VSE under which CICS/VS runs) must be valid for that release of CICS/VS.

The minimum hardware requirements of CICS/VS operating in a VM/370 virtual machine are the same as those for CICS/VS running in

a real machine, and should be considered as additional to the minimum requirements for VM/370 itself, and any other virtual machines within the VM/370 environment.

Processor utilization and possibly terminal response times will be greater when CICS/VS is running under VM/370 than when it is running in a real machine. The effect on performance will be most noticeable when VM/370 is introduced into an installation where processor and main storage resources are already substantially committed to existing CICS/VS and other work.

If the impact on performance is significant, its effect may be partially or totally offset by the installation of additional main storage, a processor model upgrade or both.

The operation of CICS/VS running in a virtual machine may differ in certain respects from that obtainable when running in a real machine. Briefly the significant differences are:

1. BTAM support of the Autopoll feature will not work correctly under MVS if Wrapiist polling is specified.
2. VM/370 does not support the 7770 Audio Response Unit.

**Intersystem Communication Considerations:** Intersystem communication functions are likely to increase the processor utilization and terminal response time. The effect on performance will be most noticeable when processors and main storage resources are already substantially committed to existing CICS/VS and other work.

If the impact on the performance is significant, then its effect may be partially or totally offset by the installation of additional main storage, a processor mdl upgrade or both.

**STORAGE CONSIDERATIONS**

The CICS/VS distributed and generated libraries require in the order of 80 million bytes of direct access storage, depending upon the system options generated and blocking factors chosen by the user (where applicable).

The system configuration required for the use of CICS/VS in a data base/data communication system will be largely determined by the scope of the environment to be supported and the nature of the user's application programs. CICS/VS is designed in a modular fashion with many system generation options so that the user can select the options that are meaningful to his operation with maximum economy of main storage.

Careful consideration must be given to avoiding overcommitment of the real storage resource in a small system to prevent significant response time degradation. CICS/VS functions that require a large amount of real storage may incur page faults beyond an acceptable level. In addition, certain terminal network configurations and/or data base organizations require larger access method storage. It is important that pageable real storage not be overcommitted by trying to include too many CICS/VS functions, too large or varied a terminal network, too many and/or complex data base structures, or too large a batch operation, if these are used frequently. Also placing the paging data set on the same DASD as high-usage data sets (data base and libraries) should be avoided.

No CICS/VS functions or configurations have been identified that would not perform in a small system provided it has sufficient real storage. However the use of many of the CICS/VS functions together in a normal error-free transaction can generate a requirement for significant amounts of real storage. The total storage requirement should be carefully examined to ensure that sufficient real storage is available in the system. Functions, features and characteristics which may require significant real storage include:

- CICS/VS options (e.g., intersystem communication, temporary storage or basic mapping support).
- All user application programs, especially those written in a high level language, although use of the PL/I Shared Library and reentrant programs may reduce the paging overhead and size of user programs.
- Large terminal networks and networks of more than one terminal type.
- Transfer of large volumes of data to and from a data base.
- Transaction rates that require several transactions to be processed simultaneously by the processor.
- Operating system access methods (ISAM, VSAM, VTAM, TCAM, DL/I, etc.) and their possible impact on the storage requirements of the operating system.

The effect on the real storage requirement of CICS/VS functions and application programs that are used only occasionally, e.g., abnormal or error situations, is of less significance.

If TCAM is used with CICS/OS/VS, the size of the user-written TCAM Message Control Program (MCP) should be taken into consideration when computing overall storage estimates.



PROGRAM PRODUCTS

CICS/VS (cont'd)

PERFORMANCE CONSIDERATIONS

The performance of CICS/OS/VS and CICS/DOS/VS is highly dependent on the system configuration, (Processor, I/O devices and terminal network), the users' application programs, the system loading and the CICS facilities being used.

It is the users' responsibility to prepare the system configuration and design his application programs to satisfy his performance requirements. Information in CICS/VS SRLs is provided to allow the user to estimate the major processor resources he requires (processor power, real and virtual storage, number of physical I/O operations) together with guidelines on writing his applications and configuring the system to achieve satisfactory performance characteristics. In order to verify specific performance requirements, benchmarking the CICS/VS system is highly recommended.

RPOs ACCEPTED: No

MVS SYSTEM INTEGRITY APPLIES: Yes

**5740-XX2 - INFORMATION MANAGEMENT SYSTEM/VS**

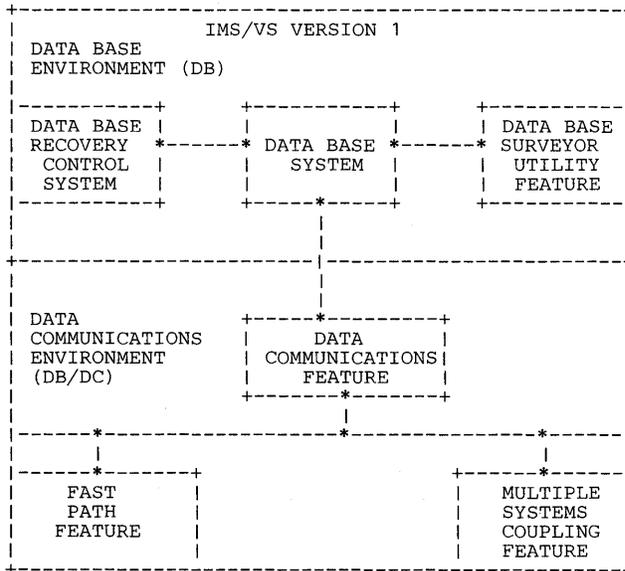
**PURPOSE**

Information Management System/Virtual Storage (IMS/VS) Version 1 is Data Base/Data Communication (DB/DC) program. IMS/VS supports user-written batch processing and teleprocessing applications. Batch and teleprocessing applications may execute concurrently or separately. IMS/VS provides: Data Base management services which support the implementation of multiple applications using a common data base ... Data Communications management services which support the implementation of multiple terminal-oriented applications using a common data base.

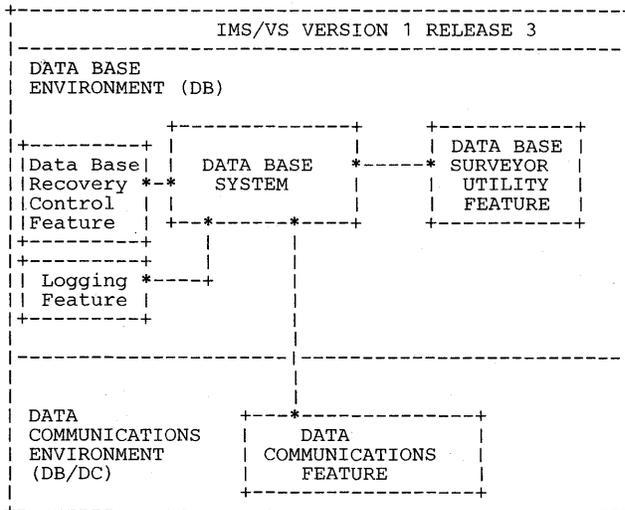
The data base management services are offered as basic material in an orderable component called the *Data Base (DB) System*. The data communications management services are offered as a feature in a separately-orderable component called the *Data Communication (DC) Feature*. The DB System is prerequisite to the DC Feature. When the basic DB System and the DC Feature are combined, the two form the *IMS/VS Data Base/Data Communication (DB/DC) System*. The IMS/VS System has been designed to facilitate transition from the DB to the DB/DC System.

Additional features, Fast Path (FP), Multiple Systems Coupling (MSC) with Intersystem Communication, Data Base Surveyor Utility, and Data Base Recovery Control Feature are described in the section "Features."

The following figure shows the relationship of the various IMS/VS Version 1 features to the Data Base System:



The following figure shows the relationship of the various IMS/VS Version 1 features to the Data System starting with IMS/VS Version 1 R3. New product packaging occurs in R3 where Fast Path and Multiple Systems Coupling are no longer separate features, but are a part of the IMS/VS Data Communication feature.



**DESCRIPTION**

Application programs call upon the data base and data communications management services through Data Language/I (DL/I). For the most part, application program use of DB/DC management services is independent of terminal and storage media programming considerations. IMS/VS provides installation management tools to control terminal and storage programming considerations independent of application programs. Installation management can approach the problem of enhancing productivity for the total community of applications and users without affecting the functional capabilities of the members of the community.

IMS/VS application programs can be insensitive to: The reorganization of stored data, the addition of new applications or data, changes in access methods organization or access strategy, and the introduction of new storage or terminal devices.

**Data Base Management:** The data base management services of IMS/VS assist the user in:

- Description of data base structures.
- Creation of data bases.
- Access to and maintenance of data bases.
- Reorganization of data bases.
- Recovery and reconstruction of data.
- Checkpoint/restart for DB environments.

Using IMS/VS utilities supplied, the customer describes the structure of the data base from two viewpoints; the stored data structure as seen by the system and the logical data structure as seen by the application. Only one description of the stored data exists. However, multiple descriptions of the logical data may exist. These data base descriptions are external to applications programs. They exist as stored data themselves and are referenced by the system when it is processing access requests for application programs.

Data base descriptions define symbolic names for data items (fields), segments and data bases. They map collections of fields into segments and segments into data bases. To access or maintain stored data, the application program generates a functional GET/PUT request for data base management services. As part of the functional request, the application program supplies symbolic names which identify the data (segment type) to be processed. The names used are those defined for the logical data structure, not the stored data structure. Through data base descriptions, the system maps the application-supplied logical data names to corresponding stored data names, determines an access strategy and performs the requested function against the stored data.

The data base descriptions contain information about organization, access strategy, the physical attributes of the data, the physical structure of the stored data segments and storage device characteristics.

Data bases may be stored in two general organizations: Hierarchical Sequential (HS) or Hierarchical Direct (HD). For HS-organized data the access method and basic processing strategy may be sequential or indexed sequential. For HD-organized data it may be direct or indexed direct. Within a single data base, the system description defines a hierarchical relationship among segments of the stored data structure. In addition, relationships can be established between segments in different hierarchical structures stored within the same data base. Finally, relationships can be established between segments in different hierarchical structures stored in different data bases. The ability to interrelate hierarchical data structures assists in nonredundant data storage and permits data to be accessed through multiple retrieval paths.

Reorganization and recovery of stored data bases are supported by a set of IMS/VS Utility programs.

Checkpoint/restart capabilities are available in the data base environment.

**Data Communications Management:** The data communications management services of IMS/VS provide:

- Application-independent terminal management.
- Input/output message traffic handling.
- Terminal and program message switching.
- Message format service for device independence.
- Transaction-initiated scheduling of application programs.
- Conversational/interactive application support.
- Diagnostic aids.
- System command and control language.
- Resource security.

## IMS/VS (cont'd)

- Checkpoint/restart for DB/DC environment.
- Message class scheduling.
- Display terminal paging.
- Audio response.

Application programs generate requests for message input/output operations through Data Language/I. Messages are presented to the application programs in the same manner as data base requests. Data communications management services handle input and output traffic for the terminal network asynchronously to the processing performed by applications. In the characteristics response-oriented interchange between terminal and application, the application is aware of the origin of the message it processes and the destination of the output it produces in a symbolic manner. The application views the symbolic terminal as though it were a two-level hierarchical data structure. The first level represents a segment type "First Message Segment". The second represents a second segment type "Remaining Message Segments".

There is at least one symbolic name associated with each terminal managed by the system. Each transaction type known to the system also has a symbolic name. Messages entered by a terminal operator contain one of these two kinds of symbolic names. Based upon the characteristics of the name, an input message is sent to other terminals or to applications for processing. Applications may send messages to terminals or to other applications. The Multiple Systems Coupling Feature enhances this capability (see the "Features" section).

The Fast Path feature allows a variation to the application view and message handling. See the "Features" section for a further description.

IMS/VS order of message processing of a transaction (message) type is based on class and priority within class associated with its application program. The user specifies these parameters when he generates the IMS/VS DB/DC system.

Multiple application programs may be scheduled simultaneously against the same data base to a segment level.

When an application program updates a data base segment, other programs are prevented from accessing the updated segment until the updating program has completed its entire update procedure or reached a synchronization point. If the updating program terminates abnormally prior to completion of the update procedure, the updates it has made are backed out of the data base to the last point of synchronization.

With the Fast Path feature, data base recovery and data base update are accomplished a little differently. See the "Features" section for a further description.

Some applications have the requirement to interface with a terminal operator in a conversational or interactive exchange of related input-response messages. The system will maintain data for the application between the interchanges of a conversation. A single conversation involves only one terminal operator, but may take place with more than one application program.

A support facility is provided for IMS/VS users of SLU 1, 2, 4, P and LU6 and 2740, 2741, 3270 and 3600 terminals. This Message Format Service (MFS) allows application programs to deal with logical messages instead of device-dependent data, thus helping to make the application development function simpler. The same application program may deal with different device types with a single set of editing logic while device input and output varies to suit a specific device. The presentation of data on the device or operator input may be changed without application program changes. Full paging capability is provided for display devices. Input messages may be created from multiple screens of data.

Operation of the DB/DC system can be monitored and altered through a system command and control language. The commands provide dynamic display of the status of system resources such as communication lines, terminals, data bases, message queues and programs. In addition, they permit the status of system resources to be changed dynamically. IMS/VS diagnostic aids can be invoked through the command language.

Provision for system resource security is provided through a combination of password, terminal, data base and program protection features. Security facilities support is provided to log all IMS/VS detected attempts to violate IMS/VS communications security. Optionally, immediate notification to the master terminal of detected attempts to violate IMS/VS communication security is provided.

System resource integrity, reliability and recovery are provided through extensive checkpoint/restart capabilities.

Checkpoint/restart capabilities are available in both the batch and online environments.

## HIGHLIGHTS

IMS/VS Version 1 is a general-purpose system that the user tailors to suit his environment. IMS/VS Version 1 Release functions are carried forward and are upward compatible with the exception of 3790 (limited inquiry). A summary description consists of the following highlights:

**Application Support:** Application programs can, for the most part, be designed to operate independently of data management access methods and organization.

Application-independent support is provided for a variety of storage and communication devices. The "System Requirements" section contains detailed device support information.

Storage protection is provided for each application program.

Transactions are scheduled according to class and priority.

Program isolation allows concurrent execution of two or more application programs which may update the same segment type in a data base. In addition, program isolation assists in data base integrity if a message processing program abnormally terminates.

Application Load Balancing (also known as Parallel Scheduling) permits the IMS/VS control region to schedule the same application program into more than one message region, or batch message region, simultaneously.

Transaction Load Balancing permits the IMS/VS control region to schedule the same transaction type into more than one message region simultaneously. This support, for message processing regions only, provides the user with the ability to process high volume transactions in parallel, and will allow processing of the same transaction on both processors of an MP/AP system simultaneously.

The Update Only Recovery Facility permits the user to define inquiry transactions (which do not change the data base) as unrecoverable. This may reduce line utilization because acknowledgment back to the terminal is not required.

Application Program Output Limits permits limits to be established for the size and number of application program output message segments. This facility enhances IMS/VS integrity by helping to minimize the impact of erroneous application program operation on the message queues.

Automated operator interface provides an IMS/VS interface that allows:

- An application program to issue, via DL/I calls, IMS/VS operator commands to receive the command responses.
- A user-written exit to monitor activity related to IMS/VS resources as reflected in IMS/VS messages to the master terminal operator, and in IMS/VS commands and command responses, and invoke action based on customer-specified criteria.
- A hard-copy or data set log of many operator commands, responses and synchronous output to the IMS/VS secondary master terminal.

The automated operator interface offers the following advantages:

- Reduces operator intervention.
- Increases information in hard copy audit trails.
- May reduce response time to errors reported to the Master Terminal Operator by IMS/VS.

The usage of the automated operator interface is optional and requires user-written programs and an optional user-written exit routine to perform processing desired by the installation.

Primer function is for new users of IMS/VS under OS/VS1 and OS/VS2 MVS to install IMS/VS more easily, design their initial data bases and applications, and begin operations with a subset of IMS/VS in a simple environment.

The Primer Function consists of:

- Manuals which supplement the existing IMS/VS library of publications: The *IMS/VS Primer*, *Primer Sample Listing*, *Master Terminal Operator Guides for BTAM and VTAM*, and a *Remote Terminal Operator Guide*.
- Sample application support including: Sample data bases, sample Data Base (batch) applications and sample Data Communication (online) applications.

**System Services:** Telecommunications and batch operations can execute concurrently or separately.

System definition allows a maximum upper limit of 5,000 each of physical terminals, logical terminals, programs, transactions and data bases. (A practical upper limit for execution is based on total system requirements for a particular IMS/VS installation.)

Security techniques are provided.

PROGRAM PRODUCTS

IMS/VS (cont'd)

Checkpoint/restart capabilities are provided for online message application programs.

Batch checkpoint/restart facility provides support to allow checkpoint and subsequent restart of batch and batch message application programs.

The immediate checkpoint eliminates the forced termination of MPPs at the time a simple checkpoint is taken. System activity is interrupted only during the time the system control blocks are actually being written to the log.

Extended Checkpoint/Restart permits batch programs to reestablish data base positioning and to reinitialize user-specified areas during an application program restart with user's DL/I calls. This helps provide improved programming and operating flexibility in restart processing.

The Optional Dual Log facility allows the user to maintain duplicate log tapes for increased reliability and provides a higher degree of system integrity than single logging.

Logical/Physical Logging permits each MPP and BMP to issue logging requests which are executed as a separate task in parallel with other tasks in an MP environment, thus facilitating better workload distribution.

The Track Recovery Option of the Data Base Data Set Recovery program allows re-creation at the track level rather than the data set level in the event of a permanent Read/Write error. The data base access method must be Enhanced VSAM.

The Utility Control Facility provides a method of performing most data base utility operations and maintenance in preparation for recovery and reorganization under the control of one job, and in one step. UCF's checkpoint/restart function enables the user to stop and then resume a utility operation as schedules permit.

The IMS/VS DB Monitor can provide a trace of internal activities of an IMS/VS DB System and a report program that prints summary and distribution reports of this collected data. The DB Monitor provides the capability for collecting data. The DB Monitor provides the capability for collecting performance data to investigate specific application designs, data base designs and resource allocations.

The IMS/VS DC Monitor can provide a trace of activity within the IMS/VS control region and dependent regions, and a report program that prints summary and distribution reports of this collected data. The DC Monitor provides the capability for collecting performance data to investigate specific application designs, data base designs and resource allocations.

System Definition Rewrite allows the user to define a larger IMS/VS system without a proportional increase in required input source statements. The user can define a larger and/or more complex IMS/VS system configuration without a proportional increase in Stage 1 processing time. System Definition Rewrite also contains additional documentation of macro instructions and copy members within the source statements that improves the serviceability of the System Definition function. The ability to define a larger IMS/VS system is achieved by allowing the user to define one or more transaction codes, data base names and logical terminal names on one occurrence of a macro statement. Also, the alphabetic sorting of application program names, transaction code names, data base names and logical terminal names that was previously done during Stage 1 will now be done within Stage 2 processing. This decreases Stage 1 processing time and allows these functions to occur during parallel Stage 2 assembly processing.

The Statistics Analysis Utility Program sort rewrite combines two functions, the first sort and the first edit pass, allowing record reduction earlier in the process and increasing usability.

The Formatted Dump allows IMS/VS to format and dump its control blocks and data areas as part of Abend processing. This will aid in problem determination, and allows a more rapid solution. The IMS/VS Formatted Dump is functional when IMS/VS operates on OS/VS1 and OS/VS2 (MVS).

Enhanced restart is designed to reduce the time required to restart an IMS/VS system through the reduction of or elimination of delays resulting from:

- Unnecessary tape reading.
- Records not needed for restart.
- Searching for starting checkpoint.
- Operator tape handling.
- Operator errors.
- Job initiation.

A direct-access data set called the "restart data set" is provided to record a minimal set of key information necessary for restart. If possible, restarting is done using this data set. Also system log termination can be performed during IMS/VS restart, rather than as a separate stand-alone utility job. The enhanced restart function includes the following:

- Restart from DASD data set (optional).
- Online log termination.
- Use of the dynamic log from shutdown of a previous IMS/VS system execution for data base backout at restart of a new IMS/VS execution.
- Elimination of the requirement for operator entry of the restart command.
- Availability of new DC Monitor reports in support of the DASD logging facility.

Enhanced Checkpoint/Restart increases the availability of the IMS/VS system by reducing the time required after either system failure or scheduled shutdown. The functions provided are:

- Online dumping of message queues by a simple checkpoint or at an IMS/VS shutdown.
- Restart without building the queues.

Online Image Copy Utility allows the user to copy data sets of a data base to tape or disk concurrent with online application usage. This utility makes it easier to schedule normal maintenance of data bases because the data bases being copied can still be used by online applications for inquiry or update. The Online Image Copy Utility runs in a BMP region.

The dynamic allocation/deallocation function for IMS/VS data bases removes the requirement that DL/I data bases and Fast Path Data Entry Data Base (DEDB) areas be initially allocated through Job Control Language (JCL). The data base will be allocated either at IMS/VS initialization or at the first attempt to use it. Also, the IMS/VS DC Monitor need not be allocated through JCL. DC Monitor log data sets are allocated at the time the DC Monitor is started and deallocated when the DC Monitor is stopped.

This function improves the overall availability of the IMS/VS Control Region, but is available only to the OS/VS2 MVS user.

The 3850 Mass Storage System (MSS) is supported for single track recovery by the IMS/VS Data Base Recovery Utility on VSAM data sets only. Track Recovery allows the user of large data bases to recover data from a permanent read error on the staging drive track without having to do a full data base recovery.

At the user's option, the following enhanced security and accountability capabilities are provided through the use of the Resource Access Control Facility (RACF) program product (5740-XXH) Release 3 and subsequent releases (for MVS only) or through a user-written security exit (for VS/1 and MVS):

- Verification of a user-identification at signon from a terminal.
- Validation of transaction level authorization for the specific user-identification logged on.
- Validation of program-to-program switches using modifiable PCBs.
- Validation of dependent region's authorization to access defined resources (PSBs, TRANs, LTERMs for BMP; TRAN for MPP; PSB for FP region).
- User-identification is logged with messages, terminal signon and signoff and data base changes for accountability. The IMS/VS Log Print utility may be used to print/copy log records associated with a user-identification for audit purposes.
- User-identification information is passed to the application program in the I/O PCB.

These security facilities provide control mechanisms within the scope of the IMS/VS product. To complement these facilities, RACF may be used for control of system resources outside the scope of IMS/VS.

If the user selects the Resource Access Control Facility (RACF) program product (5740-XXH) Release 3 and subsequent releases for the OS/VS2 MVS system, then its prerequisites must be applied to the user's OS/VS2 MVS Release 3.8 system.

These are security facilities that permit the control of access to one system's resources by another. Data protection facilities of communicating systems and subsystems should be considered when using the Intersystem Communication function.

A new parameter is available to the IMS procedure which allows the user to select the local storage option. This option permits the MVS user to load some IMS/VS modules and buffers that were in the Common Storage Area (CSA), into the private storage area of the IMS/VS control region.

The user can now have up to 31 dependent regions concurrently active in an online IMS/VS system.

IMS/VS Release 1.6 and subsequent releases are installable with SMP Release 4 and defines IMS/VS distribution and system libraries in an SMP format. SMP can support multiple IMS/VS nuclei in one

## PROGRAM PRODUCTS

**IMS/VS (cont'd)**

RESLIB and multiple IMS/VS systems from a single set of distribution libraries.

**Data Base Services:** Data base support is supplied through Data Language/I.

Virtual Storage Access Method (VSAM) support is designed to take advantage of the virtual storage environment of S/370.

IMS/VS VSAM shared resource support can reduce main storage requirements (both fixed and variable) by sharing buffers and control blocks across VSAM data sets. Secondary indexing of IMS/VS data bases is automatically maintained by the system. VSAM must be used for the index data bases.

Variable Length Segments in IMS/VS data bases can be dynamically changed in length to best meet the needs of variable information. These data bases must be VSAM.

Log Tape Write Ahead support for ISAM/OSAM and VSAM based data sets is provided. Parallel DL/I permits calls to data bases to be processed in each Message Processing Region and/or Batch Message Processing Region with the exception of calls which require reading from an ISAM data set, which must be done in the IMS/VS control region. This eliminates the necessity of routing DL/I calls through the control region. In an MP environment it allows for DL/I execution to occur in both processors simultaneously.

Edit/Compression Routine Exits allow inclusion of user-written encode/decode routines to improve the utilization of direct access storage space for data base storage space. This is available for VSAM data sets only.

The General Sequential Access Method allows batch programs to access OS BSAM and VSAM ESDS data sets through DL/I in a BMP or Batch region. GSAM provides data set repositioning through Extended Checkpoint/Restart.

Low-Level Code and Continuity Checking is an application support program that can generate and update low-level codes in a HIDAM organized parts data base, and which can ensure the continuity of a manufacturing product structure. The application support program is a callable subroutine and becomes part of a user-written application program. The addition of these enhancements will assist in the migration to IMS/VS-DL/I from DBOMP, BOMP and CFMS program products.

The IMS/VS ISAM/OSAM buffer handler is a restructuring of the buffer handler to provide better look-aside buffering and to reduce buffer serialization interference. It applies to all operating systems.

The OSAM I/O Driver is a modification to the READ/WRITE access method routines of the OSAM access method. The EXCP interface to the IOS component of OS/VS2 (MVS) is replaced with an I/O Driver interface. This eliminates the requirement to map between EXCP and MVS/IOS control structures. In OS/VS1, the interface to IOS uses EXCPVR.

In addition, OSAM can optionally be used to write to the system log tape because the OSAM I/O Driver includes a write-to-tape interface that replaces the BSAM write-to-tape function. OSAM cannot be used to write to the log tapes in an IMS/VS DL/I Batch system that uses OS/VS Checkpoint/Restart.

The Partial Data Base Reorganization Utility allows a user to reorganize a specified range of HIDAM or HDAM data base records into a designated target area within the data base. The term "range" means a set of low-high key values in the primary index data set of a HIDAM data base or a set of low-high relative block numbers in the root addressable area of a HDAM data base.

This utility may increase the availability of the data bases by allowing a user to reorganize a portion of the data base. This allows shorter reorganization periods when data bases must be offline.

Field Level Sensitivity provides a mechanism to limit access to a subset of the fields in an IMS/VS DL/I data segment. Field Level Sensitivity is not supported for IMS/VS's GSAM data bases. It allows the application program independence from the sequence of the fields in a physical segment. Also changes to a field's position in a DL/I data base segment do not require changes in the user's application program. DL/I call syntax and functional call capabilities, including path calls, are unchanged.

When sensitive fields are retrieved by an application program, only those fields appear in the application program's I/O area in the order specified by the PSB. When those fields are from a variable length segment, special considerations apply. If an application program retrieves a segment without field sensitivity, then the I/O area contents are unchanged from previous IMS/VS releases.

The SENFLD statement is used for PSB generation. PSB generation should be rerun to take advantage of Field Level Sensitivity. Data Base Description (DBD) need not change if only currently named fields are being used.

**Data Communication Services:** Existing terminal support using BTAM can co-reside with VTAM support to facilitate conversion. The

terminals supported by IMS/VS are listed under "Data Communications" in the "System Requirements" section.

VTAM support allows utilization of VTAM network sharing capabilities and has the ability to access other program products and operating system programs through VTAM when terminals are not being used for IMS/VS operations.

Message Format Service (MFS) is provided for most terminal users and includes a paging feature for display devices (allows multiple screen output with forward and backward paging).

Message Format Service (MFS) Online Testing Facility support allows the creation of terminal and message formats utilizing MFS and testing these formats online while the IMS/VS system is being used in a production environment.

Conversational terminal operation is supported.

Conversational Processing provides scratchpad compression/expansion to reduce data movement and I/O requirements. A FIXED option reduces storage requirements for main storage scratchpads and reduces I/O for disk scratchpads.

Terminal operators can specify a range of resources to be operated on. Exception responses to command input allow entry of both the keyword and parameter in error.

Wait for input function enables the user to specify that a Message Processing Program or Batch Message Program can remain in its region until additional messages are available for processing. This permits transactions to bypass program initialization.

Response Mode operation for terminals optionally allows synchronization between the terminal operator and the application program. After input is received by IMS/VS, communication with the terminal is physically and/or logically stopped until the application program response is transmitted.

Response Alternate PCB permits definition of an alternate PCB which may be used by application programs to insert messages to logical terminals in EXCLUSIVE mode. This facility may also be used to satisfy the response requirements of physical terminals in conversation or in response mode by inserting a message to a component logical terminal instead of to the I/O logical terminal.

Message Delete Option optionally allows output message suppression on two levels: Sysinfo, which suppresses terminal status message DFS059, and NONIOPCB, which suppresses broadcasts, message switches, and alternate PCB messages. This terminal level option provides protection for printers that use a special form and/or depend on forms alignment.

User Message Table Option permits the user to define installation-specific messages which may be sent by user exit routines in the IMS/VS control region. This enhances the capabilities of the exit routines to perform data analysis and notify the terminal operator of errors without scheduling an application program.

Physical Terminal Input Edit Routine allows a user-written routine to edit device input that is not processed by Message Format Service before the IMS/VS basic edit processing occurs for all applicable terminal types. This facility allows additional editing and validation to occur prior to insertion of input into the message queue.

The MFS Language Utility increases usability and performance. Language facilities which provide for repetitive generation of MFLD/DFLD statements and powerful text substitution capability simplify source output preparation. Error detection, error correction, and status messages enhance usability. An optional facility allows concurrent execution of the utility and the IMS/VS control region, deferring update of the format library. A single job step may later update the online format library with the result of many compilations, thus reducing the activity which must take place when the control region is not active.

Multiple Physical Page Input Messages allows creation of an input message from multiple 3270 pages, providing additional application program device independence.

3270 SYSMSG Field allows users to define a field which may be used for IMS/VS error messages. This facility prevents destruction of the screen format and operator input when an error is detected by IMS/VS.

An IMS/VS DB/DC system requires an IMS/VS master terminal. The list of terminals that qualify is contained in the "Data Communications" portion of the "System Requirements" section.

Additional Operator Control allows operators to request the last logical page of a message. Operators may also request the next message and be notified if none is available.

Field and Segment Edit Exits allow user-supplied routines to perform common verification and editing functions after MFS editing, but prior to message queuing. Using this facility may simplify application programming requirements and improve performance by detecting errors before an application program is scheduled. If errors are

PROGRAM PRODUCTS

IMS/VS (cont'd)

detected, the message may be cancelled or returned to the input terminal (with or without modification).

Password Creation allows an IMS/VS password to be created from the 3270 operator identification card reader in addition to data from one or more fields.

MFS support includes attribute simulation for devices other than 3270 display, automatic page numbering, prompting at end of output, default literals for input message fields, removal of blank lines from output to printers and improved performance for long output messages.

Acknowledge-with-Reply allows recoverable input transactions to be sent to IMS/VS in System Network Architecture (SNA) exception response mode. A performance gain may be realized (depending on type of input) since an SNA response need not be sent except in the case of error. This can be optionally selected for the IMS/VS 3600 and SLU P support.

IMS/VS supports secondary logical units 1, 2, 4 and P and logical unit 6 (MSC Feature).

IMS/VS support for secondary logical unit P provides extended function for user-written programs in SNA programmable controllers. This support extends full IMS/VS functional capabilities to the user-written program within the remote controller and optionally includes the MFS Distributed Presentation Management (DPM) function.

The Message Format Service (MFS) provides a function, named Distributed Presentation Management (DPM), that supports Intersystem Communication and SLU P, for a user-written program in SLU P controllers or another system connected by Intersystem Communication. With DPM, message formatting is distributed between the remote program (which handles device-dependent formatting) and MFS (which handles device-independent formatting). This distribution of function allows a device-independent data stream to be transmitted between IMS/VS and the remote program, and the IMS/VS application program to use a single data structure, regardless of the data source or destination.

The VTAM Authorized Path, used to reduce the path length for certain VTAM macro statements, is available to VTAM terminals supported by IMS/VS on OS/VS2 MVS. (It has no effect on terminal support of non-VTAM devices.)

For BTAM BSC 3270 support, if a line or 3270 control unit error occurs, IMS/VS logs the error and attempts to automatically restart the appropriate component(s) before discontinuing use of the line or control unit. After attempting to restart the failing component(s) the specified number of times, if the error persists, IMS/VS discontinues using the failing component(s). If the restart attempt is successful, communication with the devices continues normally.

IMS/VS supports the 3270 subsystem through BTAM and VTAM as follows:

- IMS/VS support of the display screen sizes (960, 1920, 2460, 3440 and 3564 characters) is provided through IMS/VS Message Format Service (MFS).
- Formatted master terminal is only available in the 1920 size screen.

New models of the 3270 Information Display System have been announced previously. IMS/VS supports the additional functions of 3270 subsystems as follows:

- Support of 3278-5 display screen sizes through IMS/VS Message Format Service (MFS).
- Support of 3279 color display.
- Ability to specify features (integers F1-F10) for the 3270 device type as well as the currently accepted feature. The specifications are mutually exclusive with the feature specifications currently available for 3270.
- Ability to specify field attributes of color, extended highlighting and programmed symbols (PS).
- MFS editing can be bypassed with the use of reserved map names.
- Capability for 3270 screens to operate in unprotected mode.

Secondary Logical Unit 4 (SLU 4) support product functional capabilities include:

- Console.
- Card I/O.
- Printer.
- Word Processing Media 1, 2 and 3.

IMS/VS supports SLU 4 in an ACF/VTAM-based system environment. The user can have distributed processing and word processing concurrently.

- With SLU 4, users can enter and receive data from IMS/VS user application DL/I data bases.

- SLU 4 products with console, card or printers can be used with IMS/VS applications.
- IMS/VS applications can be expanded to include word processing units and define word processing medias 1, 2 and 3.

The basic edit process supports input data transparency for these new components.

The Multiple Systems Coupling feature was enhanced to include a VTAM connection in addition to the previous connection types (main storage-to-main storage, channel-to-channel, binary synchronous) for an IMS/VS-to-IMS/VS connection. Another function is available as part of the Multiple Systems Coupling feature. It is called Intersystem Communication and uses an IMS/VS subset of the SNA logical unit 6 (LU 6) protocols. Intersystem Communication allows communication between IMS/VS and other systems (such as CICS/VS or a user-written system), or IMS/VS to another IMS/VS system. With Intersystem Communication, users of other subsystems can use IMS/VS application programs, data bases (through user-written application programs) and terminals. Distributed Presentation Management (DPM) allows the distribution of the presentation management function of MFS to other subsystems.

IMS/VS application programs can be initiated from other systems without changing the IMS/VS application programs. For more information on Intersystem Communication, see the "Features" section. For details see the "Multiple System" part of the "System Requirements" section.

Support for MSC Directed Routing allows an application program to specify the multiple system name (MSNAME) and destination within that system for a message. The application program can receive the MSNAME of the system that originally scheduled it.

HIGHLIGHTS OF IMS/VS VERSION 1 RELEASE 2

DATA BASE SYSTEM

**IMS/VS Data Sharing Facility:** A Data Sharing Facility is being offered with the planned availability of IMS/VS Version 1 Release 2. The Data Sharing Facility is contained in the IMS/VS base product, the Data Base System. The Data Sharing Facility will allow accessibility and concurrent sharing of IMS/VS data bases by online and/or batch IMS/VS systems. When the concurrent sharing is done on one processor (UP/AP/MP) it is called intraprocessor sharing. When the concurrent sharing occurs between online and/or batch IMS/VS Systems in more than one processor, it is called interprocessor sharing.

An online IMS/VS system is application programs running in an MPP or BMP region of an IMS/VS system. A batch IMS/VS system is batch application programs running in one or more DL/I batch regions of an IMS/VS system. An installation may be all online or all batch IMS/VS systems, or a mix of both online and batch. Two levels of sharing capability are being offered, Data Base Level and Block Level. Data Base Level sharing is available under both OS/VS1 and OS/VS2 MVS operating systems. Block Level sharing is available only on the OS/VS2 MVS operating system. Block Level sharing is defined as locking at a physical block for ISAM/OSAM data bases and at a control interval for VSAM data bases. Data Base Level sharing is defined as locking at the IMS/VS DL/I data base level whether ISAM/OSAM or VSAM. For an interprocessor configuration, the maximum number of processors at the block level of sharing is two (2). At the data base level of sharing, the maximum number of processors which can participate is limited by the number of paths to the direct access device(s) upon which that data to be shared resides.

**The IMS/VS Resource Lock Manager (IRLM):** A component of IMS/VS Version 1 Release 2, governs and passes information on the usage and ownership of blocks of data within the same processor or across processors. IRLM is used for IMS/VS Data Sharing when doing Block Level sharing, which requires the OS/VS2 MVS operating system. Interprocessor sharing (across processors), requires ACF/VTAM (or ACF/TCAM Version 2 Release 2 or 3) with an IBM 3705 Communications Controller attached to each processor through a channel adapter. In addition to IBM 3705 Communications Controller support, ACF/VTAM Version 2 provides Channel-to-Channel (C-T-C) support on OS/VS2 (MVS).

An installation's performance requirements, when using the IRLM with an IBM 3705 Communications Controller, may require additional Communications Controller capacity. For higher performance environments, the use of ACF/VTAM Channel-to-Channel may be required.

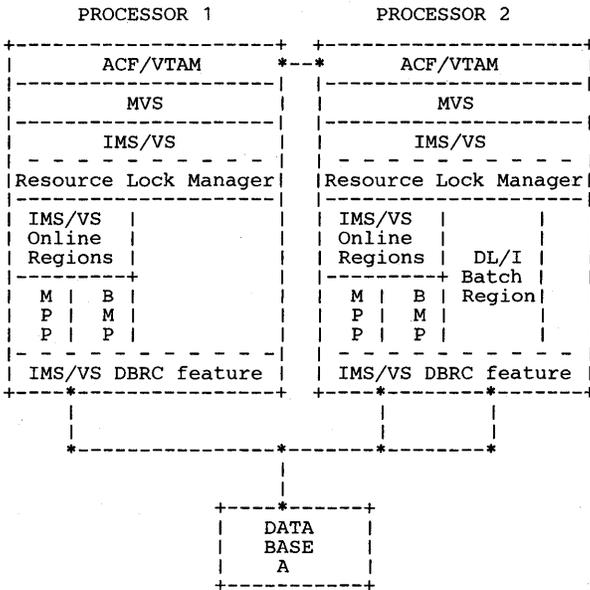
**IMS/VS DATA BASE RECOVERY CONTROL FEATURE (DBRC):** The Data Base Recovery Control Feature (DBRC) of IMS/VS Version 1 Release 2 is required for the IMS/VS Data Sharing facility. DBRC has been enhanced to provide an authorization process for data sharing to determine whether the IMS/VS system is registered and whether the intended use of a data base is allowable.

**Additional Information - IMS/VS Data Sharing Facility:** Figure 1 is a block diagram showing how the parts of IMS/VS Data Sharing facility fit together. It shows an interprocessor configuration using ACF/VTAM

**PROGRAM PRODUCTS**

**IMS/VS (cont'd)**

and operating under OS/VS2 MVS at the block level of sharing which requires IRLM and DBRC.



**Figure 1.** Example Configuration Interprocessor Sharing at Block Level

**LEVELS OF SHARING:** Two levels of sharing capability are being offered, Data Base Level and Block Level. Data Base Level sharing is available under both OS/VS1 and OS/VS2 MVS operating systems. Block Level sharing is available only on the OS/VS2 MVS operating system. Block Level sharing is defined as locking at a physical block for ISAM/OSAM data bases and at a control interval for VSAM data bases. Data Base Level sharing is defined as locking at the IMS/VS DL/I data base level whether ISAM/OSAM or VSAM.

There are various Read/Update environment rules that apply to both interprocessor and intraprocessor sharing as well as to the level of sharing, Data Base or Block. Figure 2 is a matrix of the Read/Update environments of IMS/VS Data Sharing.

IMS/VS-Data Sharing Read/Update Environments		
For: IMS/VS V1 Release 2	Interprocessor & Intraprocessor Sharing	Operating System VS1/MVS
Data Base Level Sharing	Single Update, All others READ only	VS1 or MVS
BLOCK LEVEL SHARING		
Block Level Sharing	Multiple UPDATES, Multiple READs	MVS only

**Figure 2.** IMS/VS Data Sharing Read/Update Environment Rules

Referring to Figure 2, interprocessor and intraprocessor sharing have the same Read/Update rules throughout the chart. Depending upon the level of sharing used, the rules are different. The "Read only" term used here includes programs that specify only that READ can run concurrently or includes programs that are willing to run with a single UPDATE.

See the description of DEDB Data Sharing under "Highlights of IMS/VS Version 1 R3".

**DATA SHARING LIMITATIONS:** The following are IMS/VS Data Sharing limitations:

- The maximum number of processors which can participate at the data base level of sharing is limited by the number of paths to the direct access device(s) upon which the data to be shared resides.
- The maximum number of processors at the block level of sharing is two (2) for an interprocessor configuration.
- Fast Path data bases and GSAM data sets are not supported by IMS/VS Data Sharing.

- Data protection and integrity are ensured at the block level of sharing data. There is an option at the block and data base level of sharing to read uncommitted update data.
- While existing CICS/OS/VS Version 1 Release 5 applications will run with IMS/VS Version 1 Release 2, CICS/OS/VS Version 1 Release 5 does not support the IMS/VS Version 1 Release 2 Data Sharing facility.

**3375 Direct Access Storage Device Support:** This 3375 Direct Access Storage Device support expands the existing IMS/VS OSAM device support to include Count-Key-Data (CKD) support of the 3375 Storage Facility. IMS/VS also supports 3375 through VSAM in all data formats.

3375 will be supported for use for data bases (HISAM, HIDAM, HDAM and HSAM), including Fast Path data bases, message queues, SPA, and for restart data sets using VSAM and OSAM. Users will be able to migrate data bases to 3375 without modification to application programs. 3375 and non-3375 stored data bases can coexist within an IMS/VS system.

IMS/VS V1 R2's 3375 Direct Access Storage Device support is planned for availability in 3Q81.

**Support of Speed Matching Buffer for 3380:** This support expands the IMS/VS OSAM device support to allow a high speed data transfer 3380 device to be connected to standard I/O channels through the Speed Matching Buffer feature (#6550) on the 3880 control unit.

IMS/VS V1 R2's support of Speed Matching Buffer for 3380 is planned to be available 4Q81.

**DATA COMMUNICATION FEATURE**

**Printer Sharing:** Printer Sharing provides the capability to share LU1, LU4 and 3270P devices with other VTAM based systems.

- IMS/VS will use the VTAM Q RELREQ options when requesting sessions for the above device types when they are defined as sharable units.
- For 3270P sharable devices (non-SNA), IMS/VS will request a VTAM session when the display operator requests COPY.
- A user exit will be provided for devices marked 'SHARE' and will be activated when a message is enqueued for that device and a session is not in effect. The exit may specify the following IMS/VS actions:
  - Proceed with the session request (default).
  - Do not request the session.
  - Schedule a user transaction.

**Extended Printer Support (SNA and non-SNA):** Extended Functions for SLU1 and 3270 family printers provides the capability for the following types of printers to use the following printer processing features while utilizing Message Format Service.

- Printers that use SLU1 SNA Character Data Streams (SCS1) and defined as SCS1.
  - For these SNA printers it will be possible to set vertical forms on a message by message basis, to set line density without losing a print line, and to use the extended presentation of data (color, highlighting, and programmed symbols) through Message Format Service (MFS).
- Printers Defined as 3270P.
  - For these non-SNA printers it will be possible to use the extended presentation of data (color, highlighting, and programmed symbols) through Message Format Service (MFS).

**3604 Administrative Keyboard Display Model 7 Support:** This support expands the IBM 3604 Administrative Keyboard Display mdl 7. Support extends the IMS/VS support of 3600 displays to include the 3604 mdl 7 with its larger screen size (24x80). Message Format service (MFS) can be utilized to format the 3604 mdl 7 screens. The MFS support is the same as that which was previously provided for 3600 displays.

**Cross-Memory Services for Local Storage Option:** Local Storage Option facility with Cross-Memory support extends the use of the Local Storage Option (LSO), available in IMS/VS V1 R1.6, by allowing LSO to run on MVS/System Program Release 2 utilizing the MVS Cross Memory services. This new LSO facility enables installations to optionally specify at IMS/VS system initialization time the selection of LSO with Cross Memory support.

The LSO, available in R1.6, necessitates the switching of execution from the dependent region TCB to a TCB in the control region. The new LSO with Cross Memory support available in IMS/VS V1 R2 eliminates the need to switch from a dependent region TCB to a control region TCB, while still providing parallel execution. It does this by using the Cross Memory Services in MVS/System Product Release 2. This capability allows the transfer of control from code in one memory to

## IMS/VS (cont'd)

code in another, while retaining and utilizing the execution structure of the original memory.

### Additional Highlights of IMS/VS V1 R2

**Multiple OSAM Data Base Subpools:** There can be multiple OSAM data base subpools of the same size. Each OSAM pool will carry a unique identifier that will allow specific data base data sets to be directed to a designated subpool at execution time and can be used to optimize buffer pool allocations to the unique reference characteristics of a data base. This permits further allocation of buffer pool resources to establish performance priority.

**Log Tape Compatibility:** With the introduction of Data Sharing, some log tape records have been modified to record the appropriate information necessary to provide the system restart and data base recovery. In order to maximize log tape compatibility between IMS/VS V1 R2 and prior releases, any new information will be added at the end of the existing log record data and before the sequence number.

**Application Return Codes:** Under processing options GOT and GON, a status code will be returned to an application program when the segment that the application program is trying to retrieve contains an invalid pointer. Previously, IMS/VS terminated the application program abnormally.

**Increased Security Generation Limits:** The IMS/VS security table size limitation of 32K bytes has been removed. The security table now has no specified size limit and is only bounded by practical resource limits. This aids the user that has extensive growth in the terminal networks and applications, resulting in more securable resources.

**Improved Sort in System Definition:** The internal SORT algorithm function of the IMS/VS System Definition Stage 2 has been improved to reduce the amount of time required to sort large numbers of system descriptors. The degree of improvement will vary depending on the number of resources defined to the System Definition.

**Additional Trace Capabilities:** There are three (3) new functions added to the IMS/VS trace capabilities.

- Lock activity of certain DL/I modules will be recorded in a trace table.
- Trace table activity can optionally be recorded on the log tape.
- Start and stop of all traces can be done from the IMS/VS master terminal or an IMS/VS procedure library member.

**VSAM/OSAM Open for Input:** VSAM/OSAM data sets will be opened for input if read processing intent is defined for the data base containing the data sets, otherwise the VSAM/OSAM data sets will be opened as usual for read and write.

**Log Terminated Message:** When the Log has been terminated, a confirmation message is sent to the master terminal operator and system console.

**Single Message Dequeue:** The /DEQUEUE command is enhanced to allow the next message to be sent from an LTERM to be deleted.

**DATA BASE RECOVERY CONTROL FEATURE:** The Data Base Recovery Control feature (DBRC) of IMS/VS Version 1 Release 2 has been enhanced to support the Data Sharing facility. The Data Sharing facility in IMS/VS Version 1 Release 2 requires DBRC for an IMS/VS system to share IMS/VS DL/I data bases with another IMS/VS system. DBRC is optional if the IMS/VS data sharing facility is not being used. The authorization process for data sharing determines if the IMS/VS system is registered and if the intended use of a data base is allowable.

A more complete description of the content of the facilities of DBRC in IMS/VS Version 1 Release 2 follows.

**Data Sharing Support:** DBRC supports the sharing of the IMS/VS DL/I data bases by multiple IMS/VS systems through the addition of exit routines for:

- Registering or deleting an IMS/VS system with DBRC.
- Authorizing the reading or updating of data bases.
- Setting or resetting data base status information when IMS/VS global commands are used.
- Closing data bases to remove their authorization.
- DSLOG log merge capabilities.

**IMS/VS Utility Support:** The automatic recording of recovery data in the RECON data set is achieved through exits to DBRC in the standard IMS/VS utilities. Additional IMS/VS utilities which now interface to DBRC are HISAM Reorganization Reload, HD Reorganization Reload, System Log Recovery, DEDB Log Tape Check and Copy, Data Base Backout and Prefix Update.

**IMS/VS Control Program Interfaces:** The IMS/VS control program provides exits which can give control to DBRC for recording information to be used in a recovery operation. These exits to DBRC provide the following functions:

- Processing of log tapes for use in the recovery process.

- Automatically allocating data bases from the online IMS/VS system.
- Signing an IMS/VS system on or off with DBRC.
- Authorizing or prohibiting use of an IMS/VS DL/I data base.
- Supporting a set of IMS/VS global commands.
- Opening a data base and ensuring that only one RECON data set pair contains the most current recovery generation information.
- Recording the detection on an I/O error on a data base.
- Recording the occurrence of a dynamic backout failure.
- Recording the occurrence of an ESTAE failure.
- Closing a data base to eliminate the IMS/VS system authorization of a data base.

**DBRC Control Statements as IMS/VS Commands:** A group of IMS/VS commands permits the master terminal operator or other authorized terminal users to invoke specific DBRC utilities through the IMS/VS commands. Therefore, an authorized terminal operator can read, display and change information in the RECON data set.

**Enhancements to the DBRC Installation Process:** An improved installation macro is provided that generates the JCL to install DBRC. This macro permits the user to add keywords in the JCL, to change or override the generated statements and to specify the data set names of the DBRC module libraries.

### HIGHLIGHTS OF IMS/VS VERSION 1 RELEASE 3

#### NEW PROGRAMMING FACILITIES

**DASD LOGGING:** A new Logging feature is being introduced in IMS/VS with this release. It extends the use of DASD that has evolved over several releases to become a full DASD logging capability for log recording, dynamic backout, and restart activities. The IMS/VS online system log records will be written to DASD data sets. Multiple disk data sets will be used in a wraparound fashion. When filled, the online log must be archived. Archiving copies log data to a tape, disk or MSS data set. Archiving may be initiated automatically or manually at the user's option. Logging to DASD may also be used in IMS/VS batch systems. If desired, batch logging to tape may go directly to an archive data set.

The new IMS/VS Logging feature replaces the former online tape logging, dynamic logging, and restart disk logging. Tape logging for online IMS/VS systems will no longer be supported. Tape OSAM (TOSAM) is no longer supported.

IMS/VS V1 data communications now supports Log Write Ahead (LWA). For certain failures, under previous IMS/VS V1 releases, it was necessary to close the IMS/VS V1 system log using a main storage dump. With IMS/VS V1 R3, this is no longer necessary.

**ENHANCED DATA BASE RECOVERY CONTROL (DBRC):** The following enhancements are new in DBRC with IMS/VS Version 1 Release 3:

**DASD Logging Support -** A new Log Control function will be used to manage the online DASD log and it will be used to provide System Control facilities for the online DASD log, as well as for the archived log data sets.

**Improved Fast Path DEDB Support -** The DBRC function is also used to support sharing of DEDBs and DEDB's multiple Area data sets.

**DBRC Generation Process Included in IMS/VS Process -** The system generation process of IMS/VS includes the generation process of DBRC.

**Virtual Storage Consideration -** For IMS/VS online in MVS, DBRC will execute in a separate address space, eliminating increased storage requirements in the IMS/VS Control Region.

**Command Improvements -** New commands have been introduced to add information to the RECON data sets about the execution of the Image Copy and the Change Accumulation utilities.

**Integrity Improvements -** Options are provided on the INIT and CHANGE commands to force DBRC registration of all data bases, permitting users to increase operational integrity.

**Optional Data Sharing Control -** An option is provided to permit an installation to select the level of DBRC control desired. This allows for the use of DBRC for recovery and/or log control without introducing the added complexities of the data sharing environment.

**RECON Recovery Online -** RECON duality is now system maintained if the user assigns a spare RECON data set. In the event of RECON data set errors, the spare data set automatically replaces the failing data set.

**RECON Reorganization Online -** RECON Reorganization can be accomplished online via command.

**Start Subsystems with one RECON -** The user now has the option to allow IMS/VS subsystems to start with only a single RECON data set.

PROGRAM PRODUCTS

IMS/VS (cont'd)

**Dynamic Allocation of RECON in MVS** - Dynamic allocation of RECON data sets is optionally supported in the MVS environment.

**Image Copy Recovery Period Support** - In addition to the fixed cycle of Image Copy data sets identified by the user for each data base data set, a retention period may be specified to prevent the premature reuse of Image Copies.

**Time Stamp Change Accumulation** - Support is provided for executing the Change Accumulation Utility using a subset of log volumes.

**Improved DSLOG Error Handling** - On output error, the DSLOG Utility will continue to process logs to all output data sets that are not in error.

**Migration and Coexistence** - DBRC RECON data sets from previous releases of IMS/VS can be upgraded by command to IMS/VS V1 Release 3 format. DBRC fallback capability for IMS/VS Release 3 and/or coexistence with IMS/VS V1 Release 2 will be provided through the service process. IMS/VS V1 Release 1.6 DBRC fallback/coexistence is not supported.

**ADDITIONAL DATA BASE RECOVERY CONTROL ENHANCEMENTS**

- DBRC trace is extended to allow the use of a generalized trace facility (GTF) data set as an external trace table, in addition to the internal wrap-around trace table. This will assist diagnosis when the problem does not cause an ABEND. (This enhancement is also applicable to the CICS/OS/VS - DL/I environment.)
- Enhancements have been made to the online DBRC commands so they may be issued through an automated operator interface (AOI) application. The command output is sent as a single message (single or multi-segment).
- Command enhancements include additional flexibility for DELETE.LOG and LIST.DB commands. The NOTIFY.RECOV command has been extended to simplify RECON recovery. (This enhancement is also applicable to the CICS/OS/VS - DL/I environment.)
- A new SYSGEN parameter is provided to permit the installation to force DBRC use from any batch applications by overriding the execution-time parameter. (This enhancement is also applicable to the CICS/OS/VS - DL/I environment.)

**ONLINE CHANGE:** The capability is offered to introduce new system libraries online. The following resources may be added, changed, or deleted without bringing down IMS/VS: Data bases (excluding DEDBs and MSDBs), programs, transactions, MFS formats, ACBs, IMS/VS V1 security definitions, and Fast Path routing codes.

The ability to make online modifications makes the system more adaptable to changing needs, and allows longer periods of continued operation.

**DATA SHARING ENHANCEMENT:** The IMS/VS V1 Data Sharing Facility, introduced in IMS/VS V1 R2, has been enhanced to include Data Entry Data Bases (DEDBs).

- **DEDB Data Sharing** - Data sharing makes it possible for Fast Path application programs in separate IMS/VS systems, and in the same or separate IMS/VS processors, to access the same DEDB. Data sharing is not supported for MSDBs.

Fast path application programs and IMS/VS online application programs (mixed mode) in IMS/VS systems can share DEDBs; IMS/VS batch programs cannot access DEDBs.

IMS/VS systems may share DEDBs at the Area level or the Block level:

- When IMS/VS systems share a DEDB at the *Area level*, application programs in each IMS/VS system can read the data concurrently; or one IMS/VS system can update the data while the other IMS/VS systems have read-only access to it. Read-only access means that application programs are able to read the data, but they are not protected from reading data that is inconsistent. At the area level, IMS/VS systems share an area of the DEDB.
- When sharing at the *Block level*, several application programs in different IMS/VS systems on up to two processors may read or update the data concurrently. Readers are protected from reading inconsistent data. Block level data sharing is supported only for DEDBs that do not contain a sequential dependent segment type.

**MVS/XA PORTABILITY SUPPORT:** This release of IMS/VS integrates the support for MVS/XA SP V2 R1. In addition, it provides for upward system portability between MVS/SP V1 R3 and MVS/SP V2 R1. For example, a system generated on MVS/SP V1 R3 may be executed on an MVS/SP V2 R1 system. Thus, an IMS/VS Version 1 Release 3 system generated on MVS/SP V1 R3 can be installed on MVS/SP V1 R3 or MVS/SP V2 R1 and operate properly in either of these environments. A system generated on MVS/SP V2 R1 will operate only in that environment.

**OSAM BUFFERS ABOVE 16M REAL STORAGE:** OSAM buffers may reside in real storage above 16 megabytes if the user does an IMS/VS Version

1 Release 3 system generation on MVS/SP V2 R1 specifying the MVS/SP V2 R1 environment and has real storage in excess of 16M available.

**VIRTUAL STORAGE CONSTRAINT RELIEF:** With this release, IMS/VS will dramatically reduce the virtual storage requirements of the control region by movement of the IMS/VS Data Base function into a separate address space. Additional virtual storage constraint relief is achieved in an MVS/XA environment by Message Format Service (MFS) use of greater than 16-megabyte addressing. These capabilities add to the previously announced reduced virtual storage requirements of IMS/VS V1 R3, which were:

- DBRC in a separate address space in an IMS/VS DC environment.
- IRLM with cross-memory option has reduced CSA requirements.

The additional virtual storage made available in an IMS/VS system can be used (currently constrained by the lack of available virtual storage) for:

1. Increasing pool sizes.
2. Allowing growth in terminals and applications.
3. Flexibility in allocation of private area and common areas.
4. Reallocation of virtual storage to the above item may result in improved transaction rate.

**IMS/VS V1 Data Base (DL/I) Separate Address Space:** The Data Base (DL/I) separate address space in an IMS/VS V1 online (DB/DC) system running under MVS/XA or MVS/370, is an optional subordinate address space which contains most DL/I-related code, control blocks, and buffers for all the DL/I data bases on that system.

Local Storage Options allow the user to balance the storage allocated in the common area with the storage allocated to the private area. The Data Base separate address space option allows this storage to be allocated in a new address space, thereby providing virtual storage savings in both CSA and private memory.

The Data Base separate address space does not apply to Fast Path data bases, and is not applicable to the CICS/OS/VS - DL/I environment.

**Note:** For CICS/OS/VS - DL/I, virtual storage constraint relief continues to be provided in both the MVS/XA and MVS/370 environment by the CICS/OS/VS MRO facility and, additionally, by the CICS/OS/VS EXEC DLI command support and the CICS/OS/VS 31-bit mode application support in the MVS/XA environment.

**MFS Utilization of MVS/XA Capabilities:** In an MVS/XA environment, the MFS format pool, fetch request elements and directories will be moved to extended private storage.

The use of extended private storage addressing capabilities of MVS/XA can result in:

1. Better utilization of large real main storage.
2. More effective use of processor capability.

**Reduced VSAM Pool Requirements:** The minimum required number of buffers to be allocated to a VSAM buffer pool is reduced by three per CI size defined. In some cases, buffer pools larger than required were being created. The new algorithm will allow smaller buffer pools. The DL/I user selects the optimum number of buffers to meet the performance requirements of the system. The previous minimum was determined by application regions or CICS threads defined.

**EXTENSIONS to DEDB STRUCTURE:** DEDB's capabilities have been extended by:

- **Improved DEDB Structure for Flexibility** - The DEDB structure has been expanded. A DEDB can now contain up to 127 segment types, and up to 15 hierarchical levels, providing more flexibility in data base design and application programming. The 127 segment types can include one sequential dependent segment type, if desired.
- **Physical Child Last Pointer for Insert Performance** - Installations can now specify that they want new segments to be inserted at the end of a sequence of unkeyed segments. A physical child last pointer is used to make this insertion instead of traversing all the segments ahead of it.
- **DEDB Subset Pointers** - DEDB subset pointers allow direct access within a chain of DEDB direct dependent segments. Up to eight subset pointers may be defined per direct dependent segment type and used independently. This function may provide performance benefits for DEDBs with long twin chains of direct dependent segments.

**Improved DEDB Availability**

- **Block Deactivation** - In previous releases, all write errors stopped all access to the DEDB Area containing the write error. Other application programs and online users were unable to access any of the data in that Area until the write error was resolved.

PROGRAM PRODUCTS

IMS/VS (cont'd)

With this enhancement, if an I/O error occurs, any program trying to read the block of the data base in error will receive a status code indicating the error condition, the block will be deactivated, and the application program can then continue with other processing.

- **Multiple Area Data Set Support** - It is now possible to provide multiple copies of a DEDB Area. The advantage of this is in the protection it gives against data base I/O errors; if there is an error in one Area data set and an additional copy of that Area data set exists without an error, the system will access valid data from the alternate copy. Installations may define and create new copies of an Area online without stopping the Area. Only one copy at a time will be read from, but all copies will be updated concurrently.

FAST PATH APPLICATION PROGRAM ENHANCEMENTS

- **Multiple Segment Search Arguments** - Application program processing Data Entry Data Bases (DEDBs) may take advantage of the expanded DEDB structure by specifying up to fifteen Segment Search Arguments (SSAs) in data base calls. In previous releases, application programs were limited to one SSA when accessing a DEDB. Multiple SSAs provide more processing capabilities for application programs and may reduce the number of data base calls necessary to retrieve data from a DEDB.
- **Boolean Operators** - Fast Path application programs may specify multiple qualification statements in an SSA by using Boolean operators. With Boolean operators, the application program provides multiple search arguments to be used to determine if the segment can satisfy the data base call. Calls to DEDBs cannot use the independent AND, as it is only used for secondary indexing.
- **Command Codes** - Data base calls in application programs processing DEDBs may now make use of Command Codes in SSAs. Calls to DEDBs can use all the Command Codes except 'Q'. In addition, five new Command Codes are supported for use with the new Subset Pointer facility. Fast Path ignores Command Codes in calls processing sequential dependent segments.

**SINGLE LOCK MANAGER:** The Single Lock Manager allows MVS installations to utilize IMS/VS Resource Lock Manager (IRLM) or Program Isolation (PI) Lock Manager for locking services. When IRLM is specified, all locking services will be provided by IRLM. The IRLM is required for block level data sharing.

**IRLM CROSS MEMORY SUPPORT:** The IMS/VS Resource Lock Manager (IRLM) optionally supports the use of MVS Cross Memory. This provides for the movement of blocks and code from Common Storage Area (CSA) to the IRLM's private address space. If IRLM is used for program isolation, the CSA demands for program isolation may also be reduced.

**255 USER-DEPENDENT REGIONS:** If your operating system is OS/VS2 MVS or MVS/XA, the architectural limit has been increased from 31 to 255 for the number of concurrent, user-dependent regions and Fast Path output threads.

**SYSTEM DEFINITION PERFORMANCE IMPROVEMENTS:** An optional preprocessor has been introduced whose purpose is to perform name checking. The sorting which has been performed in Stage 2 will now be optionally performed in Stage 1 of system definition. The sort has been rewritten. The amount of performance improvement which will be realized is a function of the number of objects defined. The larger the number of objects, the larger will be the performance improvement. With a small number of objects, the improvement in performance may be up to 10%. With a large number of objects in system definition, the performance improvement may be up to 90% for control block system definition.

**EXTENDED SYSTEM DEFINITION LIMITS:** The limit of 5,000 occurrences for IMS/VS system definition macro statements has been removed for some macros, when Assembler H is used for the Stage 1 assembly. The DATABASE macro has a new limit of 32,700. For APPLCTN, TRANSACT, STATION, TYPE, TERMINAL, NAME, RTCODE, and SUBPOOL macros, there will be no limit other than the storage resources available to the system. If Assembler F is used, the maximum remains at 5,000.

**IMS/VS VERSION 1 RELEASE 3 DL/I with CICS/OS/VS VERSION 1 RELEASE 6:** IMS/VS Version 1 Release 3 only supports CICS/OS/VS Version 1 Release 6. IMS/VS Version 1 Release 3 is supported by CICS/OS/VS Version 1 Release 6. The following enhancements for the CICS/OS/VS-DL/I user will be available at general availability of IMS/VS Version 1 Release 3.

- **CICS/OS/VS DL/I Command Level Interface Support** - The CICS/OS/VS COBOL or PL/I programmer is provided with a new set of EXEC DLI commands for processing IMS/VS data bases in a CICS/OS/VS environment, including online, CICS/VS Shared Data Base, and IMS/VS DL/I Batch applications. The EXEC DLI language is supported by the CICS Execution Diagnostic Facility (CEDF), is upward compatible with the DL/I DOS/VS EXEC DLI language, and is extended for IMS/VS functions.

- In the OS/VS2 MVS or MVS/XA environments, the number of concurrent DL/I transactions supported by CICS/OS/VS V1 R6 is increased from 31 to 255.
- New initialization options available in CICS/OS/VS V1 R6 enable the IMS/VS V1 R3 user:
  1. To load and access IMS/VS modules in the Link Pack Area (LPA), for improved system integrity.
  2. To page fix ISAM/OSAM buffers for performance tuning.
- IMS/VS V1 R3 users will not need to create a CICS/OS/VS Program Specification Block (PSB) for configuring the IMS/VS nucleus at CICS/OS/VS initialization.
- CICS/OS/VS modules do not have to be link-edited with IMS/VS V1 R3 modules. Therefore, the IMS/VS load library is not required during CICS/OS/VS V1 R1.6 generation, and in addition, application of IMS/VS maintenance to a CICS/DL-I system is simplified.
- **CICS/OS/VS-DL/I Primer Sample Programs** - Code will be provided to support the CICS/OS/VS-DL/I Primer sample programs. This code will be integrated with the IMS/VS Primer code from previous releases of IMS/VS and will be distributed as a part of the IMS/VS V1 R3 Data Base System.

**ENHANCED BMP RESTART:** When restarting a Batch Message Processing program (BMP), it is no longer necessary to specify the exact checkpoint-id nor to change the JCL to point to the appropriate log. If the user chooses to use the enhanced BMP restart facilities, the BMP will restart from the last checkpoint-id without the need to mount log tapes, provided that the checkpoint data is on the online disk log.

**IMPROVED MFS FORMAT POOL MANAGEMENT:** The following improvements have been made to improve the performance and usability characteristics of the IMS/VS online DB/DC system:

- A new dynamic directory will be utilized. This will allow the user to specify the base directories content at initialization. Additional entries will be added dynamically by MFS as new formats are fetched during online execution. (MVS/XA only)
- Multiple concurrent I/O operations to the format library will be supported for retrieving format blocks. (MVS/XA only)
- MFS now supports up to 16 concatenated format libraries when executing in an MVS/XA environment.
- MFS buffer pool manager will utilize page load/page release to reduce page faults in the IMS/VS control region address space during MFS operations.
- A new hashing algorithm is provided to improve the performance of the MFS pool manager by reducing the search time to service a format fetch request.
- In addition to the above, existing limits on the following MFS objects are increased as indicated below:
  - The maximum MFS format pool will be increased to 99,999,000 bytes from the current limit of 999,000 bytes.
  - The maximum number of fetch request elements (FRE) is increased to 99,999 from the current limit of 65,536 (64K).

USABILITY ENHANCEMENTS

- The process of restarting a BMP has been simplified when its checkpoint records exist in the online log data set. It is no longer necessary to specify the checkpoint ID at restart time. This simplifies the overall process of restarting IMS/VS and BMPs which were executing at the time of an online IMS/VS or operating system failure. BMP application programs which fail may also be independently restarted so long as the checkpoint records still reside on the online log data set (OLDS).
- The Dequeue command is simplified by providing SINGLE, SNGL, and FIRST as synonyms for the PURGE1 parameter for purging the first message on the specified queue.
- Enhancements to the MFS language utility are added to ensure maximum available format library space for adding/changing descriptor members, and to eliminate unnecessary overhead in the maintenance of the PDS directory. Specifically, STOW-REPLACE will be used for changed format blocks, and an additional compress option is provided prior to the termination of phase 2 processing.
- The unconditional opening of all libraries by the MFS service utility is replaced by opening only the libraries required by the function requested. This will minimize an operator reply requirement when any of the libraries are data- or password-protected.

AVAILABILITY ENHANCEMENTS

- Selective dispatching enhancements have been made to reduce communication pool deadlocks during periods of unexpected high activity. Additional statistics are also provided on the log for later analysis and tuning.

PROGRAM PRODUCTS

IMS/VS (cont'd)

- As a part of the control region restructure with additional tasks, several potential wait conditions have been removed.
- Log latch contention has been reduced for simple checkpoint.

SERVICEABILITY ENHANCEMENTS

- The Lock Activity Trace Table has been merged with the DL/I Trace Table to ease debugging.
- Symbolic identifiers have been added to many control blocks to aid problem determination.
- Tracing facilities are extended to include additional resources to be traced, and optional logging.

GENERAL ENAHNCEMENTS

- SMP4 installation samples are included in the *IMS/VS V1 Primer Function Installation Guide* (SH20-9208).
- IMS/VS support is extended for IMS Message Re-queue (MR, 5796-ATP), Batch Terminal Simulator (BTS, 5668-948), and IMS Queue Loader (IQL, 5785-GAJ) so that installation of the aids is simpler and modifications to IMS/VS are no longer required.
- A warning message is available when the message queue data set reaches a user-specified threshold.
- CWAP can now be specified up to 9,999K.
- PSB size limits are increased to 512K. (Still 64K in CICS/OS/VS.)
- The number of Sensitive segments (SENSEG) is increased to 1,000.
- Symbolic parameters have been added to the DFSMPR procedure to simplify overriding positional parameters.

NEW PRODUCTS and DEVICES

**NETWORK TERMINAL OPTION (NTO) DEVICE SUPPORT:** The Network Terminal Option (NTO) program product (5735-XX7) is supported by IMS/VS for 33/35 Teletype and 274X start-stop devices. Terminals such as 3101, 3232 and S/23 that are compatible with the above terminals may be used. MFS SLU-1 console support is provided for these NTO attached terminals.

**4700 FINANCE COMMUNICATION SYSTEM:** The 4700 Finance Communication System is supported by IMS/VS. This support is functionally equivalent to the IMS/VS support of the 3600 Finance Communication System.

**3290 INFORMATION PANEL SUPPORT:** The 3290 Information Panel is supported as a 3270 and SLU-2. MFS supports full-screen addressability. The 3290 provides, in IMS/VS V1 R3, a screen size of 62 lines with 160 characters per line to allow more application flexibility. Full-screen addressing capability provides for more effective use of products such as the Report Management and Distribution System (RMDS, 5665-310).

**DATABASE 2 ATTACHMENT SUPPORT:** The Database 2 (DB2, 5740-XYR) offers relational data base capabilities for the MVS/XA and MVS/370 environments. DB2, through the Structured Query Language (SQL) supports data definition, retrieval, manipulation, and control operations. IMS/VS V1 R3 Data Communication feature (DC) attaches to DB2, providing relational data base capabilities in addition to those previously available through DL/I (full-function) and Fast Path. DB2 data may be accessed concurrently from IMS/VS V1 R3 Message Processing programs (MPP) and IMS/VS V1 R3 Batch Message Processing programs (BMP) and IMS/VS V1 R3 Fast Path programs.

Current application programs using DL/I data bases are not affected. New application programs may use the facilities of both DL/I and DB2 data bases.

In an environment with IMS/VS applications accessing DB2 data, IMS/VS V1 R3 DC coordinates recovery with DB2 so that potential inconsistencies can be resolved without loss of data.

Operator-issued commands are routed to DB2 to display and control the status of both the DB2 subsystem and its individual data bases.

For additional information about DB2, see pages for 5740-XYR.

Data Extract (DXT, 5668-973), announced with DB2, provides a method of selectively extracting data from existing IMS/VS data bases, VSAM and SAM files. This extracted data may then be loaded into DB2 tables. The primary benefits to the IMS/VS V1 R3 user are:

- Query Management Facility (QMF, 5668-972) access to operational data.
- IMS/VS V1 R3 access to data currently maintained in SAM/VSAM.

See pages for PP 568-972 and 5668-973.

FEATURES

New product packaging occurs in R3 where Fast Path and Multiple Systems Coupling are no longer separate features, but are a part of the IMS/VS Data Communications feature. The Data Base Recovery Control (DBRC) feature and the new Logging feature are packaged with the IMS/VS Data Base System, since they are required for its proper system definition, installation and operation.

**Multiple Systems Coupling Feature Including Intersystem Communication:** The Multiple Systems Coupling (MSC) feature is an IMS/VS feature. MSC extends the message routing facilities of IMS/VS to include transactions and logical terminals in other IMS/VS systems. The MSC feature allows these message routing facilities to occur between two or more IMS/VS DB/DC systems in one or more S/370(s) (UP or MP/AP).

Multiple Systems Coupling supports IMS/VS functions the way they are today, that is, transactions (messages), responses, program-to-program switches, and fixed-length conversational Scratch Areas, but on two or more IMS/VS DB/DC Systems. MSC allows the routing of messages through an intermediate IMS/VS system (and return) at the destination IMS/VS system for processing. In addition MSC Directed Routing allows an application program to specify the multiple system name (MSNAME) and destination within that system for a message. Routing is performed based on destination name (transaction code or logical terminal name).

IMS/VS Multiple Systems Coupling system-to-system communication is established by the following Multiple Systems Coupling connection types:

- Binary synchronous (BISYNC) communication line (BSC) which requires Basic Telecommunications Access Method (BTAM) and supports point-to-point contention mode (BSC1). BSC operates under OS/VS1 and OS/VS2 (MVS).
- Channel-to-channel adapter (CTC) (OS/VS2 (MVS) only). If the MSC feature of IMS/VS uses a CTC adapter, this adapter must be separate from any CTC adapter that is used by ASP, JES2-NJE or JES3.
- Main storage-to-main storage communication between two IMS/VS systems which reside in the same S/370. (Only one IMS/VS system will use VSAM global shared resources. The other IMS/VS system will not use parallel DL/I to process calls against a VSAM data base; VSAM calls will be processed in the IMS/VS control region.)
- VTAM using the LU 6 protocols which require the advanced communication function for Virtual Telecommunications Access Method (ACF/VTAM). LU 6 operates under OS/VS1 and OS/VS2 MVS.

In addition, the MSC feature permits communication between IMS/VS and another system (such as CICS/VS, a user-written system or another IMS/VS system) with the use of the Intersystem Communication function of MSC. With Intersystem Communication, users of other systems can use IMS/VS application programs, data bases (through user-written application programs), and terminals. Intersystem Communication uses an IMS/VS subset of the Logical Unit 6 (LU 6) protocols with the following functions:

- Parallel sessions.
- DPM through MFS support.
- Negotiable Session Initialization Parameters (BIND).
- Common system protocols.
- Architected system data stream formatting.

With Intersystem Communication, users in other systems can access IMS/VS data bases through IMS/VS application programs without changing the IMS/VS application programs. Intersystem Communication is available in both OS/VS1 and OS/VS2 (MVS).

Enhancements to Intersystem Communication (ISC)

- Simplification of SNA Protocols for Non-response Transactions and Unsolicited Output
  - For the Intersystem Communication user, the SNA protocols required to handle non-response transactions and unsolicited output have been simplified by reducing the number and types of SNA headers required to perform these functions.
- Error Recovery Enhancements
  - Discrimination in error handling is improved so that some errors detected on an Intersystem Communication session between IMS/VS and CICS/VS which previously caused the session to be terminated will generate an error message to the MTO and allow the session to continue.
- Improved Handling of Intersystem Communication Message Switches

## IMS/VS (cont'd)

- If an Intersystem Communication Message Switch is sent to another system and is rejected by that system, the message switch will be deleted from the IMS/VS message queues and the error message will be routed back to the source terminal without terminating the Intersystem Communication session.

The Data Base system and the Data Communication feature of IMS/VS are prerequisites of the Multiple Systems Coupling feature.

Each IMS/VS System in an MSC configuration maintains its own recoverability. The device-dependent modules (DDM) of the physical connections were designed to ensure that messages are neither lost nor duplicated between two systems in the event of transmission or system failure. Commands allow changing the relationship between connections dynamically. Physical connections can be backed up by other connections. An unavailable S/370 can be backed up by another S/370. The corresponding IMS/VS System is executed in the backup S/370 and the involved connections are properly reassigned by the master terminal operator. Data and communication facilities involved must be sharable between systems. In addition, where the backup link is either BSC or channel-to-channel it must be exclusively allocated for that use.

Current IMS/VS functions are compatible between a non-MSC system and a Multiple Systems Coupling environment, thus providing upward growth and compatibility. The requirement is for fixed-length SPAs in MSC conversational transactions. No restriction applies to the support of IMS/VS Message Format Service-supported terminals, even if the processing is done in different IMS/VS Systems.

Message Format Service provides the same services and the same interface to application programs as in a non-MSC system environment. IMS/VS Message Format Service is not involved in any Multiple Systems Coupling system-to-system communication.

Conversational processing provides the same capabilities (using fixed-length SPAs) in a Multiple Systems Coupling environment as in a non-MSC IMS/VS System. Multiple Systems Coupling operation is normally transparent to both terminal users and application programs.

Program-to-program switches may be performed over system boundaries, and conversational steps may be processed in any system of the Multiple Systems Coupling configuration, independent of the location of the transaction initiating terminal.

IMS/VS system definition provides facilities to define the destinations (transactions and logical terminal names) which belong to another system of the MSC configuration. These remote designations determine the required Multiple Systems Coupling routing. Routing exit routines allow the user to customize the Multiple Systems Coupling routing and to avoid repetitive definitions for the same destination. Also, the types of connections and their relationships are defined during system definition.

There are three routing exit routines; Terminal Routing, Program Routing and Link Routing Exit. These routines are optional and user-provided.

The distribution of IMS/VS functions and resources may improve response times for transactions if the configuration is designed such that: (a) critical transactions are processed entirely in the system to which the terminal is attached, and (b) long-running transactions are routed to another system to avoid resource contention.

Two IMS/VS facilities are provided to recognize definition inconsistencies in an MSC configuration. The /MSVERIFY command may be used in the online environment to display inconsistencies between two systems. The IMS/VS MSC Verification Utility is an offline utility program which should be used to detect inconsistencies in the definition of two or more IMS/VS MSC systems.

Each IMS/VS system in a Multiple Systems Coupling configuration is operationally an independent unit. It exclusively owns its resources. That is, each system is controlled by its own master terminal.

The IMS/VS security facility applies to a Multiple Systems Coupling environment. Security maintenance is performed independently on a system basis. An IMS/VS Multiple Systems Coupling system may use transaction security to prevent transactions sent by unauthorized systems from being processed.

Statistics can be produced for a complete IMS/VS Multiple Systems Coupling configuration. The system log tapes will be merged (by a utility provided by MSC) from the separate systems into one data set. This data set will be in order by date and time and can then be processed by the standard IMS/VS statistics modules.

The following are additional IMS/VS DC Monitor reports that are available for Multiple Systems Coupling:

- MSC Traffic Report.
- MSC Queuing Summary Report.
- MSC Traffic Summary Report.

**Fast Path Feature:** See the description of improved Fast Path function under section "Highlights of IMS/VS Version 1 R3".

The Fast Path feature is a compatible extension of IMS/VS which is designed to enable the user to select either improved performance for simply structured transactions or full function for complex transactions, depending on the requirements of particular applications. Fast Path provides new facilities for those applications which need only selected IMS/VS function and a simple data structure, and may have large transaction volumes.

Major elements of the feature are expedited message handling, two new types of data bases and a new approach to data integrity and recovery through synchronization point processing. Highlights of each of these facilities follow.

### Expedited Message Handling

- Utilizes DL/I calls and maintains the DL/I interface in support of expedited message processing.
- Dynamic selection and routing of input messages to either Fast Path processing or normal IMS/VS processing.
- Single-segment messages utilizing a buffer for each terminal accelerates the message flow through the system.
- Use of transaction response mode of operation.
- An output message is returned to the same terminal that originated the input. The response may be routed to a different component of the same physical terminal by use of the response alternate PCB. (Conversational processing and message switching are not available.)
- Fast Path, using an alternate terminal PCB, enables output from both message-driven and nonmessage-driven programs to be sent to:
  - A different logical terminal (LTERM) on the same IMS/VS system or another IMS/VS system using the MSC feature.
  - An IMS/VS application program on the same IMS/VS system or another IMS/VS system using the MSC feature.
- For the OS/VS2 (MVS) user, use of VTAM Authorized Path as supported by IMS/VS.
- A Load Balancing Group (LBG) scheduling approach combining IMS/VS facilities:
  - Multiple application copies.
  - Wait-for-input.
  - A Fast Path facility, employing simplified FIFO message queue management, speeds transaction processing. (The normal IMS/VS transaction message queuing and application scheduling facilities are bypassed.)
- Application independence is provided for a variety of storage devices and communication devices using VTAM or BTAM. (See the terminal chart under "Data Communications" for details.)
- Message Format Service.
- Use of protocol with 3600 and SLU P.

### Main Storage Data Base

- A root only fixed length segment data base facility residing in main storage --- Main Storage Data Base (MSDB).
- Four types of MSDBs available to support application requirements.
- Use of DL/I calls, thus maintaining the DL/I interface for MSDBs.
- One DL/I call to permit access to data at the field level (Field) and the use of one call instead of two to update data.
- Two utilities to support maintenance and recovery.

### Data Entry Data Base

- An additional data base facility residing on direct access storage --- Data Entry Data Base (DEDB).  
This facility is designed to handle applications requiring the collection of a large volume of detailed data, with master record update capability available if desired.
- Data Entry Data Base organization containing a root segment type and a maximum of seven dependent types, one of which may be a sequential dependent segment, the others being called direct-dependent segments.
- DEDB provides data base partitioning which enables application processing to continue when all partitions of the data base are not online either planned or unplanned.
- A maximum of 240 DEDB areas (data sets) may be specified per data base.
- Use of VSAM Improved Control Interval Processing by DEDBs.
- Use of SRB interface to VSAM for MVS.
- Use of DL/I calls, thus maintaining the DL/I interface for DEDBs.
- One DL/I call to assist in effective utilization of DEDBs (Position).

## IMS/VS (cont'd)

- Four utilities to provide support for formatting, extraction, deletion and reorganization.

### Synchronization Point Processing

- Synchronization processing approach helps provide for MSDB and DEDB integrity and recovery.
- Facilitates parallel processing by executing the synchronization point in a dependent region.
- Updates MSDBs during synchronization point processing time.
- Schedules DEDB updates and terminal response messages to be performed after logging is completed.
- A common data base deadlock detection and common transaction synchronization point coordination between IMS/VS full function and Fast Path when Fast Path mixed mode is utilized.

The Fast Path feature available with IMS/VS R1.6 and subsequent releases allows Fast Path application programs to retrieve from as well as update all IMS/VS DL/I data bases.

All IMS/VS DB/DC (online) application programs (MPPs and BMPs) are able to retrieve from as well as update all IMS/VS Fast Path Data Entry (DEDB) and Main Storage Data Bases (MSDB):

**Fast Path Feature Formatted Dumps:** Fast Path control blocks are now included in the IMS/VS formatted dumps.

**Fast Path Feature on OS/VS1:** The Fast Path feature contained in this release of IMS/VS V1 operates under OS/VS2 MVS and OS/VS1 operating systems. For future planning purposes, the Fast Path Feature will be supported on the OS/VS2 MVS operating system only.

**Selection Criteria:** Fast Path can be selected for applications that meet these criteria:

- Transactions are initiated by a single-segment, response-type message.
- Input messages require only one response (this is necessary because transaction response mode is used).
- The input and output message lengths do not exceed that specified at system definition time for each terminal designated to handle Fast Path transactions.
- Transactions are designed to operate not only on root segments or no root segments with a maximum of seven dependent segments, one of which may be a sequential dependent segment, the others being called direct-dependent segments.
- DEDB now supports the dynamic allocate/deallocate on an area (data set) level.
- Fast Path allows the use of IMS/VS Message Format Service (MFS), but display formats are limited to one logical page.

**Limitations:** Fast Path is compatible with IMS/VS in many areas. It achieves some of its increased performance capability by limiting some function and adding others (e.g., the new DL/I calls). This section identifies areas which should be considered when planning for a Fast Path application, either a new one or one presently running on IMS/VS but being adapted or converted to Fast Path.

In the systems definition area, extensions to existing macros are provided to describe Fast Path. The basic process remains the same.

For processing input and output messages, the following should be noted:

- Normal IMS/VS conversational processing is not available, but a capability for simulating SPAs through MSDB exists.
- Fast Path transaction input from the IMS/VS master terminal is not supported.
- Fast Path uses a simplified message processing and queuing approach. Transaction codes and routing codes are used, but there is no use of priorities and message classes.

Fast Path data base facilities cannot be a part of an IMS/VS logical data base. The DL/I call formats and interface are maintained and two calls are not available for some data bases.

Fast Path and MSC can coexist on the same IMS/VS system, but Fast Path messages must be processed in the IMS/VS system in which they are entered.

The Data Base Surveyor Utility feature does not support Fast Path's Data Entry Data Bases (DEDB) and Main Storage Data Bases (MSDB), the partial Data Base Reorganization Utility or the Online Image Copy Utility. The Fast Path feature has its own online reorganization utility.

No OS/VS checkpoint is available for Checkpoint call, if the IMS/VS application (BMP) has access to Fast Path data bases.

No composite analysis is available for all activities of an application program using both IMS/VS and IMS/VS Fast Path data bases. To analyze the IMS/VS activities, the DC Monitor should be used. To

analyze the IMS/VS Fast Path activities, the Fast Path Log Tape Analysis Program should be used.

The Fast Path feature allows a variation to the application view and message handling. The Fast Path application views the symbolic terminal as though it were a one-level hierarchic data structure with a single message segment in and out. Each terminal has its own buffer associated with each terminal managed by the system. Each transaction type known to the system also has a symbolic name. Messages entered by a terminal operator contain only transaction names and associated data. Conversational processing and message switching are not supported by the Fast Path feature.

The Expedited Message Handling (EMH) facility of the Fast Path feature replaces the functions associated with the queue manager and the transaction scheduler and uses the following: Incore preallocated buffers, prescheduled application programs, and routing codes to direct transactions to application programs.

**Data Base Surveyor Utility Feature:** A data base report utility feature called "Surveyor" is available as a part of IMS/VS V1 R1.5. The function of this utility feature is to survey an IMS/VS data base (HDAM and HIDAM only) to aid the user in determining the need for reorganization and provide a report describing the physical organization and the free-space utilization. Surveyor allows for a full scan of an entire data base or a scan of a user-specified range of segments in a data base. Surveyor runs as either a batch job or BMP job. This utility complements and is intended to be used in conjunction with the Partial Data Base Reorganization Utility.

**Data Base Recovery Control Feature:** See the description of enhanced DBRC function under section "Highlights of IMS/VS Version 1 R3".

The IMS/VS Data Base Recovery Control feature is designed to assist IMS/VS installations with recovery of their data bases.

The feature consists of two utilities, processing that occurs when the feature is given control from the IMS/VS control program and the IMS/VS recovery utilities, and a number of data sets used to store the information needed for recovery. The full advantage of the feature is realized when you use an IBM 3850 Mass Storage System or other direct-access storage devices to store recovery-related data sets (thereby reducing the amount of tape handling that is associated with the recovery of data bases).

See the description of DASD Logging feature under section "Highlights of IMS/VS Version 1 R3".

### CUSTOMER RESPONSIBILITIES

A customer installing IMS/VS must:

- Have installed at least the minimum machine configuration.
- Assure that appropriate OS/VS1 or OS/VS2 and S/370 training (including terminal and direct access storage education) be given to system analysts, application programmers, system programmers and system operators.
- Have OS/VS1 or OS/VS2 successfully installed (no customer should attempt to implement IMS/VS until the installation has achieved proficiency in the use of OS/VS1 or OS/VS2).
- If VTAM terminal support is to be used, ACF/VTAM is required.
- Have personnel educated in IMS/VS (a thorough knowledge and understanding of data base concepts and IMS/VS before installation are essential).
- Provide adequate protection against the accidental loss or misuse of his data (functions exist in IMS/VS to assist in providing data security).
- Plan for installation and operation of his remote terminals.
- Make sure personnel are trained in COBOL, PL/I or Assembler language.
- Specify transactions for each application defined.
- Describe the structure of each data base for IMS/VS and for the application.
- Specify and implement application programs.
- Define the physical and logical communications network.
- Provide, when the 7770 Audio Response Unit mdl 3 is used, the input, output and signon exit routines.
- Provide, when the 3270 Information Display System is used, message input and output descriptions using the message format language utility.
- Provide, when the S/3, S/7, S/32 (as a S/3) or S/34 (as a S/3) is used with IRSS, the necessary support programs in the remote processor and the support programs for bit handling, blocking, deblocking, synchronization and recovery functions.

PROGRAM PRODUCTS

IMS/VS (cont'd)

- Provide, when 3600 or SLU P systems are used, the necessary support program for the controller.
- Generate the IMS/VS control program by describing data bases, applications, transaction codes, message classes, terminals, queues, system libraries, buffering requirements, storage devices, capacity and programming system configuration to the IMS/VS system definition utility.
- Provide, when the 3740 Data Entry System is used, the signon exit routine.
- Apply necessary programming changes to OS/VS1 or OS/VS2 associated with the installation of IMS/VS.
- When considering backup, provide an alternate connection and necessary facilities to backup an unavailable Multiple Systems Coupling connection. Also, provide alternate or back up systems to increase the overall availability and recoverability of the Multiple Systems Coupling configuration. Each system in an IMS/VS Multiple Systems Coupling configuration uses the recovery capabilities of a non-MSM IMS/VS system. The Multiple Systems Coupling facility was designed to help ensure that messages are neither lost nor duplicated during their transmission from one system to another. Recovery is possible in the whole Multiple Systems Coupling configuration as long as no system is cold started or no log records were lost. Cold start or lost log records may impact the recoverability of the directly involved system and of any system which maintains communication with it. The impact of cold start or lost log records is the loss of messages which may be from or in transit to other IMS/VS systems.
- When installing the Data Base Recovery Control Feature:
  - Set up new recovery procedures for error situations and informational messages.
  - Establish frequency and type of recovery procedures to be used.
  - Define data base data sets, to be recovered by the feature, in the recovery-control data set.
  - Modify the JCL provided by the feature to match the installation requirements.
  - Establish procedures to recover the recovery-control data set.
  - Define security procedures for the recovery-control data set.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Processors:** IMS/VS Version 1 executes under the virtual storage operating systems (OS/VS1 and OS/VS2) in IBM S/370 mdls 138, 145, 148, 155II, 158, 165II, and 168 and the 303X, 308X and 4300 Processors. When operating with MVS/SP V1 R3 or subsequent releases, the following is recommended: With the IBM 3033 Processor, the Extension feature #6850 should be installed; with the IBM 3031 Processor, EC 209877 or later should be installed; and with the IBM 4341 Model Group 2, 4361-5 or 4381 Processor, the Extended Control Program Support (ECPS:MVS) facility should be installed. With MVS/Extended Architecture (MVS/XA), IMS/VS executes on the IBM 308X Processor Complex operating in extended architecture mode, with the MVS/System Product Version 2 (MVS/SP V2), and the Data Facility Product (DFP) installed.

It is suggested that the IBM S/370 mdl 138 be limited to the IMS/VS Data Base System only.

**System Console:** OS/VS1, OS/VS2 MVS and MVS/XA requirements apply.

**Tape Units:** At least one IBM 2400\* or 3400 9-track tape unit is required for installation.

**Direct Access:** For system libraries and working storage space, any devices supported by the operating system are allowed.

For IMS/VS data base storage, within the capabilities and restrictions of BSAM, QSAM, ISAM and VSAM support, the following IBM devices are allowed:

2305 - mdls 1, 2*	Fixed-Head Storage
2314/2319**	Direct Access Storage Facility
3330 - mdls 1, 2, 11	Disk Storage
3333 - mdls 1, 11	Disk Storage and Control
3340	Direct Access Storage
3344	Direct Access Storage Facility
3350	Direct Access Storage
3375	Direct Access Storage
3380	Direct Access Storage
3850	Mass Storage Facility

\* MVS/Extended Architecture does not support the 2305 mdl 1.

\*\* MVS/Extended Architecture does not support these devices.

**Fast Path:** Fast Path function *operates only* in an OS/VS2 MVS or MVS/XA environment. All devices supported by the operating system are allowed for system libraries and working storage. MSDBs are stored as DASD data sets when Fast Path is shut down. The space required for MSDBs depends on their number and size. Direct access devices supported by IMS/VS and VSAM improved control interval processing (ICIP) are available for DEDBs.

Fast Path supports the following communication devices:

Terminal Type	Polled	Local Mode	SNA
2740-1 (Note 1)	BTAM		
2740-2	BTAM		
3270 (BSC/local)	BTAM	BTAM	
3270 (BSC/local)	VTAM	VTAM	
3600/Finance (Note 2)			VTAM
3767			VTAM
3770			VTAM
SLU 1 (Note 3)			VTAM
SLU 2			VTAM
SLU 4 (Note 3)			VTAM
SLU P			VTAM
LU 6			VTAM
NTO Devices			VTAM

Note 1: Station control only.

Note 2: 3614 support via 3601 only.

Note 3: Must have at least one input component.

**Multiple Systems Coupling:** Each IMS/VS system in a multiple systems configuration must consist of an entire IMS/VS DB/DC release with its own IMS/VS master terminal. The IMS/VS systems in the configuration must be compatible releases.

The following releases are compatible and may be connected:

- IMS/VS Version 1 Release 1.6.
- IMS/VS Version 1 Release 2.
- IMS/VS Version 1 Release 3.

When the physical link is a binary synchronous communications line, BTAM is required. Point-to-point contention mode (BSC1) is supported.

When the physical link is a main storage-to-main storage link, OS/VS1 and OS/VS2 MVS are supported.

When the physical link is a channel-to-channel adapter, the S/370 channel-to-channel adapter or a logical channel on the 3088 is required. An MSC channel-to-channel link is supported on OS/VS2 MVS and MVS/XA only.

When the MSC connection is via VTAM, if Intersystem Communications (ISC) is used, ACF/VTAM Version 1 Release 1 or later is required. The Synchronous Data Link Control (SDLC) line discipline is used. The parallel session capability is not available with ACF/TCAM.

**Data Sharing Requirements**

- For interprocessor sharing, either a 3705 controller or a channel-to-channel (CTC) link can be used. If a 3705 controller is used, ACF/VTAM Version 1 Release 3 Multisystem Networking Facility or a subsequent release with the appropriate ACF/NCP release is required. If a CTC link is used, ACF/VTAM Version 2 Release 1 is required.
- IMS/VS systems running under OS/VS1, OS/VS2 MVS or MVS/XA may share data at the data base level; for block level sharing, OS/VS2 MVS or MVS/XA is required.
- For block level sharing, the IMS/VS Resource Lock Manager (IRLM) is required. IRLM is a component of the IMS/VS Data Base System. IRLM must be defined as an OS/VS2 MVS subsystem and the appropriate ACF/VTAM definition provided.



PROGRAM PRODUCTS

IMS/VS (cont'd)

TERMINALS SUPPORTED by IMS/VS: The following table lists the terminals that IMS/VS supports.

Supported Product	Compatible Product	Contention	MODE Switched	Polled	Local	SNA	Notes
1050			BTAM	BTAM			
2260-1,-2				BTAM	GAM		
2265-1				BTAM			
2740-1	3767	BTAM	BTAM	BTAM			1
2740-2	(2740 mdls only)			BTAM			1,2
2741	CMCST	BTAM	BTAM				1,3
2770	3770 (BSC)			BTAM			
2780	5110	BTAM		BTAM			
2980				BTAM			4
3270			BTAM	B/V	B/V	VTAM	1,2
3600/Finance	4700					VTAM	1,2,5,8
3614						VTAM	4,5
3740	5280		BTAM				4,6
3767						VTAM	1,8
3770						VTAM	1,8
SLU 1 (i.e., 3230, 3232, 3262, 3268, 3767, 3770, 3770P, 3790 (type 2 batch & bulk print), 4700, 5210, 5280, System/32, System/34, System/36, System/38, 8100)						VTAM	1,2,9
SLU 2 (i.e., 3178, 3276, 3278, 3279, 3290, 3790 (3270 DSC feature), 3600 Admin PP, 4700, 5280, 5520, 8100, 8775, System/34, System/36, System/38, 6580)						VTAM	1,2
SLU 4 (i.e., 6670)						VTAM	1,2
SLU P (i.e., 3600, 3630, 3650, 3680, 3770PC, 3790, 4700, 5520, 8100, System/34, System/36, Series/1						VTAM	1,2,5,7
LU 6						VTAM	1,2
NTO (i.e., 33/35 TTY, 2740, 2741, 3101, 3232, 3767, S/23						VTAM	1,2
7770-3			ARAM				3,4
33/35 TTY	3101, 3102 S/23		BTAM				3
System/3				BTAM			7
System/7		BTAM		BTAM			7
System Console					WTO(R)		
Card Reader					BSAM		
Printer					BSAM		
Magnetic Tape					BSAM		
DASD Devices					BSAM		

KEY

- ARAM = IMS/VS audio response access method.
- BSAM = Basic sequential access method.
- BTAM = Basic telecommunications access method.
- B/V = BTAM or VTAM.
- GAM = Graphic access method. Graphic programming service is required to receive GAM.
- SNA = Systems network architecture. IMS/VS is independent of physical connection types used by VTAM for SNA.
- VTAM = Virtual telecommunications access method.
- WTO(R) = OS/VS write-to-operator/write-to-operator-with-reply (WTO/WTOR).

Notes:

1. The IMS/VS Message Format Service (MFS) is available for this device. MFS editing can be bypassed on a message-by-message basis.
2. IMS/VS Fast Path feature allows the use of the compatible terminals.
3. IBM does not provide error detection capability for this device. Therefore, only inquiry-only transactions are allowed, even though the non-inquiry capability exists.
4. User-written exit routines are required for the 3614, 3741 and 7770-3 terminals, and may be required in some environments for the 2890.
5. Although IMS/VS provides sample code for this terminal, additional user coding is required.
6. Connection between IMS/VS and this terminal requires a manual dial from the host.

7. IMS/VS provides no device resident code for this device. Additional user coding is required to attach it to IMS/VS.
8. These terminals can be defined by identification number and as SLUs. The support for the multiple definition is not necessarily the same.
9. Support of SLU 1 is with SCS data stream.

SOFTWARE REQUIREMENTS

IMS/VS Version 1 Release 3 operates under the following virtual storage operating system configurations:

- OS/VS1 Release 7.0
  - The Fast Path function is *NOT* supported for OS/VS1 operating system starting with this release of IMS/VS V1.
  - The IRLM is *NOT* supported for OS/VS1 operating system.
- OS/VS2
  - For S/370 environment (with their appropriate prerequisites):
    - MVS/System Product-JES2 (5740-XYS) or -JES3 (5740-XYN) Version 1 Release 3, referred to below as MVS/SP V1 R3;
    - With either MVS/370 Data Facility Product (5665-295), or OS/VS2 Data Facility Device Support (5740-AM7) and Data Facility Extended Function (5740-XYQ).
    - Data Facilities Extended Function Release 1 (5740-XYQ).
  - For MVS/Extended Architecture (MVS/XA) environment (with their appropriate prerequisites):
    - For MVS/System Product-JES 2 (5740-XC6) or -JES3 (5665-291) Version 2 Release 1, referred to below as MVS/SP V2 R1.

## IMS/VS (cont'd)

- MVS/XA Data Facility Product Release 1 (5665-284), referred to below as MVS/XA DFP R1.

- For both operating systems:

- IMS/VS V1 R3 requires OS Assembler H Version 2 (5668-962).

For proper execution of IMS/VS, system definition and system execution must be performed under the same operating system release. Unless required by the operating system, a new IMS/VS system definition using the same IMS/VS release does not make it necessary to recompile user application programs.

The selection of an OS/VS configuration has some effect on the potential performance, reliability and availability characteristics of IMS/VS. Certain options are required by IMS/VS in all of the applicable configurations.

IMS/VS is designed to be a portable system. That is, when generated using MVS/SP V1 R3, it can run on either a System/370 or a System/370 running in Extended Architecture mode.

IMS/VS Version 1 Release 3 can also be generated as a nonportable system. That is, when generated using MVS/SP V2 R1, it can run only on a System/370 running in Extended Architecture mode. MVS/XA comprises MVS/SP V2 R1 and MVS/XA DFP R1. If a nonportable system (one using MVS/XA) is generated, Assembler H Version 2 Release 1 is also required.

When the Data Communication feature is used, ACF/VTAM Version 1 Release 3 or later is required. Also, if BTAM is used on MVS/XA, then BTAM/SP (5665-279) is required.

An IMS/VS Data Base System operates only in pageable (V=V) storage. In a DB/DC system running under OS/VS1, OS/VS2 MVS, or MVS/XA, the control, message processing, and batch message regions operate in pageable storage.

When the IMS/VS control region or partition is run in a virtual environment, the user is given the ability to fix specific portions of the control program. This permits tuning of the IMS/VS system to a particular environment.

IMS/VS also operates in a VM/370 virtual machine under control of OS/VS1, OS/VS2 MVS or MVS/XA with the following restrictions:

- If binary synchronous terminals through BTAM are employed, communication line timeouts should be expected. Note that this timeout of terminals is not limited to VM/370, but when it does occur, it affects the recovery because polling is inconsistent when BTAM operates under VM/370.
- The IMS/VS Statistics Analysis Utility is not supported.
- If problems are encountered when operating IMS/VS under VM/370, it may be advantageous to re-create the problem in a standalone OS/VS environment.

IMS/VS operation in a VM/370 environment is intended primarily for use in program development and testing. IMS/VS can operate under VM/370 for production purposes. If you have specific throughput or terminal response time requirements, you should plan to benchmark under VM/370 to ensure that the proposed configuration will meet your needs. Consideration should be given to making the virtual machine running IMS/VS a favored virtual machine.

**Programming Language:** IMS/VS is written in Assembler and PL/S.

**Access Methods:** An IMS/VS Data Base System uses basic sequential access method (BSAM), queued sequential access method (QSAM), indexed sequential access method (ISAM) and/or virtual sequential access method (VSAM). IMS/VS uses VSAM shared resources support, which reduces main storage requirements by sharing buffers and control blocks across VSAM data sets. A DEDB uses VSAM ICIP only.

An IMS/VS DB/DC system uses, in addition, basic telecommunications access method (BTAM) and virtual telecommunications access method (ACF/VTAM). If local support for 2260 Display Stations is required, the graphic access method and graphic programming services are required. IMS/VS Version 1 Release 1.6 or later operates only with ACF/VTAM - not VTAM. If MSC or ISC will utilize parallel sessions or negotiable session initialization parameters (BIND), ACF/VTAM Release 2 or later is required.

**Program Currency:** IMS/VS Version 1 Releases 1.6 and 2 remain current. Their end-of-currency will be announced at least 12 months prior to effective date.

## COMPATIBILITY

**Between IMS/360 and IMS/VS:** Application program source modules developed for previous versions of IMS (5736-CX3, 5734-XX6) are upward compatible to IMS/VS. IMS/VS provides substantial new functional enhancements over IMS/360 (5734-XX6).

**Between IMS/VS Version 1 Releases:** Application programs developed for IMS/VS Version 1 Releases are upward compatible. The user does not have to re-compile nor re-linkedit. Application programs which use MFS and use the input cursor field may require a change. See *Message Format Service User's Guide* (SH20-9053).

**Between IMS/VS Version 1 Releases and IMS/VS Version 1 R1.4 and R1.5 Fast Path Feature:** For Fast Path application programs running under IMS/VS, a system definition process must be done to develop the interfaces and definitions of the two new data bases, message processing, transactions, etc. The Fast Path feature offers new data base calls which, if used, require some application program modification. The use of these calls is not required for all programs. When migrating Fast Path application programs from IMS/VS V1 R1.4 to R1.5, different results are obtained in some areas, for example, status codes.

**For Multiple Systems Coupling feature compatibility between IMS/VS V1 R1.3 and R1.4, between R1.4 and R1.5, between R1.5 and R1.6, and between R1.6 and R2:** See the "Multiple Systems" subsection under the "System Requirements" section. Multiple Systems Coupling Feature (MSC) in IMS/VS V1 R1.5 and R1.6 is supported for communication with MSC in IMS/VS V1 R2.

**For IMS/VS V1 R1.5:** A /EXIT command issued during a conversation will delete the queued transaction if it exists as yet unprocessed in the system which originated the conversation. A code will be given to the user's conversation abnormal termination exit routine, and a message will be sent to the terminal operator, indicating the status of the transaction.

- Field Level Sensitivity is optional and does not require a change to the user's application program unless variable-length segments are used. DL/I call syntax is unchanged.

**For IMS/VS V1 Release 3:** Application programs developed for IMS/VS Version 1 are upward compatible to IMS/VS Version 1 Release 3. The Message Format Service (MFS) compatibility enhancement for downward compatibility of the IMS/VS Version 1 Release 3 MFS Format Library will be made available through the service process. The archive log data set of IMS/VS V1 R3 and the log data set of IMS/VS V1 R2 may be used with either IMS/VS V1 R2 or IMS/VS V1 R3 recovery utilities: Change Accumulation, Data Base Recovery, and Batch Backout. The IRLM available with IMS/VS V1 R3 must be used with IMS/VS V1 R2 when block level data sharing is used between R2 and R3. For Multiple Systems Coupling, IMS/VS V1 R1.6 and IMS/VS V1 R2 and IMS/VS V1 R3 are compatible and may be connected to each other. IMS/VS V1 R3 does not support OS/VS Checkpoint/Restart.

In addition to the Compatibility statements announced previously, the following are additional effects on the compatibility between IMS/VS V1 R2 and IMS/VS V1 R3: JCL changes may be required in the control region ... because of 3 multiple address spaces, a user's accounting routines may be affected ... a new ACBGEN will be required. Compatibility between IMS/VS Version 1 Release 2 and IMS/VS Version 1 Release 3 for Fast Path Data Entry Data Bases, for the IMS/VS Version 1 Release 2 level of Fast Path function, will be provided through the service process.

**For Data Base Recovery Control Feature:** The Data Base Recovery Control Feature supports Fast Path Data Entry Data Bases in IMS/VS V1 R1.5. No other Data Base Recovery control support is provided for Fast Path. Fast Path data bases and GSAM data sets are not supported by IMS/VS Data Sharing facility.

## CONVERSION

The following are conversion considerations for R1.5:

- To utilize display formats currently designed for 3270 displays on new devices with larger screen capacity, users of IMS/VS V1 R1.1 or later may require changes to current MFS source definitions. Users of releases prior to IMS/VS V1 R1.1 will use currently defined MFS conversion procedures.
- Although any nonswitched 3270 may be used as the IMS/VS Master Terminal, the special MFS master terminal formatting option applies only to 24 x 80 screens (1920 characters).

PROGRAM PRODUCTS

**IMS/VS (cont'd)**

- Users of R1.5 will be required to generate allocation parameter lists for the data bases used in dynamic allocation.
- All data bases subject to dynamic allocation will be required to be cataloged.
- Before installing the Fast Path feature under IMS/VS V1 R1.5, see the "Limitations" subparagraph of the "Fast Path feature".
- S/3 and S/7 programs may have to be modified to handle a new system message error block.
- A user-written conversation abnormal termination exit routine may have to be modified to handle the new interface.
- PSB and ACB generations must be rerun after insertion of the new SENFLD statement(s). The field names must be the same as contained in the DBD generation information.
- A DL/I call with SSA cannot use a field (except key field) to which the application program is not sensitive.
- When using the Data Base Recovery Control Feature with IMS/VS V1 R1.4 or R1.5, all data base data sets under recovery control of the feature must be identified in the recovery-control data set. Data sets not under feature control can be recovered using currently defined IMS/VS procedures.

The following are considerations for R1.6:

- 3790 limited inquiry support is withdrawn. All other 3790 functions continue to be available (as SLU types 1, 2 and P).
- If VTAM is used, then IMS/VS V1 R1.6 requires ACF/VTAM, because IMS/VS V1 R1.6 does not support VTAM Level 2.
- IMS/VS V1 R1.6 will be installable using System Modification Program Release 4 (SMP4). Release 1.6 defines IMS/VS distribution and system libraries in a format for SMP installation. SMP installation removes the requirement by IMS/VS of providing unique input job streams for system installation. Users will no longer be required to execute separate installation procedures for SCPs or SUs and another for IMS/VS. Initialization of the ACDS and CDS for IMS/VS will occur during the IMS/VS SMP installation.

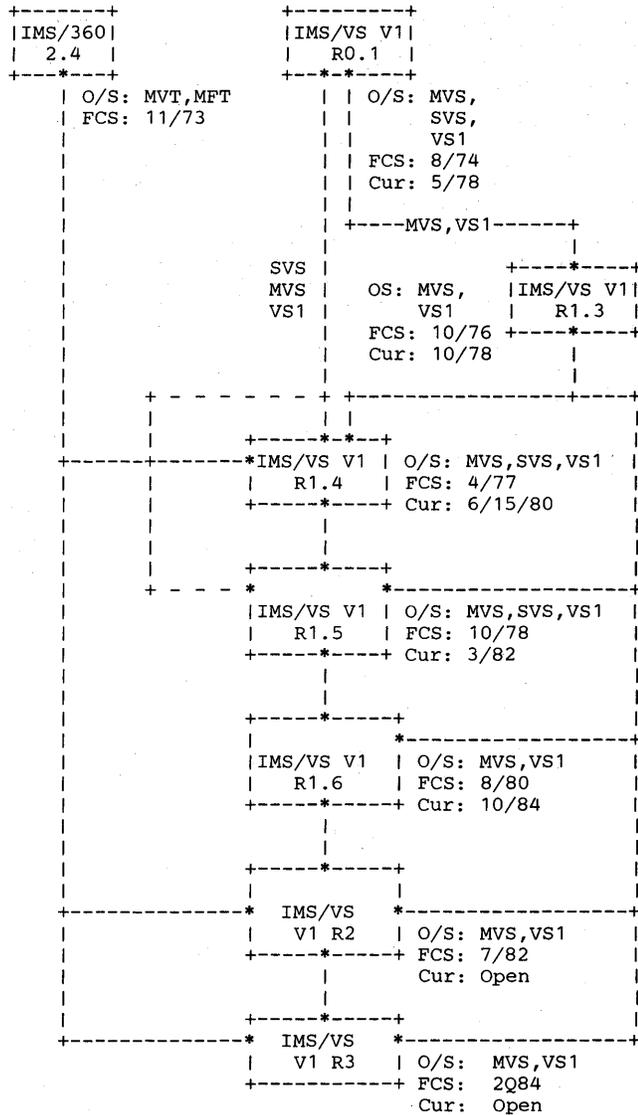
The following are considerations for R2:

- The ACB Library must be regenerated.
- IMS/VS Version 1 Release 2 will be installable using System Modification Program Release 4 (SMP4). Release 2 defines IMS/VS distribution and system libraries in a format for SMP installation. SMP installation removes the requirement by IMS/VS of providing unique input job streams for system installation.
- For IMS/VS Version 1 Release 2, the DBRC RECON data set from earlier releases must be converted to the new RECON data set format using the utility provided for that purpose. Access by IMS/VS V1 R2 DBRC and R1.6 DBRC features to the IMS/VS V1 R2 DBRC's RECON data set will be provided by a PTF.

See *IMS/VS Installation Guide* (SH20-9081) for installation information.

**MIGRATION PATHS for IMS/VS USERS**

The following chart shows the various migration paths possible for an IMS/VS user according to a particular operating system. Note the first customer ship dates and the currency dates to the right of each box. For details on currency see the above currency period table.



O/S Operating System  
FCS First Customer Ship  
Cur Currency

**DATA SECURITY and AUDITABILITY**

IMS/VS Version 1 is subject to all the controls of its environment such as those provided by the operating system, access methods and the subsystem to which it is communicating. It includes all security features and functions previously announced including the Resource Access Control Facility (RACF).

In addition, there are security facilities that permit the control of access to one system's resources by another. Data protection facilities of the communicating system and subsystem should be considered when using the intersystem communication function. Customer management is responsible for the selection, application and adequacy of those controls.

**PERFORMANCE CONSIDERATIONS**

The performance of IMS/VS in a virtual storage environment is highly dependent on the system resources available, the programs that operate concurrently and their relative priorities, and system and application data set placement. Performance also depends on the paging characteristics and storage reference patterns of IMS/VS and its application programs, the allocation of data sets to particular devices and the particular data being processed.

PROGRAM PRODUCTS

**IMS/VS (cont'd)**

In an MP/AP environment, performance of IMS/VS is also dependent upon the amount of concurrent processing considering the demand of processor time by the IMS/VS control region, message processing programs, batch message programs and other users of the system.

For specific online performance and response time requirements, particular attention must be given to ensuring that adequate real resources (main storage, processor computing capability, channels, direct access devices, etc.) are available. To verify specific performance, benchmarking the IMS/VS system may be appropriate.

**Performance Considerations for the Fast Path Feature:** An increased performance capability is available with the IMS/VS Fast Path feature. The main effect of these performance improvements can be greater transaction throughput rates than is achievable with the base IMS/VS system for a given processor utilization level. Fast Path performance gains are achievable in general by trading main storage space and function for performance, wherever such trades are consistent with the requirements of high-volume, limited-processing DB/DC applications. Because of these trade-offs, care must be taken that the functions in Fast Path are adequate for the given application and that sufficient real main storage is available to maintain acceptable paging rates.

Fast Path performance gains have been achieved by reducing the path length (number of processor instructions executed) in processing a transaction. These path length savings should improve overall performance whenever the processor is the limiting component in the installation. Path length reduction is achieved by:

- Expedited message handling
  - Single-segment messages only.
  - Terminal response mode only.
  - Simplified message queuing in main storage.
- Pre-scheduled application programs
  - Wait-for-input mode only.
- Expedited data base access
  - New main storage data base organization with single-call field updating.
  - New data entry data base organization for efficient insertion of variable-length segments.
- Use of advanced SCP support
  - VSAM Improved Control Interval Processing.
  - SRB dispatching (MVS).

Performance improvements can also result from the reduction or elimination of I/O and I/O contention:

- Main storage message queuing eliminates spill of message queues to DASD.
- Pre-loading of control blocks eliminates dynamic fetching.
- Main storage data bases eliminate I/O for some data base access.

Fast Path was designed to take advantage of the MVS, VTAM and SNA environments. In other environments, performance gains may still be achieved, but will not in general be as great. For example:

- Fast Path uses Acknowledge-with-Input for SNA programmable controllers such as the 3600 and SLU-P. For other terminal devices and line disciplines such as the 3270 BSC, path length savings relative to the IMS/VS base product will not be as great.
- Fast Path takes advantage of authorized program support in MVS, for example, SRB dispatching and suspend/resume. In other operating systems environments (VS1), the use of the equivalent standard application program facilities will in general cause longer path lengths.

Thus the potential exists for realizing performance enhancements for selected transactions and/or applications. However, certain precautions must be understood and met to achieve a desired performance level. Some of these were discussed in the previous section.

**PLANNED AVAILABILITY**

IMS/VS Version 1 Release 2 general availability was July 15, 1982. IMS/VS Version 1 Release 2 MVS/XA support general availability was 8/27/82. IMS/VS Version 1 Release 3 general availability is planned for 2nd Quarter, 1984. IMS/VS Version 1 Release 3 Early Support Program (ESP) is planned for 1st Quarter, 1983. The Fast Path function will be made available to the IMS/VS Version 1 Release 3 ESP during 3rd Quarter, 1983.

**PROGRAM CURRENCY**

The following table shows the end-of-currency period of IMS/VS Version 1:

IMS/VS VER - SION 1	END-OF-CURRENCY DATE
R1.5	3/82
R1.6	10/84
R2	*

\* An IMS/VS V1 currency date has not been established. End-of-currency will be announced at least 12 months prior to effective date.

**PREVENTIVE SERVICE**

Preventive Service (PTFs) for IMS/VS Version 1 will be distributed to all licensed users. The PTFs contain solutions for problems resolved since the last preventive service tape and are installable with System Modification Program Release 4 (SMP4). Preventive PTFs are distributed with the object module and will include, as appropriate, source changes for the module in machine readable format.

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing situations where the installation of IMS/VS V1 R1.5 on OS/VS2 (MVS) R3.7 or R3.8 and IMS/VS V1 R1.6, R2 and R3 on OS/VS2 (MVS) R3.8 causes an exposure to the system integrity of OS/VS2 MVS and MVS/XA. This statement applies to the IMS/VS Data Base System as well as to the Data Communication, Multiple Systems Coupling, Fast Path, Logging, Data Base Recovery Control, and Data Base Surveyor Utility Features. This program is intended to run authorized.

RPCs ACCEPTED: No



**PROGRAM PRODUCTS**
**GENERALIZED INFORMATION SYSTEM/VIRTUAL  
STORAGE  
GIS/VS (5740-XX7)**
**PURPOSE**

GIS/VS is designed to enable the programmer or the non-data processing professional to maintain and extract information on a timely basis from an installation's data base. This is made possible by the use of a generalized high level language which is easy to learn yet powerful enough to handle complex multi-file data requests with extensive logic and computational requirements. In conjunction with IMS/VS (5740-XX2), GIS/VS can provide an integrated information system which uses the flexibility and power inherent in these two complementary DB/DC systems. Non-technical users of the data processing facility can formulate their own data requests and enter them directly into the computer either on a batch basis or via a remote IMS/VS terminal. As a result, the programmer work load and associated costs can be substantially reduced, and the total turnaround time normally required with the development, testing and execution of a reporting application or a one-time program can be drastically cut.

**DESCRIPTION**

GIS/VS in conjunction with the Operating System (including OS/VS1 and OS/VS2, SVS and MVS) provides a powerful technique for addressing specific customer needs for data processing, as well as many of the requirements of executive management information systems. Combined with IMS/VS, it provides a comprehensive information system. Access to either DL/I or non-DL/I files may be either batch or from an IMS/VS terminal. These files may then be temporarily or permanently modified and reported upon. In response to spontaneous and changing requirements, GIS/VS provides sets of generalized routines which enable data set creation, maintenance, and retrieval. With this program, existing or new files are described, including significant support for DL/I data bases, and then user-selected symbolic names serve to identify and locate both the appropriate file and the fields of data within it as needed by a GIS/VS procedure.

Using conventional programming practices, implementing a particular application ordinarily entails coding a multitude of routines. Once implemented, however, the system requirements usually prove unstable. Additional routines are needed to extend capabilities; revised coding is needed to produce reports not anticipated when the application was initially defined. Accordingly, a dynamic operational environment imposes a significant continuing demand on programmers to maintain existing programs.

In contrast, the GIS/VS user describes his new or existing files in a procedure that does not involve detailed programming. As a result of processing by a GIS/VS program component, these file descriptions enable the user to address the contents of his files by means of symbolic names. No longer must the user repeat, in every procedure, the size of each field, its unit, relative location and other data management parameters.

When the system user employs GIS/VS techniques to create, maintain and query his files, his procedures will be compiled by another GIS/VS program component after diagnostic testing to ensure their validity. The compiled, executable procedure code may then be applied to the file data or stored for later use and re-used when called from the GIS/VS library by the procedure's symbolic name.

As necessitated by the task being performed, GIS/VS procedures can link to non-GIS/VS routines referenced in the procedure specification. User routines written in other languages, such as PL/I, FORTRAN or COBOL, can access GIS/VS files.

A design provision enables a GIS/VS installation to invoke restrictions on the accessibility of sensitive data. Another provision enables selective recording of the occurrence of processing errors and the alternative actions to be taken.

In short, GIS/VS is a structured-file, information handling system designed for use in cross-industry applications. The system's design provides for a dynamic operational environment.

**HIGHLIGHTS**

GIS/VS has been designed to recognize that different customers will make different use of the many capabilities of GIS/VS and that many will start out using GIS/VS only for simple batch query into existing files. Accordingly, GIS/VS is priced as a basic query system with three optional features -- Advanced Query, Modify and Update/Create:

**Basic Query System** -- Permits the user to formulate simple queries on a batch basis against sequential or indexed sequential data sets. It can be used with OS/VS1 and OS/VS2. Up to sixteen different files may be addressed in a single query, but files may not be hierarchical. The ability to temporarily hold, resequence and list data in a report format is included. Also included are symbolic arithmetic functions. Significant capabilities include:

**Formal Report Capability** -- Provides language extensions to support the generation of report programs within a GIS/VS procedure. This feature enhances the Basic LIST capability by

permitting the specifications of a title page, page headers and trailers, summary lines conditioned on end of data and/or control field breaks and detailed lines, all with the flexibility to control the horizontal and vertical spacing of the printed output.

**Control Statement Capability** -- Provides language extensions to permit scanning of data fields, generation of procedure testable switches, and additional comparison operators for detecting increase or decrease of a field and absent or empty state of a field.

**Utility Capability** -- Provides language to save both external and compiled forms of GIS/VS language, performs corrections on saved language, executes a precompiled procedure or subprocedure and defines the necessary data set formats to support the execution.

**Arithmetic Statement Capability** -- Extends the language by providing four additional arithmetic verbs.

**Processing Statement Capability** -- Extends the language to provide totaling, counting, averaging and count of unique occurrences of data with both automatic and user controlled output.

**Advanced Query Feature**

**Teleprocessing Support Capability** -- Enables procedure (GIS/VS and non-GIS/VS) input from an IMS/VS terminal. Included are a syntax checker and capabilities for job status checking and output direction.

**DL/I Query Support Capability** -- Allows GIS/VS query against DL/I data bases. This feature, when combined with the Modify Feature (see below), allows DL/I files to be modified.

**Modify Feature:** Provides the MODIFY verb and the associated security logic to perform field level file maintenance activities. This feature is required for the DL/I File modify capability. Also included is the previously separate (in GIS/2) Edit/Encode capability. This extends the system processing by providing automatic data entry validation and conversion in file maintenance activities controlled from data description.

**Update/Create Feature:** Extends the language to provide segment addressing verbs, automatic I/O control and implied data format translation for addition and replacement of data in file creation or general file maintenance activities. Also included is the previously separate (in GIS/2) hierarchic file capability. This extends the file definition and processing support to provide for repeating groups of data. As many as fifteen levels of subordination may be specified, and at the most subordinate level, there may be multiple formats of data.

**Note:** Use of DL/I query or modify capabilities or IMS/VS terminal entry facility requires IMS/VS (5740-XX2).

**DB/DC INTEGRATION**

**DL/I QUERY SUPPORT CAPABILITY:** Contained within the Advanced Query Feature, provides the ability to extract information from an installation's DL/I data bases. This capability can be used with or without the GIS/VS Modify Feature. In addition, either the Data Base Package or the combined Data Base/Data Communications Package of IMS/VS (5740-XX2) must be installed. All DL/I data base organizations are supported except Fast Path data bases. The GIS/VS modify feature and the most current version of IMS/VS are prerequisites for DL/I file modification.

DL/I data bases need only be described to GIS/VS once; thereafter, reference to the contents of these data bases is by the symbolic names given in this description. The user need not restate such parameters of the data base as field lengths and units, location within segment, field output patterns, and data management parameters.

The GIS/VS Queries run either as Batch or as Batch Message Processing (BMP) IMS/VS (5740-XX2) application programs. Thus, online as well as offline data bases may be queried with the feature.

The user may query or modify multiple DL/I data bases at the same time, or may concurrently query or modify DL/I data bases and non-DL/I files.

He may also specify exactly the format of his output report, build a library of GIS/VS procedures, expand his arithmetic or logic capability, modify DL/I files, query up to sixteen data bases simultaneously and enter his interrogations from an IMS/VS terminal.

GIS/VS terminal operation under TSO control is also provided. Automatic background file processor job submission and status checking or TSO foreground compilation and execution are allowed as user options through system input parameter commands.

The LIST RECORD and HOLD/KEEP RECORD capabilities may not be employed on a DL/I data base, but the elemental forms of these statements may be used, including LI STing, HOLDing, or KEEPing complete segments. In conjunction with the MODIFY Feature, DL/I file

PROGRAM PRODUCTS

**GIS/VS (cont'd)**

fields or segments may be altered or deleted. Multiple files may be modified in one subprocedure.

The UPDATE/CREATE feature of GIS/VS may not be used to maintain DL/I data bases. The DL/I Query Support Feature can substantially reduce the time, effort and cost required to design, program and debug a batch inquiry into an installation's DL/I data base. This effectively increases the scope of tasks which may be performed. Thus, the implementation of complex, one-time information requirements becomes economically feasible.

**TELEPROCESSING CAPABILITY**

With the Teleprocessing Capability (also known as Terminal Entry Capability) the user may enter both GIS/VS and non-GIS/VS tasks from an IMS/VS terminal. Any GIS/VS procedure may be entered and will be checked to eliminate major syntax errors before GIS/VS passes the job on to a batch or BMP region for compilation and execution. Both the language processing and file processing output may be directed back to the originating terminal or to a remote location. Further, the status of the output may be checked and output quantity may be limited.

With the Teleprocessing Capability, the DB/DC user completes the information system loop.

**HIGHLIGHTS OF GIS/VS R1.1**

GIS/VS Version 1 Release 1 Modification 1 (GIS/VS R1.1), in addition to those capabilities currently provided in GIS/VS R1.0, is designed to provide the following functions:

- Automatic decimal alignment of numeric data, according to the user-defined decimal precision for numeric data fields and variables, during data manipulation and calculation in GIS/VS procedures. Automatic decimal alignment is not provided for user-written Edit, Encode and Decode routines.
- Limited phrase substitution for GIS/VS procedural language statements, which is designed to provide new language translation capabilities that permit users to tailor the GIS/VS procedural language to individual needs.
- Utilization of Virtual Storage, instead of DASD I/O, for five GIS/VS compilation work files.
- An improved installation procedure which is controlled by generation macros that are designed to eliminate excessive coding and punching of JCL.
- Enhancements to the LIST and MLIST statements that permit:
  - User controlled line spacing.
  - Suppression of header/line identification for single header output.
- Enhancements that are designed to improve usability by:
  - Eliminating a redundant parameter on the ENTER command of the GIS/VS R1.1 terminal interface.
  - Permitting the user to expand the size of the GISTASK data base in the GIS/VS R1.1 terminal interface.
  - Providing additional date and time formats for Formal Reports.
  - Providing three installation management exits with the Advanced Query Feature that allows insertion of user routines for accounting and control of GIS/VS tasks in an IMS/VS environment.
- Explicit support of the 3800 Printing Subsystem, via the Job Entry Subsystem of the host Operating System, including user controlled specification of output font. Note: This support is not available under the Operating System running under VM/370.
- Support, through message format services of IMS/VS, of the 3767 Communications Terminal and the 3770 Data Communications System and (in 3270 Data Stream Compatibility Mode) the 3790 Communication System. This support requires IMS/VS, Version 1, Release 1.3, or subsequent releases unless otherwise identified.

**USE**

As its initial input, the program accepts file descriptions reflecting an actual or proposed organization of data. These descriptions become permanent reference tables in storage until replaced as the operational requirements dictate. The system user then writes a series of procedure specifications and enters them with or without transaction data to create and maintain his data files. Similarly, a set of procedure statements is entered to select, manipulate and retrieve data residing in the files.

Fields of data are addressed by their user-assigned names. Entire files also have symbolic names by which they are addressed.

Task information such as data or specifications can be saved in secondary storage and recalled as part or all of a procedural input specification. With the use of the DL/I Query Support Capability, the user must build his DBDs and data bases. Next, he describes his data

bases to GIS/VS as they will be retrieved by DL/I, a process which need not be repeated unless the data base changes. Then he may query his data bases, either in batch mode or from an IMS/VS terminal, using all the query capabilities he has installed. The user need not concern himself with PSBs -- these are produced by the GIS/VS compiler as needed.

Customers planning to use the DL/I Query Support Capability or Teleprocessing Capability must first install IMS/VS (5740-XX2) -- either the Data Base Package or the combined Data Base/Data Communications Package.

**CUSTOMER RESPONSIBILITIES**

All persons installing, operating, or maintaining GIS/VS must have a working knowledge of the installation's Operating System.

With GIS/VS, as with other systems, considerable attention should be given to pre-installation systems design and analysis. The resulting choice of data organization and record design will affect processing speed, as well as each file's value in the overall information system.

As with other systems, the customer is responsible for providing adequate protection against accidental loss or misuse of his data. This includes an adequate review of the system's security provisions by the user.

**Education:** Education of customer personnel is necessary for successful installation. In addition, IMS/VS DC education is required for installations using the Teleprocessing Support Capability.

Customer system programmers responsible for describing existing files to GIS/VS or designing files to be created by GIS/VS require an in-depth knowledge of the file structures, OS/VS and/or DL/I Data Management organizations acceptable to GIS/VS, and the Data Description language employed by GIS/VS.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Under OS/VS1 and OS/VS2, 384K bytes of virtual storage (V=V) are required for the Language Processing (compilation) phase of GIS/VS R1.1. It is recommended, however, that the minimum partition/region size be 512K bytes of virtual storage for a GIS/VS compilation. If limited phrase substitution is used, the compilation may require additional virtual storage, depending on the size of the phrase table selected.

An allotment of dynamic main storage in addition to that specified above is necessary for access methods. Additional dynamic main storage may permit multiprogramming with procedural execution(s) overlapped with one procedural compilation.

In addition to these amounts, an additional allotment of storage (70K message processing region) must be made for the IMS/VS Terminal Entry Message Processing region.

If limited phrase substitution is used during syntax checking, the message processing region may require additional virtual storage, depending on the size of the phrase table selected.

While the above dynamic main storage allocation does include space for all the necessary parameter tables to support multi-file operation, it does not necessarily guarantee successful compilation of a multi-file procedure. In addition to the parameter tables, sufficient memory must be available to hold, concurrently, the key Data Description Table (DDT) information for each file. A reserved area is included in the above for this purpose. The actual space requirement for multi-file compilation is, however, highly dependent on file complexity. The factors to be considered are the number of files involved (including the number of unique field and segment names), the actual number of fields and segments, and the quantity of edit, encode and decode specifications, field redefinitions and field security specifications. For this reason, it is not possible to set a fixed maximum (other than the system limit) on the number of files which can be used in one procedure. A program is provided with the Basic Retrieval System to calculate the memory requirements for key Data Description Table information during compilation for any specific combination of files described to GIS/VS.

Minimum essential I/O devices for GIS/VS system generation, program service and operation include a system input unit, one tape unit and a system output unit. For more efficient operation, two IBM 2314s, or one IBM 3330, or two IBM 3340s, or the equivalent, are recommended. These devices are in addition to the OS/VS secondary storage requirements and do not require dedication to GIS/VS. Total secondary storage requirements depend, of course, on the size and number of user files.

**SOFTWARE REQUIREMENTS**

GIS/VS programs are written in the OS/VS Assembler language and require no further coding by the system user. GIS/VS requires the following components and options of the Operating System.

**GIS/VS (cont'd)**

Operating System, Virtual Storage 1  
or  
Operating System, Virtual Storage 2  
plus  
Input/Output Support for BDAM

**Utilities**

Sort/Merge (360S-SM-023) or Program Product Sort/Merge-OS  
(5734-SM1) or Program Product OS/VS Sort/Merge (5740-SM1)

Linkage Editor

Primary Data Management (BSAM, BPAM, QSAM)

Optional Data Management:

**ISAM** - User files may be defined as ISAM.

**VSAM** - User files may be defined as VSAM. VSAM user files are supported through the ISAM interface or through DL/I (IMS/VS).

**DL/I** - All DL/I (IMS/VS) file organizations are supported except Fast Path data bases.

GIS/VS operates under OS/VS1 or OS/VS2, or under OS/VS1 or OS/VS2 under VM/370. Optionally, GIS/VS can operate under TSO.

The Advanced Query Feature of GIS/VS requires IMS/VS (5740-XX2) and will operate under the most current version and release of IMS/VS, unless stated otherwise in a future revision of this document. The DL/I query support capability of the Advanced Query Feature requires the Data Base Feature of IMS/VS. The terminal interface capability of the Advanced Query Feature requires the Data Communications Feature of IMS/VS. The support for 3767, 3770 and 3790 provided with GIS/VS R1.1, requires IMS/VS, Version 1, Release 1.3, or subsequent releases unless otherwise identified.

Under OS/VS2, the interface for the 3800 Printing Subsystem is supported through the Job Entry Subsystem (JES2 or JES3).



**S/370 PLANNING, CONTROL AND DECISION  
EVALUATION SYSTEM/INTERACTIVE (PLANCODE/I)  
DOS/VS (5746-XX9) - OS/VS (5740-XX8)**

**PURPOSE**

PLANCODE/I is an interactive application program which provides facilities for the building and implementation of business planning models by means of a plan simulation language. The program is intended for the business professional. The user is guided by menu selections, and also has the possibility for 'expert' mode of operation. Functions are included to provide for the production of consolidated plans and to perform 'what if' type sensitivity analysis as well as statistical and financial calculations.

**SPECIAL SALES INFORMATION**

PLANCODE/I can be used in various business management areas such as:

- General Management
  - Strategic and Operating Plans
  - Budgets
- Financial Management
  - Cash Planning
  - Usage of Funds
  - Capital Investment Analysis
  - Loans and Capital Repayment Plan
- Marketing
  - Product Marketing Plan
  - Pricing Analysis
  - Sales Force Incentive Plan
  - Advertising Media Analysis
  - Distribution Channel Analysis
- Administrative Management
  - Personnel (hiring, salary, and assignment)
  - Education Plan
  - Space Evaluation, Building Plan
- Plan Management
  - Capacity Studies
  - Investment in New Equipment
  - Manufacturing Expenses
  - General Production Schedule

The program is intended to meet the needs of individuals who are not trained in the direct use of computers and want a facility that they can use easily in their planning cycle.

**HIGHLIGHTS**

PLANCODE/I provides:

- A double entry data table for calculation purposes. Its maximum dimensions are 1,500 rows and 60 columns.
- An English-like language that permits:
  - Referencing data elements with symbolic names supplied by the user,
  - Automatically repeating calculations on a row or on a set of rows,
  - Calling standard routines that perform calculations such as investment depreciation, production cost, learning curves, present value of capital expenditures, data extrapolation, etc.
- A report language that permits:
  - Specifying standard tabular report formats and charts.
  - Designing complex report layouts in free-format directly on a display terminal.
- A Planning Data Set which allows the user to store planning data.
- A model control feature which enables the user, conversationally, to request the running of a model and the display of the results in a required report. The user may request sensitivity analysis for a given model.
- Analysis facilities which allow analyzing data items in the Planning Data Set or entered directly from the terminal.

**NEW WITH RELEASE 3**

- Color Graphics Capabilities

An interface to the Interactive Chart Utility of GDDM/PGF is provided. This makes it possible to produce the common types of business graphs (line graphs, bar charts, etc.) interactively from PLANCODE/I data.

Charts produced by GDDM/ICU can be printed by the GDDM/ICU print function; see GDDM/ICU for supported printers.

- Monochrome charts can be constructed on 3290 Information Panel through the Interactive Chart Utility interface.

This capability is available for the VM/SP CMS, TSO and CICS/VS environments.

- Full-Screen Data File Editor

A full-screen editor for use with PLANCODE/I data files. The screen is divided into rows and columns of numeric fields, which can be directly updated in place. An entire data file is edited at one time, and scrolling is provided both in column and row directions.

3290 Information Panel with large-screen sizes can also be used with the full-screen data editor.

The full-screen editor uses GDDM as screen manager.

This capability is available for the VM/SP CMS, TSO and CICS/VS environments.

- Support for CICS SCS printers

This support makes it possible to direct PLANCODE/I output under CICS to printers that have SCS capability.

**DESCRIPTION**

PLANCODE/I is a terminal-oriented application program for building, testing and implementation of planning models.

Planning models can operate optionally on data supplied by the user from the terminal or on data stored in the Planning Data Set. Plan results can be stored in the Planning Data Set.

Comprehensive facilities are provided for the analysis of the effect of changes in input values on specified output values using 'what if' type sensitivity analysis.

Facilities are provided to enable the consolidation of results of planning models.

Planning model reports can be displayed in either tabular format or in a flexible free-format.

The PLANCODE/I Planning Data Set can be accessed from the terminal for the entering, display, or modification of data values.

Data analysis facilities are provided for the analysis of data values stored in the Planning Data Set or supplied directly from the terminal. These facilities include linear regression, exponential smoothing, multiple regression, and seasonal adjustment analysis. The results are displayed in either tabular or graphic form.

Syntax checking facilities are provided. The syntax is checked for each user input and any errors are diagnosed for correction by the user. Paging facilities are provided to enable users to control scanning of reports, data, etc.

PLANCODE/I is logically composed of six application areas or modes. These modes are:

- **Model mode**, for building and editing models
- **Report mode**, for designing and editing report layouts
- **Data mode**, for entering or displaying planning data
- **Execution mode**, for running models and displaying the results
- **Analysis mode**, for analyzing data using regressions, exponential smoothing, etc.
- **Procedure mode**, for generation of specific application usage of PLANCODE/I facilities for quicker and efficient operations.

**CUSTOMER RESPONSIBILITIES**

The customer must have installed the necessary IBM processor, appropriate terminals, and other required devices, and CICS/VS, IMS/VS, TSO or VM/SP CMS. To install PLANCODE/I, the customer will need operational personnel who are knowledgeable in CICS/VS or IMS/VS or TSO or VM/SP-CMS. The *PLANCODE/I Operations Guide* should be read and followed during the installation of the program product.

The user should be familiar with the fundamentals of financial and business planning techniques. The preparation of data, development of business planning models, definition of reports and interpretation of computed results are the responsibilities of the user.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

- PLANCODE/I OS/VS executes on IBM S/370, 30XX and 43XX Processors supported by MVS, MVS/XA or VM/SP CMS.
- PLANCODE/I DOS/VS executes on IBM 0, 30XX and 43XX Processors supported by VSE/Advanced Functions.

**PLANCODE/I (cont'd)**

- Direct Access Storage required by PLANCODE/I is 6 million bytes.
- PLANCODE/I OS/V/S and PLANCODE/I DOS/V/S executing under VM/SP CMS execute on IBM S/370, 30XX and 43XX Processors supported by VM/SP CMS.
- PLANCODE/I requires floating-point and decimal instruction sets.
- Virtual storage required by PLANCODE/I, in addition to the host environment is:
  - In TSO, PLANCODE/I requires a 2 megabyte Virtual Region (private space).
  - In IMS/V/S, 1,750K bytes for the first user and 250K bytes for each additional user of PLANCODE/I.
  - In CICS/V/S, 975K bytes for the first user of PLANCODE/I and 225K bytes for each additional user.
  - In VM/SP CMS, 2 megabytes of virtual storage for each user of PLANCODE/I.
- IBM terminals supported by PLANCODE/I under CICS/V/S:
  - 3270 Information Display System:
    - 12 PF keys are required.
    - Selector Light-Pen feature (optional) is supported for Option Selection on menu panels.
    - 3275 mdl 2
    - 3276 mdls 2, 3, and 4
    - 3277 mdl 2
    - 3278 mdls 2, 3 and 4
    - 3279 mdls 2A, 3A, 2B and 3B
    - 3268 Printer mdl 2
    - 3284 Printer mdl 2
    - 3286 Printer mdl 2
    - 3287 Printer mdl 2 and 2C
  - 3290 Information Panel
  - 3178-C20 Display Station
- IBM terminals supported by PLANCODE/I under TSO and VM/SP CMS:
  - 3270 Information Display System:
    - 12 PF keys are required.
    - Selector Light-Pen feature (optional) is supported for Option Selection on menu panels.
    - 3275 mdl 2
    - 3276 mdls 2, 3, and 4
    - 3277 mdl 2
    - 3278 mdls 2, 3 and 4
    - 3279 mdls 2A, 3A, 2B and 3B
  - 3290 Information Panel
  - 3178-C20 Display Station
- IBM terminals supported by PLANCODE/I under IMS/V/S:
  - 3270 Information Display System:
    - 12 PF keys are required.
    - Selector Light-Pen feature (optional) is supported for Option Selection on menu panels.
    - 3275 mdl 2
    - 3276 mdls 2, 3, and 4
    - 3277 mdl 2
    - 3278 mdls 2, 3 and 4
    - 3279 mdls 2A, 3A, 2B and 3B
    - 3268 Printer mdl 2
    - 3284 Printer mdl 2
    - 3286 Printer mdl 2
    - 3287 Printer mdl 2 and 2C
  - 3178-C20 Display Station

**SOFTWARE REQUIREMENTS**

PLANCODE/I OS/V/S (5740-XX8) operates under the control of CICS/V/S (5740-XX1) as a single transaction for each user, or under the control of IMS/V/S (5740-XX2) as a Wait for Input (WFI) transaction servicing all users, or under the control of TSO.

Under MVS/XA, PLANCODE/I OS/V/S operates in 24-bit addressing mode.

- Required releases: MVS/TSO 3.8, IMS/V/S 1.1.6 or 1.2, CICS/V/S 1.5 (CICS/V/S 1.6 for IBM 3290 support).
- The following components are required:
- Virtual Storage Access Method (VSAM)
  - PL/I Resident Library (5734-LM4)
  - PL/I Transient Library (5734-LM5)

- If access to DL/I is required under CICS/V/S, the IMS/V/S DB facility is required.

PLANCODE/I DOS/V/S (5746-XX9) operates under the control of CICS/V/S (5746-XX3) as a single transaction for each user.

- Required releases: DOS/VSE AF R2, CICS/V/S 1.5 (DOS/VSE AF R3 and CICS/V/S 1.6 for IBM 3290 support).
- The following VSE/Advanced Functions (5746-XE8) components are required:
  - VSE/VSAM (5746-AM2)
  - PL/I Resident Library (5736-LM4)
  - PL/I Transient Library (5736-LM5)

PLANCODE/I OS/V/S (5740-XX8) and PLANCODE/I DOS/V/S (5746-XX9) can also execute under VM/SP CMS.

- Required release: VM/SP R1.
- The following components are required:
  - Virtual Storage Access Method, VSAM
  - PL/I Resident Library (5734-LM4)
  - PL/I Transient Library (5734-LM5)

GDDM/PGF (5748-XXH) is required in utilizing the graphic and full-screen data file editor functions.

- Required release: GDDM R2 for full-screen data file editor and graphics, R3 for 3290 Information Panel support.

PLANCODE/I programs are written in the PL/I (as supported by OS and DOS PL/I Optimizing Compiler) language and in Basic Assembler language.

**DOCUMENTATION**  
(available from Mechanicsburg)

- PLANCODE/I General Information Manual (GH19-1103) ...
- PLANCODE/I Program Product Specifications (GH19-6355) ...
- PLANCODE/I Program Reference Manual (SH19-1123) ...
- PLANCODE/I Operations Guide (SH19-6354).

**SYSTEM/370 PLANNING, CONTROL AND DECISION  
EVALUATION SYSTEM/STANDARD  
PLANCODE/S  
DOS/VS (5746-XXA) - OS/VS (5740-XX9)****PURPOSE**

PLANCODE/S is an application program which allows the building of Business Plans and Budgets, defined by the user, and the consolidation of these different Plans and Budgets at divisional or corporate levels. These plans and budgets permit the financial evaluation of the consequences of management decisions. In addition, PLANCODE/S enables the user to build a Budgetary Control application measuring actual results against planned objectives.

PLANCODE/S provides:

- A double entry data table for calculation purposes. Its maximum dimensions are 255 columns or 32,000 rows. The product of the number of columns and the number of rows must be less than 1,200,000.
- An English-like modeling language that permits:
  - referencing data elements with symbolic names supplied by the user, thus the planning process can be formulated in the planner's own language such as:
  - calling standard routines that perform calculations such as investment depreciation, production cost learning curves, present value of capital expenditures data extrapolation, etc.
- A report language that permits:
  - specifying standard report formats and charts.
  - designing user specified report layouts.
  - performing "housekeeping" calculations such as line-totals and ratios between two lines.
- A Planning Data Set which allows the user to store planning data in the form of multi-entry tables.
- A model execution feature for processing planning models, using data either coming from the Planning Data Set or directly from the user.
- A Budgetary Control facility that permits:
  - the definition of the hierarchy of the company responsibility center.
  - the merging of planned data with actual data.
  - the selection of reports to be produced and printed for each responsibility center.
  - the automatic consolidation of Budgetary Control reports.

**HIGHLIGHTS**

In a typical planning application, the planner generates several budgets or plans which differ by the planning calculations and/or the output formats. For example, the budgets of the production and sales departments differ in their planning calculations and output formats.

The budgets of two sales departments, however, may only have different output formats.

The user specifies calculations by building one or more programs, planning models made up of a PROGRAM command, followed by calculation statements using the PLANCODE/S planning language facilities. The user specifies the output format by using REPORT definition statements.

A planning application can be made up of as many programs as the user wishes. Any number of company responsibility centers can use the same program (if suitable) to build their plans. They can also use the same set of report definition statements, but they can define their respective report page headings at plan generation time. The user can build as many applications as needed.

Planning data can be stored in the form of multi-entry tables in the Planning Data Set. Up to four dimensions are allowed. The user is able, for example, to define data as being a set of plan items ordered by product type, department, and division name.

Then the user can read:

Either one plan item (for example, sales) for all products, departments and divisions, or,

Several items for all or a few selected products, all departments and for a specific division.

A double-entry data table, called a calculation matrix, is available for calculations done with up to 16 significant digits. The matrix lines correspond to the items of the plan; the columns usually correspond to the plan periods such as weeks, months, years, but they can also represent categories of the plan items such as lines for expense items and columns for expense distribution by products. Planning data can be entered into this calculation matrix directly from cards or by a command which extracts the data from the planning data set.

PLANCODE/S is designed in a modular approach. The user can initialize a section or mode by including a set of commands in the planning run input stream.

- *Model mode* for entering planning language statements and report generation specifications.
- *Data mode* for entering planning data, listing file contents, and file manipulations.
- *Execution mode* to run the planning models and print reports.

These modes are separate so that each can be used independently, but are integrated by means of the Planning Data Set.

**CUSTOMER RESPONSIBILITIES**

To install and run PLANCODE/S, the customer must define VSAM data sets (Planning Data Set System Files) and link-edit the PLANCODE/S object modules at installation time in order to obtain the executable module.

Customers can also define a message file in their own language if they do not want to use the English messages included in PLANCODE/S.

To run the Budgetary Control Programs, the user has the responsibility of defining the hierarchy of the company responsibility centers, and entering tables in which the rules for assigning actual data items to planned data items are defined.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS****PLANCODE/S DOS/VS (5746-XXA)**

PLANCODE/S DOS/VS runs on S/370 with floating point and decimal instruction sets, one disk storage drive, one printer and one card reader. The minimum real storage allocated to PLANCODE/S DOS/VS is 60K bytes in addition to the operating system requirements.

**PLANCODE/S OS/VS (5740-XX9)**

PLANCODE/S OS/VS runs on System/370 with floating point and decimal instruction sets, one disk storage drive, one printer and one card reader. The minimum real storage allocated to PLANCODE/S OS/VS is 60K bytes, in addition to the operating system requirements.

**SOFTWARE REQUIREMENTS****PLANCODE/S DOS/VS (5746-XXA)**

PLANCODE/S DOS/VS operates in batch mode under the control of the Disk Operating System/Virtual Storage (DOS/VS) Release 34 and under the Disk Operating System/Virtual Storage DOS/VSE) and subsequent releases unless otherwise identified. It also operates in virtual machine mode under control of DOS/VS running under VM/370. It is written in PL/1. The Sequential and Virtual Storage Access Methods are used. The PL/1 Resident Library (5736-LM4) and PL/1 Transient Library (5736-LM5) of the PL/1 Optimizing Compiler (5736-PL1) are required.

**PLANCODE/S OS/VS (5740-XX9)**

PLANCODE/S OS/VS operates in batch mode under the control of the System/370 Operating System/Virtual Storage OS/VS1, Release 3.0 or OS/VS2, Release 1.7 or 2.0 and subsequent releases unless otherwise identified. It operates in virtual machine mode under control of OS/VS1 and OS/VS2 running under VM/370. It is written in PL/1. The Sequential and Virtual Storage Access Methods are used. The PL/1 Resident Library (5734-LM4) and PL/1 Transient Library (5734-LM5) are required.



PROGRAM PRODUCTS

**CUSTOMER INFORMATION FACILITY/VS**  
**5740-XYB (IMS/VS)**  
**5740-XYC (CICS/OS/VS)**  
**5746-XXS (CICS/DOS/VS)**

**PURPOSE**

Customer Information Facility/VS Release 1 Modification Level 0 is a new set of application programs for the management and control of customer related data in a Financial Institution.

This system improves the efficiency of a Financial Institution by providing a central data base that contains all customer descriptive data, thus eliminating the requirement of repeating this data in multiple account files or data bases.

Cross-referencing between the Customer data base and Account data bases and within the Customer data base, provides the ability of determining a Customer's total relationship with the various service areas of the financial institution and with other customers.

The Customer Information Facility/VS operates as an application program under the IBM IMS/VS program product with the Data Communications feature or CICS/VS program product with either the IMS/VS program product data base or the Data Language/I DOS/VS (DL/I DOS/VS) program product. In both Systems, the Customer Information Facility/VS operates online through the IBM 3600 Finance Communication System and the IBM 3270 Information Display System.

Responsibility for security rests with the customer. All security features of IMS/VS and/or CICS/VS and/or DL/I DOS/VS are available to the user. The Customer must select and implement those features which are appropriate to his application and environment. Required additional security measures should be placed in the application programs.

The Customer Information Facility/VS operates in the following OS/VS1 and DOS/VS environments:

OS/VS1	DOS/VS
IMS/VS (5740-XX2)	CICS/DOS/VS
with DC Feature	(5746-XX3)
	and
or	DL/I DOS/VS
	(5746-XX1)
CICS OS/VS (5740-XX1)	
and	
IMS/VS (5740-XX2)	

**HIGHLIGHTS**

- **Central Source Of Information and Control:** The Customer Information Facility/VS is a central source of information about a Financial Institution's customers, including prospective customers. A financial institution officer can retrieve from this single source a display of a customer's total relationship with the financial institution.
- **Online Maintenance and Information Retrieval:** Online access is provided to the Customer Information Facility/VS data bases via IMS/VS or CICS/VS. These programs provide the ability to add, change, delete information in any of the data bases or scan the data bases for selective retrieval. Provisions are also made for storing user data in the form of comments.
- **Flexibility of Use:** The design philosophy of the Customer Information Facility/VS allows the user to integrate all or only selected applications into the Customer Information Facility/VS. Applications are integrated one at a time allowing a gradual migration to a fully integrated system. Modular system design facilitates user modification to the data bases or to the functional capabilities of the programs.
- **Extensive Reporting Capability:** Users can obtain predefined reports on the complete contents of the data base. Another function provides for user specified selective retrieval of information from the Customer Information Facility/VS data bases. Additional custom reports, if desired, can be generated using GIS/VS.
- **Aids to Capture Existing Customer Data:** Programs are provided to convert user supplied data from multiple application files and create the Customer data base and related Account data base(s) used by the Customer Information Facility/VS. For users of IBM Customer Information File FDPs, programs are provided to convert existing Customer and Account data bases to the format required by the Customer Information Facility/VS.
- **Support of the IBM 3600 Finance Communication System and the IBM 3270 Information Display System:** Access to the Customer Information Facility/VS data base from a numeric only terminal can be done if desired by means of the secondary index provided.
- **Use of Standard DB/DC Products:** The use of IBM data base/data communications products provides upward growth capabilities

among the versions of the Customer Information Facility/VS as well as compatibility with other applications developed under these DB/DC products.

- **Virtual Storage design:** The Customer Information Facility/VS is designed to take advantage of modern programming techniques and to improve the performance on virtual storage hardware.
- **Upward Compatibility:** The data base and screen format designs allow for upward migration as users of the system desire to move from the CIF/VS CICS/DOS/VS or the CIF/VS CICS OS/VS products to the CIF/VS IMS/VS product.
- **DASD Support:** The Customer Information Facility/VS can use all devices supported by IMS/VS or DL/I DOS/VS such as IBM 3330, 3340 and 3350.
- **EFTS Orientation:** The Customer Information Facility/VS provides significant enhancements over the current IBM FDPs and is designed to aid financial institutions in implementation of EFTS (Electronic Funds Transfer System).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Customer Information Facility/VS is designed to execute in IBM S/370 mdls 125 and above. The Customer Information Facility/VS requires a minimum virtual storage of 500K under DOS/VS and 600K under OS/VS1 and a minimum real storage of 150K under DOS/VS and 200K under OS/VS1 in addition to that required by the operating system and IMS/VS with the DC feature or CICS/VS and DL/I DOS/VS.

**SOFTWARE REQUIREMENTS**

Release 1 Modification Level 0 of the Customer Information Facility/VS source code will be produced and distributed using COBOL and Assembler language.

- **OS/VS1:** The Customer Information Facility/VS using IMS/VS (5740-XYB) Release 1 Modification Level ) operates as a set of application programs under IMS/VS (5740-XX2) Version 1 Release 1.4 and subsequent releases unless otherwise identified and requires the Data Communications feature of IMS/VS.

The Customer Information Facility/VS using CICS OS/VS (5740-XYC) Release 1 Modification Level 0 operates as a set of application programs under CICS OS/VS (5740-XX1) Version 1 Release 3.0 and IMS/VS (5740-XX2) Version 1 Release 1.4 and subsequent releases unless otherwise identified.

- **DOS/VS:** The Customer Information Facility/VS using CICS/DOS/VS (5746-XXS) Release 1 Modification Level 0 operates as a set of application programs under CICS/DOS/VS (5746-XX3) Version 1 Release 3.0 and DL/I DOS/VS (5746-XX1) Version 1 Release 3.0 and subsequent releases unless otherwise identified.

For operating system requirements, see IMS/VS or CICS/VS and DL/I DOS/VS Programming System Support in the appropriate IMS/VS or CICS/VS and DL/I DOS/VS documentation.

**Functional Compatibility:** Release 1 of the Customer Information Facility/VS includes all the functions of the following FDPs:

- Customer Information File CICS (CIF) (OS) (5798-AMR)
- Customer Information File (CIF) using IMS DB/DC (5798-AWZ)
- Customer Information File (CIF) using DOS/CICS (5798-AHX)

**CONVERSION**

The Customer Information Facility/VS provides the customer with programs to assist in converting his data bases either from the current Customer Information File FDPs or from his present system.

Installing the Customer Information Facility/VS requires the customer to:

- Tailor the source programs to meet user requirements.
- Provide a sort/merge routine and a COBOL Compiler/Library in the host system. The OS/VS Sort/Merge (5740-SM1), DOS/VS Sort/Merge (5746-SM1), OS/VS COBOL Compiler/Library (5740-CB1) and DOS/VS COBOL Compiler/Library (5746-CB1) meet these requirements.
- Set up user tables with desired values.

Customers initially installing the Customer Information Facility/VS will convert their existing system as follows:

- Organize and construct a sequential file containing the data to be used by the EDIT program.



PROGRAM PRODUCTS

**CIF/VS (cont'd)**

- Edit the file using the EDIT program until all data conforms to the new format.
- Load the information in the data bases with the programs supplied.

**PERFORMANCE CONSIDERATIONS**

The performance of the Customer Information Facility/VS Program Product is dependent on the system resources available, paging characteristics, concurrent processing and the particular data being processed.

**DOCUMENTATION**

(available from Mechanicsburg)

Title	Order Number
Licensed Program Design Objectives	GH20-4495
General Information Manual	GH20-2018

**AUTOMATED OPERATOR FACILITY  
RELEASE 1, MODIFICATION LEVEL 0  
5740-XYD**

**PURPOSE**

The Automated Operator Facility (AOF) is a transaction-driven data base/data communication program that runs as an application under IMS/VS Version 1, Release 1, Modification Level 5, with the Automated Operator Interface (AOI) function. AOF improves the operational use of IMS/VS in the data communication environment, and it can also improve the availability of service to IMS/VS application users by re-establishing the system more readily following shutdowns.

**DESCRIPTION**

AOF comprises the following:

- An application program that executes in a dependent BMP (Batch Message Processing) region.
- The AOI user exit program that executes in the IMS/VS control region.
- A DL/I data base.
- A partitioned data set.
- A data base maintenance program that executes as either a BMP program or a batch DL/I program.

The application program includes a main control program and a group of functional processors. The control program performs initialization and reporting functions, acquires input messages and directs them to the appropriate functional processors, and selects output messages. After initialization, it starts processing the message queue. Each transaction is edited to determine which functional processor is to be invoked to handle each transaction, and the program then branches to the processor that is to perform the particular function. The functional processors are: Application Grouping, Fast-Key, Network Status (Save, Update and Restore), and Sub-Network MTO (Master Terminal Operator.) The Application Grouping Functional Processor translates a transaction that addresses a user-defined application group into a set of IMS/VS commands which are then submitted to the AOI to perform the requested action on the entire group. An application group is a set of IMS/VS resources which are grouped according to user specifications (for example, data bases, transactions and terminals that will be devoted to an accounting application). The processor references information in the AOF data base which describes which network resources belong to the application group and then uses that information to generate IMS/VS commands dynamically.

The Fast-Key Functional Processor issues a pre-planned series of IMS/VS commands and certain AOF transactions that are stored as a member of a partitioned data set (PDS). These commands and transactions can be interspersed in the same member of the PDS.

The Network Status Save, Network Status Update and Network Status Restore functional processors, AOI user exit program and the AOF data base constitute a sub-system that assists the MTO in maintaining his IMS/VS environment. In general, these processors track the condition of resources and issue IMS/VS commands to the AOI at restart to restore the system to the same status that existed prior to shutdown.

The Sub-Network MTO Functional Processor allows a remote terminal operator to control a designated subset of an IMS/VS network. This control is similar to that which the MTO exercises over the entire network. The Sub-Network MTO can submit a transaction that includes a command that addresses particular resources under his control, or a transaction that results in the generation of commands that address that part of an application group under his control.

The AOF data base is a DL/I data base that supports the application group control, network status and sub-network MTO functions. Logical relationships are used to facilitate the search for the segments used to perform these functions.

The data base is maintained by the AOF Data Base Maintenance Program which defines, modifies, adds and deletes the stored information.

Data for the Fast-Key control function is stored in a partitioned data set (PDS). This PDS can be IMSVS.PROCLIB or any other PDS the user designates with a logical record length of 80 bytes. The PDS for Fast-Key data is used to provide a possible migration path from the IMS Master Terminal Operator Assist Facility FDP (Program Number 5798-CLK).

**HIGHLIGHTS**

AOF offers the following advantages:

- Permits the user to associate IMS/VS network resources into application groups and issue, with a minimum of keying, IMS/VS commands that address all of the resources within an entire group.
- Reduces the amount of keying required of the MTO by allowing a pre-planned series of IMS/VS commands to be issued when the MTO submits a single transaction to the system. This permits a

pre-defined operator command sequence to be automatically entered into IMS/VS at machine-readable speed.

- Records the status of modifiable attributes for certain network and application related resources and uses that data after restart to generate IMS/VS commands that restore the status to those resources that were modified prior to a shutdown (either planned or unplanned).
- Reduces the workload of an MTO by allowing a remote terminal operator to control a subset of IMS/VS network resources in a manner analogous to that in which the MTO controls an entire network.
- Can improve system availability to application users through faster re-establishment of the IMS/VS DC environment following any shutdown.

AOF can be used with the Multiple Systems Coupling (MSC) feature, but MSC resources are not supported by ACCF for automatic application grouping. AOF can be used with the Fast Path feature, but it cannot execute in an IFP (IMS/VS Fast Path) region. Fast Path data bases, transactions, areas, and routing codes can be operated upon, however, by AOF transactions.

**CUSTOMER RESPONSIBILITIES**

A customer who installs AOF must:

- Have successfully installed IMS/VS 1.1.5 with the Automated Operator Interface (AOI) function.
- Assure that appropriate AOF training be given system programmers and system operators.
- Modify, if desired, the AOI user exit source code to reference the user-defined transaction code for messages to the AOF, and assemble and link-edit the AOI user exit into IMSVS.PGMLIB.
- Execute the IMS/VS Security Maintenance Utility to accommodate the application program, data base, and terminals.
- Build a PDS for Fast-Key procedures or convert existing procedures for the IMS Master Terminal Operator Assist Facility (see the section "Conversion" for specific details).
- Become familiar with operating procedures for controlling a sub-network when remote terminal operators are designated as sub-network MTOs.
- Perform DBDGEN for the data base.
- Perform PSBGEN and ACBGEN for the application program and data base maintenance program.
- Prepare input for the AOF data base.
- Execute the AOF Data Base Maintenance Program to perform an initial load of the AOF data base.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

AOF does not need any hardware in addition to that which is required for the IMS/VS Data Base/Data Communication (DB/DC) System and does not require any terminals other than those which IMS/VS supports for master terminal operation. See the *IMS/VS General Information Manual* (GH20-1260) for a list of processing units and terminals supported by IMS/VS.

The minimum virtual storage requirements for AOS are listed below:

- Data Base Maintenance Program
 

When run as a DL/I program:	320K
When run as a BMP:	60K
- Application Program (BMP): 160K
- AOI User Exit Program (which runs in the control region): 1K

Both the AOF data base and PDS can reside on any direct access storage device supported by IMS/VS for DL/I data bases. The amount of space to be reserved for the data base is a function of the size of the network, the number of application programs, transactions, data bases and user-defined application groups. Space requirements for the PDS must be determined from the number and size of Fast-Key procedures developed for the PDS.

**SOFTWARE REQUIREMENTS**

AOF runs under IMS/VS Version 1, Release 1, Modification Level 5, and subsequent releases and modification levels unless otherwise stated. It requires the IMS/VS Data Base System combined with the Data Communication feature and the Automated Operator Interface (AOI) function which will be available with IMS/VS 1.1.5 as part of the

## PROGRAM PRODUCTS

**AOF (cont'd)**

Data Communication feature. It can be used with both the Multiple System Coupling (MSC) and Fast Path features as described earlier in the "Highlights" section. At the time AOF becomes available, it will operate on the Operating System/Virtual Storage (OS/VS) releases that are supported by IMS/VS 1.1.5.

No supervisor calls (SVCs) are required in addition to those which are used by IMS/VS.

The AOF data base uses HIDAM (Hierarchical Indexed Direct Access Method).

AOF is coded in OS/VS Assembler language, and both object and source code will be distributed for this product.

**CONVERSION**

The Fast-Key component of AOF provides a capability which includes the functions of the IMS Master Terminal Operator Assist Facility FDP (5798-CLK), but the following considerations apply:

- If installed, the procedure for continuing commands across records must be revised since the AOF Fast-Key PDS requires that byte 72 be used or reserved for a continuation character.
- AOF does not allow command data or a period (.) at or beyond byte 72. It assumes that these positions are used for sequencing (and ignores them), but the MTO Assist Facility does not impose this restriction.
- If procedures have been created that allow the use of IMS/VS commands which are not supported by the Automated Operator Interface (AOI), such procedures cannot be converted to yield the same results under AOF.
- AOF reserves a range of procedure names (START001 through START999) for special purposes.

**PERFORMANCE CONSIDERATIONS**

The implementation of this product will have the following performance implications:

- The efficiency of the Master Terminal Operator should be improved since AOF automates many of the functions that are required to keep the system operational and to restore the system after a shutdown. In particular, the following MTO tasks can be performed much more readily with AOF: Restarting IMS/VS, varying offline IMS/VS resources, bringing back online IMS/VS resources that belong to a particular application area and restoring the resources of a network at restart to the status that existed prior to the last shutdown.
- The efficiency of the MTO should be further improved since AOF allows authorized remote terminal operators to exercise control over a sub-network in a manner similar to that which the MTO exercises over the entire IMS/VS network.
- Since the AOF application program executes as a quasi-system program in a dependent region, it will compete for IMS/VS resources along with other user application programs.
- The rate of throughput for user application transactions may be degraded because of the interception of commands and their responses by the AOI user exit program.
- Depending on the function requested, it is possible to construct command streams which could process for an extended period of time.

**DOCUMENTATION**  
(available from Mechanicsburg)

Title	Order Number
General Information Manual	GH20-2022
Licensed Program Design Objectives	GH20-4587

## PROGRAM PRODUCTS

**OS/VS1 INFORMATION DISTRIBUTION  
WORKSTATION SUPPORT  
5740-XYE****DESCRIPTION**

OS/VS1 Information Distribution Workstation Support provides RJE support for the IBM 6670 Information Distributor (SDLC Version only). The IBM 6670 users can submit jobs and data to an OS/VS1 host for processing, and receive at the IBM 6670 job output, documents, letters and variable data generated at the OS/VS1 host. This output at the IBM 6670 can be processed or merged with constant data such as the body of a letter or report, and printed on cut sheet paper or recorded on magnetic cards.

**HIGHLIGHTS**

- Provides support for remote session initialization and data transmission to and from the IBM 6670 using the SNA protocol.
- Provides the RTAM support for SNA input data records other than default length.
- Provides the ability for JES SNA remote readers to utilize an expanded record length (up to 128 bytes).
- Provides the RTAM support for user specifiable SNA output destination selection.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Information Distribution Workstation Support program product operates on all IBM processors capable of supporting OS/VS1 RES with VTAM.

The OS/VS1 RTAM module size will increase by 4K bytes when using the Information Distribution Workstation Support program product.

**SOFTWARE REQUIREMENTS**

The Information Distribution Workstation Support program product operates with OS/VS1 Release 6.7 or any subsequent release unless otherwise stated, as well as the current or later releases of the following prerequisite programs:

ACF/VTAM Version 1	5735-RC2
ACF/VTAM Version 2	5662-280
SCP for ACF/VTAM	5741-VS1
ACF/NCP/VS	5735-XX1
SSP for ACF/NCP/VS	5735-XX3

In addition, OS/VS1 RES/RTAM (5741-SC1BB) must be installed.

**DOCUMENTATION: (available from Mechanicsburg)**

Title	Number
OS/VS1 Information Distribution Workstation Support General Information	GC24-5193-0



## PROGRAM PRODUCTS

**SCREEN DEFINITION FACILITY**  
**CUSTOMER INFORMATION CONTROL SYSTEM**  
**RELEASE 3 MOD. LEVEL 0**  
**OS/VS (5740-XYF) - DOS/VSE (5746-XXT)**

**PURPOSE**

Screen Definition Facility/Customer Information Control System (SDF/CICS) is an online application development tool for the CICS/VS application programmer who wants to define or edit maps and map sets for the CICS/VS Basic Mapping Support (BMS). The online operation and the ease-of-use oriented functions of the program enhance productivity in map and map set development and maintenance.

**DESCRIPTION**

The online functions of Screen Definition Facility/CICS run as a CICS/VS application program in all system environments supported by CICS/VS Version 1 Release 5.0 (except OS/VS2 SVS) and CICS/VS Version 1 Release 4.1 on VSE/Advanced Functions Release 2.0. Release 3.0 of SDF/CICS supports all functions of Release 2.0. In addition, it offers usability enhancements, such as arrays of structures for maps and full screen field naming, new functions for user status control and object security, and a demo session facility.

**NEW FUNCTIONS in RELEASE 3.0:**

SDF/CICS Release 3.0 supports all functions as supported in Release 2.0 and includes the following new functions or enhancements:

- **Map Editor Usability Enhancements:**  
 Arrays of structures for both input and output maps. With the full screen field naming function of the map editor, the names for fields can be defined by a full screen editor approach. New maps can be created starting from skeleton maps. A skeleton map is provided for the use of ELIAS-I developed application programs. Application structures created with the map editor can be reviewed and partially modified with the application structure review function.  
 When editing a map, the user can select a format which shows column numbers for the map.  
 The new support of multiple field marks will help to distinguish in field definition between different types of fields with different sets of field attributes.
- **SDF/CICS User Environment**  
 A hierarchy of users: System user, master user and normal user. The system user defines user environments for new users of an installation and establishes their authorization to use SDF/CICS. He can also access password protected objects by overriding the password, and use the normal functions of SDF/CICS. The master user can control start-up and shut-down of an SDF/CICS installation, investigate the list of active users and also use the normal functions. A normal SDF/CICS user only has access to the normal functions, which can be further restricted in his individual user environment object as defined by the system user.
- **Multiple Map Specification Libraries**  
 During a session, a user can have access to up to three libraries: The system library, one private library with read-only access and one private library with read/write access. These libraries are defined for each individual user by the user profile. This profile is defined by the SDF/CICS system user and can be modified by the individual user, if he is so authorized, by means of the profile editor.
- **Demo Session Support**  
 The demo session facility can be used to define and display a sequence of screens, either full screen maps or pages. When defining the demo session, the user can define a sequence of screens for the demo session and which program function key is to select the successor screen.  
 SDF/CICS Release 3.0 also includes predefined demo sessions which explain for the new SDF/CICS user how to use the map editor to define a new map and to convert an existing map for use on color display terminals.
- **Minor Usability Enhancements**  
 The SDF/CICS user can now sign on a session with a fast command format transaction with parameters. Release 3.0 contains a specific News tutorial topic which explains all functions new to this release. This topic is accessible by the NEWS command.

**FUNCTIONS AVAILABLE in RELEASE 2.0:**

- Online definition and editing of maps and map sets.
- Support of device independence for maps and map sets.
- Library directory support.
- CICS/VS-BMS map generation.
- Page simulation.
- Session profiles of defaults.
- Online help and tutorial.

- Batch utilities.
- Conversion of CICS/VS-BMS defined maps and map sets.
- Conversion of Data Dictionary Segment Definitions to SDF/CICS maps.

**Advantages**

- **Online Development Productivity**  
 Online application development offers higher programmer productivity than batch development. Bringing CICS/VS map definition online improves the overall productivity for CICS/VS application development. Providing arrays of structures both for input and output maps reduces the effort required to design and code application programs.
- **Early Test of Maps and Pages**  
 By means of the test functions of the map and page editor, the end user can immediately review the application aspects of maps and pages. Data can be entered and all fields are displayed under control of their associated attributes, such as color, highlighting or programmed symbol set.
- **Online Demo Capability**  
 With the online demo capability the end user can inspect the screens of a session as he defines them. Early demonstration for complete applications can also be generated with this function.
- **Ease-of-Use in Operation and Maintenance**  
 The functions of SDF/CICS online operations are ease-of-use oriented. Sets of defaults that can be customized as session profiles for an installation or for specific users, assignment of functions to program function keys, library maintenance by means of directory lists, recovery from a range of system failures for objects in the library or in process during a session and a trace facility for online operation contribute to this goal.
- **Management of Map and Map Set Inventory in Installation**  
 All maps and map sets defined in SDF/CICS are maintained in one library. The directory list of the library gives a complete overview of the inventory of maps and map sets in the installation as well as of their individual status.
- **Multiple-Device Support**  
 By defining multiple-device maps and map sets, old applications can be adapted to support new devices without needing to modify or recompile the application program.
- **Online Education**  
 The online tutorial with text and sample obviates the need for separate classroom education and reduces the need for the use of a hard copy reference manual.
- **Smooth Migration from BMS Macro-Defined Maps and Map Sets to SDF/CICS.**

**CUSTOMER RESPONSIBILITIES**

In order to install and use SDF/CICS successfully the customer must have installed the minimum machine configuration and the appropriate operating system required by CICS/VS and SDF/CICS and the devices as required for the SDF/CICS definition, testing and demo functions.

The distribution tape contains job and VSAM control statements which can be used by DOS/VSE, OS/VS1 and OS/VS2 (except SVS) customers to create a VSAM Master Catalog before installing SDF/CICS in the case that VSAM has not been used before.

The customer must update certain CICS/VS control tables in order to run SDF/CICS as a CICS/VS application. Card images of the macro statements to be inserted in the appropriate macro decks are contained on the distribution tape.

Finally the customer can tailor his SDF/CICS system to the needs of his installation by modifying and/or coding SDF/CICS system generation macros and/or modifying the distributed job stream.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

SDF/CICS is designed to operate on the following IBM machines:

All IBM System/370, 303X and 3081 processing units and IBM 4300 processors capable of supporting CICS/VS Version 1, Release 5.0 with OS/VS and DOS/VSE, and CICS/VS Version 1 Release 4.1 with VSE/Advanced Functions Release 2.0.

The online part of SDF/CICS works as a CICS/VS transaction, thus requiring the same specified operating environment as announced for the respective CICS/VS version and releases.

The batch part of SDF/CICS occupies a single partition in DOS/VSE and OS/VS1, or a single address space in OS/VS2 (MVS). It does not generate additional requirements on the system configuration.

PROGRAM PRODUCTS

**SDF/CICS (cont'd)**

The minimum estimated virtual partition/region size for batch SDF/CICS is 256K bytes.

The configuration must provide sufficient direct access space to contain the VSAM files used both by online and batch SDF/CICS functions. For DOS/VSE, the VSE/VSAM licensed program must be installed. The VSAM functions used by SDF/CICS in OS/VS1 and OS/VS2 are basic and thus contained in the operating system.

The terminals supported by SDF/CICS as target devices are the same as those supported for the definition of maps by the Basic Mapping

The IBM SDF/CICS terminals, that is, those devices on which the SDF/CICS user enters or receives information, are:

3275 Control Unit	Mdl 2	BSC - remote
Display Station	Mdl 12	SDLC - remote
3276 Control Unit	Mdls 1,2,3,4	BSC - remote
Display Station	Mdls 11,12,13,14	SDLC - remote
3277 Display Station	Mdl 2	local and remote
3278 Display Station	Mdls 1,2,3,4,5	local and remote
3279 Display Station	Mdls 2A,2B,3A,3B	local and remote
8775 Display Station	Mdls 1,2	local and remote
	Mdls 11,12	SDLC - remote

For the restrictions on devices supported in a specific release of CICS/VS, the corresponding manuals for the release must be consulted. Some of the above listed devices may not be announced in your country. (IBM 3278 Display Station Mdl 52 is not announced in E/ME/A or DPD). This reference must not be construed to mean that IBM intends to announce these devices in your country.

Note that display devices with a width of 80 characters and a depth of 12 lines are no longer supported by SDF/CICS Release 3.0.

**SOFTWARE REQUIREMENTS**

SDF/CICS runs as a CICS/VS application program on all IBM S/370, 303X and 3081 processing units and IBM 4300 processors capable of supporting CICS/VS Version 1 Release 5.0 in the OS/VS1 and OS/VS2 (except SVS) environments and CICS/VS Version 4.1 and 5.0 in DOS/VSE, from VSE/Advanced Functions Release 2.0 on. CICS/VS is available as 5740-XX1 for OS/VS and 5746-XX3 for DOS/VSE.

If an SDF/CICS screen with extended attributes, such as extended color, extended highlighting or field validation, is to be used in the field initialization of the map editor or in the test functions, SDF/CICS must be used with CICS/VS Version 1 Release 5.0. For defining these attributes, all CICS/VS releases supported by SDF/CICS Release 2.0 can be used.

If the SDF/CICS user specifies a programmed symbol set attribute, it is his responsibility to ascertain that the specified symbol set is loaded to the device.

Whenever SDF/CICS is used with a display device in base color mode, the fields on SDF/CICS screens are displayed in base colors according to the attributes associated with the screens.

SDF/CICS supports application programming in S/370 Assembler language, PL/I, COBOL and RPG II. For each language required, the appropriate compiler and library must be installed if application programs are compiled or assembled on the system.

SDF/CICS uses the Virtual Storage Access Method (VSAM). For DOS/VSE, the VSE/VSAM licensed program must be installed. For OS/VS, the VSAM functions used by SDF/CICS are contained in the operating system.

SDF/CICS requires for its installation and operation the following support programs:

- Assembler
- System utilities:
  - DOS/VSE: MAINT, Linkage Editor
  - OS/VS: IEBUPDTE, Linkage Editor
- VSAM:
  - DOS/VSE: VSE/VSAM licensed program 5746-AM2
  - OS/VS: VSAM Access Method Services
- SMP (System Modification Program) Release 4 in OS/VS
- MSHP (Maintain System History Program) in DOS/VSE
- PTFHIST in DOS/VS Release 34

SDF/CICS provides job streams to transfer symbolic description maps to:

- VSE/Interactive Computing and Control Facility (VSE/ICCF, Program Number 5746-TS1).

The user can establish equivalent functions for the field-developed program:

- CICS/VS Source Program Maintenance (SPM II, Program Number 5798-CFT).

SDF/CICS can convert data dictionary segments, containing logically related data fields, from the following licensed programs into SDF/CICS maps:

- OS/VS: 5740-XXF, from Release 3.0 on.
- DOS/VS: 5746-XXC, from Release 3.0 on.

SDF/CICS provides a skeleton map for the use of the ELIAS-I program products:

- ELIAS-I: 5746-XXV
- ELIAS-I/VM: 5748-XXK

SDF/CICS defined maps can be exported to DPPX/Distributed Presentation Services of the IBM 8100 Information System.

- DPPX/DPS: 5760-XR1

The distributed Basic Material consists of pregenerated object modules, CICS/VS table entries and job streams to create the VSAM clusters necessary to run SDF/CICS.

**Education:** The online tutorial serves as computer-based education material. In particular, the online tutorial contains sample screens for the map editor, and two online demo sessions are included with the product to demonstrate a simple map definition session and a conversion of an old map to extended color field attributes.

**COMPATIBILITY**

The physical maps generated by SDF/CICS are fully compatible with equivalent maps generated by the map and map set definition macros of the CICS/VS Basic Mapping Support from the CICS/VS environments supported by SDF/CICS Release 3.0. The symbolic description maps generated by SDF/CICS are a compatible superset of maps that can be generated by the CICS/VS Basic Mapping Support, in particular, longer field names and arrays of structures can be defined and corresponding symbolic descriptions of maps can be generated.

**CONVERSION**

CICS/VS maps and map sets in their BMS macro source format can be converted by a batch utility of the program into SDF/CICS card formats which can then be loaded into the library.

**DOCUMENTATION** (available from Mechanicsburg)

*Screen Definition Facility/Customer Information Control System Licensed Program Design Objectives* (GH19-6091) ... *Screen Definition Facility/Customer Information Control System Licensed Program Specifications* (GH19-6075) ... *Screen Definition Facility/Customer Information Control System General Information* (GH19-6087). ... *Screen Definition Facility/Customer Information Control System Program Reference* (SH19-6077) ... *Screen Definition Facility/Customer Information Control System Operations Guide for OS/VS* (SH19-6093) ... *Screen Definition Facility/Customer Information Control System Operations Guide for DOS/VSE* (SH19-6094) ... *Screen Definition Facility/Customer Information Control System Messages and Codes*: (SH19-6085) ... *Screen Definition Facility/Customer Information Control System Reference Summary* (SX11-6015) ... *Screen Definition Facility/Customer Information Control System Program Logic* (LY19-6060) ... *Screen Definition Facility/Customer Information Control System Release 3.0 Mirofiche* programs for OS/VS (LJD3-6001) and DOS/VSE (LJD3-6002).

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPOs ACCEPTED:** No

## PROGRAM PRODUCTS

**MASS STORAGE SYSTEMS EXTENSIONS (MSSE)  
RELEASE 1 (5740-XYG)****DESCRIPTION**

The Mass Storage System Extensions licensed program introduces additional space management, data management, and problem determination capabilities for users of the 3850 Mass Storage System.

This licensed program can be used with OS/VS2 Release 3.8 (MVS) or OS/VS1 Release 6.7 (VS1).

**HIGHLIGHTS****Space Management Facilities**

- System-initiated scratching of virtual volumes of expired data sets, uncatalogued data sets, or Generation Data Group (GDG) data sets.
- Listing of VSAM data space information (LISTDSET).
- Specifying 'date-last-used' as a selection criterion for listing or scratching data sets (LISTDSET/SCRDSET) (MVS Only).
- Specifying combinations of selection criteria in an LISTDSET/SCRDSET command.

**Data Management Facilities**

- Capability to copy mounted virtual volume (COPYV).
- Capability to copy only the allocated cylinders on a virtual volume (COPYV).
- Support for large sequential data sets.
- Staging data on a page-fault basis as an additional processing option.
- Staging VSAM data sets on a key or keyrange basis (MVS only).

**Problem Determination Facility**

- Centralized journaling of Mass Storage System messages.

**CUSTOMER RESPONSIBILITIES**

A customer installing the Mass Storage Extensions licensed program or the MVS/XA Facility must:

- Have installed at least the minimum machine configuration.
- Have the 3850 Mass Storage System installed.
- Assure that appropriate OS/VS1 or OS/VS2 (MVS) and S/370 training be given to systems programming, operations and space management personnel.
- Apply necessary programming changes to OS/VS1 and OS/VS2 (MVS) associated with the installation of the Mass Storage System Extensions licensed program.
- Specify, during the SYSGEN for OS/VS1, the option to include a WTO/WTOR user exit routine to support Centralized Journaling.
- Choose the necessary user options specified.
- Have installed the proper MSS microcode level.
- The Mass Storage Extensions licensed program must be installed prior to installing the MVS/XA Facility.
- Install MVS/SP Version 2, to place the 3081 in XA mode before using the MVS/XA Facility.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Mass Storage System Extensions licensed program can be utilized on all processing units to which the IBM 3850 Mass Storage System is attached. The Mass Storage System can be attached to IBM S/370 models 145, 148, 155II, 158, 165II and 168, and the IBM 3031, 3032, 3033, or 3081 Processors.

The MVS/XA Facility (Release 1.1 of MSSE) is required to attach the IBM 3850 Mass Storage System to IBM 3081 processors operating in XA mode with MVS/XA.

An installation can attach the 3850 Mass Storage System to from one to four systems which may be a combination of S/370 processors and XA Mode processors. The S/370 processors may operate with or without MSSE but cannot have the MVS/XA Facility installed. The attached XA processors must operate with the MSSE program product and the MVS/XA Facility.

The MVS/XA Facility is designed to operate with the IBM XA Mode processors exclusively.

The Mass Storage System Extensions licensed program, with or without the MVS/XA Facility, supports all the models of the IBM 3850 Mass Storage System. The appropriate level of MSS microcode must be installed to support the Mass Storage System Extensions licensed program.

**SOFTWARE REQUIREMENTS**

The Mass Storage System Extensions licensed program, with or without the MVS/XA Facility, operates with OS/VS1 Release 6.7 or OS/VS2 MVS Release 3.8 and subsequent releases unless otherwise specified.

The Mass Storage System Extensions licensed program with the MVS/XA Facility supports and requires the MVS/System Product Version 2, allowing the connection of the 3850 Mass Storage System to IBM processors executing in XA Mode only.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual (GH35-0034).*



PROGRAM PRODUCTS

**MASS STORAGE SYSTEMS EXTENSIONS (MSSE)  
MVS/XA FACILITY RELEASE 1.1  
5740-XYG**

**PURPOSE**

The MSSE MVS/XA Facility of the 3850 Mass Storage System Extensions program product (5740-XYG) supports the IBM processors operating in the XA mode. This enables the user to upgrade from the IBM S/370 processors to the IBM processors operating in the XA mode.

The MSSE MVS/XA Facility supports all models of the IBM 3850 Mass Storage System. The MSSE program product must be installed prior to installing the MSSE MVS/XA Facility.

**HIGHLIGHTS**

- Supports the XA Mode of IBM processors.
- Ease of migration from IBM S/370 processors to XA mode processors.
- The 3850 Mass Storage System can be attached and shared by a combination of MVS/XA and S/370 processors.
- No reprogramming required.
- No data set conversion.
- User JCL remains the same.

**CUSTOMER RESPONSIBILITIES**

- Develop an MSSE MVS/XA installation plan.
- Must have the base MSSE program product installed.

**SPECIFIED OPERATING ENVIRONMENT**

An installation can attach the 3850 Mass Storage System to up to four systems which may be a combination of S/370 processors and XA mode processors. The S/370 processors may operate with or without MSSE, but cannot have the MSSE MVS/XA Facility installed. The attached XA processors must operate with the MSSE program product and the MSSE MVS/XA Facility.

**HARDWARE REQUIREMENTS**

The MSSE MVS/XA Facility is designed to operate with the IBM XA mode processors exclusively.

The Mass Storage Systems Extensions program product (5740-XYG) must be installed prior to installing the MSSE MVS/XA Facility.

This support applies to all models of the 3850 MSS in single and loosely-coupled (channel-to-channel attachment) UP and MP configurations.

**SOFTWARE REQUIREMENTS**

The MSSE MVS/XA Facility supports the MVS System Product Version 2, allowing the connection of the IBM 3850 Mass Storage System to IBM processors executing in XA mode.

**Storage Requirements:** Virtual storage requirements for the MSSE MVS/XA Facility remain unchanged from the MSSE program product.

**DATA SECURITY and AUDITABILITY**

The MSSE MVS/XA Facility complies with and conforms to the data security and auditability controls of an MVS environment. Customer management is responsible for the selection, application and adequacy of these controls.

RPQs ACCEPTED: No

MVS SYSTEM INTEGRITY APPLIES: Yes

**DOCUMENTATION**  
(available from Mechanicsburg)

*OS/VS Mass Storage Systems Extensions General Information (GH35-0034) ... OS/VS Mass Storage System (MSS) Installation Planning and Table Create (GC35-0028) ... OS/VS Mass Storage System Extensions Messages (SH35-0041) ... OS/VS2 MVS Mass Storage System Extensions Logic: MSS Communicator (MSSC) (GH35-0043) ... IBM Licensed Program Specifications (GH35-0043) ... OS/VS Mass Storage System Extensions Operations (SH35-0040) ... OS/VS Message Library: VS2 System Messages (GC38-1002) ... OS/VS Message Library: VS2 Routing and Description Codes (GC38-1102).*

**DISTRIBUTED OFFICE SUPPORT SYSTEM/370  
RELEASE 1 - MOD. LEVEL 0 (5740-XY9)  
DISTRIBUTED OFFICE SUPPORT SYSTEM/3730  
RELEASE 1 - MOD. LEVEL 0 (5740-XYK)****DESCRIPTION**

The IBM Distributed Office Support System consists of licensed programs that provide document handling extensions to the IBM 3730 Distributed Office Communication System (abbreviated to IBM 3730 System in this document). It operates in an OS/VS environment under the IBM Information Management System/Virtual Storage (IMS/VS) or the IBM Customer Information Control System/Virtual Storage (CICS/VS) and offers both interactive and batch communication between IBM 3730 systems and an IBM host system such as the IBM S/370, the IBM 3031, 3032 or 3033 processors or the IBM 4300 processors. Significant capabilities of the Distributed Office Support System include:

- Host document filing with indexing.
- Filed document search and retrieval.
- Filed document access protection.
- Message switching between users of the same or different IBM 3730 systems.
- Submission of batch jobs to the host system from a 3732 terminal.

These functions are achieved by means of programs in the host and in each attached IBM 3730 System.

The user can file documents created at, and stored in, the IBM 3730 System in a document library maintained by the host system. While filing a document, the user can specify filing information that indexes the document and can be used for later retrieval of the document. This filing information consists of search arguments, such as the author, recipients and keywords describing the contents of the document. In addition, access codes can be added to help protect the document against unauthorized access.

To retrieve a filed document, users first identify it by a search request, either by the name of the document or by search arguments specified when the document was filed. Once a document has been identified, it can be restored in the IBM 3730 System, displayed on the screen of the IBM 3732, printed at the host or the IBM 3730 System or deleted.

In the Distributed Office Support System, end users are persons who use the IBM 3732 Text Display Station in a similar way to ordinary office equipment. They may be secretaries, typists, office clerks, editorial assistants, managers or others who need not have knowledge of data processing.

The message switching capability allows the user to send messages to other users in the system, for example, to inform them that a document has been filed and is available for retrieval.

The job submission capability allows the user to send predefined OS/VS jobs to the host system for batch execution. This capability may also be used to submit a document from the IBM 3730 System to the host along with the job. A user written program may place this document into a data set for subsequent host application processing. Additionally, with some user written conversion, the document may be imported into the Document Library Facility, program number 5748-XXE and then processed by the Document Composition Facility, program number 5648-XX9. This approach can be used to provide advanced composition functions such as multiple columns, footnote placement, automatic hyphenation and spelling verification of the document.

Filing and retrieval of documents can be performed interactively or in deferred mode. Deferred processing is particularly applicable for large documents because the operation is executed in parallel to other tasks performed at the terminal.

The Distributed Office Support System provides convenient techniques to ease the installation of the system and the maintenance of its data sets.

In a multiple-user document processing system, data security is of vital interest to its users. The Distributed Office Support System provides data security based on the interaction of the following:

- Access codes.
- Document ownership.
- Level of document privacy.

Access codes are assigned to end users centrally at the host and to documents during filing. An end user who needs to gain access to a filed document must be assigned one access code that matches one access code of the document to be retrieved. The profiles of eligible users can only be changed under central control.

The owner of a document is defined as the end user who issued the initial request to file this document in the host document library. The deletion of a document, for example, can only be initiated by the document owner.

The Distributed Office Support System distinguishes two types of documents: Private documents and public documents. Private documents are accessible to their owners alone and are, therefore, not assigned any access codes. Public documents, which are recognized by the presence of access codes, can be retrieved by all authorized end users.

In the Distributed Office Support System, passwords can be assigned to end users to control access to the central file.

These facilities for controlling access to protected resources are effective only within the context of the IBM Distributed Office Support System itself. The Resource Access Control Facility (RACF) program product, Program Number 5740-XXH, can be used to provide an integral foundation for security in IMS/VS under MVS, complementing the Distributed Office Support System's facilities by controlling access to system resources.

Access control within OS/VS1 outside the scope of the IBM Distributed Office Support System is not provided.

The following optional features are available with the Distributed Office Support System:

- **Host Print Facility:** By means of this feature, documents filed in the host library may be printed on a host-attached printer upon request from the IBM 3732 Test Display Station.
- **Direct Document Viewing Facility:** This feature allows end users to have documents in the host library displayed on their terminal screens without the need to copy the documents from the host document library to the associated IBM 3730 System permanent store. This speeds up the process of displaying documents.
- **STAIRS Input Formatter:** Using this feature, documents created at the IBM 3732 may be prepared for batch input to a STAIRS data base.

For the last feature, further processing may be required for a complete conversion.

**HIGHLIGHTS**

- Filing of IBM 3730 documents in host document library.
- Searching of documents in host document library, either by document name or by specification of search arguments.
- System-controlled indexing of external (hard-copy) documents.
- Retrieval of filed documents from host document library.
- Message switching between users.
- Submission of batch jobs to the host system from a 3732 terminal.
- Document access protection.
- Support of the IBM 3730 System Archive/Retrieval/Delete commands.
- Optional features for use with the IBM S/370 Storage and Information Retrieval System/Virtual Storage (STAIRS/VS), Program Number 5740-XR1.
- Optional features for printing of documents on host-attached printers and for direct viewing of documents from the host document library

**CUSTOMER RESPONSIBILITIES**

Customers generate the Distributed Office Support System by means of a set of specification statements. These statements provide options that may be selected to tailor the system to each company's individual needs.

**SPECIFIED OPERATING ENVIRONMENT****DISTRIBUTED OFFICE SUPPORT SYSTEM/370 (5740-XY9):****HARDWARE REQUIREMENTS**

The minimum machine requirements to execute the Distributed Office Support S/370 are:

- One IBM S/370 mdl 138 or larger, or one IBM 3031 or larger, or one IBM 4331 or larger with a main and external storage capacity and peripheral equipment as required for, and supported by, IMS/VS or CICS/VS.

**SOFTWARE REQUIREMENTS**

The Distributed Office Support S/370 is written in the IBM S/370 Assembler language. It is designed to operate in the following environment on the host system and on the IBM 3704 or 3705 Communications Controller:

**Dist. Office Support Sys. (cont'd)**

**Host System:** OS/VS1 Release 6.0 (Release 7.0 for the IBM 4300 Processors) or OS/VS2 MVS Release 3.8, or subsequent releases of these unless otherwise specified, together with the Virtual Storage Access Method (VSAM) and one of the following licensed programs:

- IBM S/370 Information Management System/Virtual Storage (IMS/VS) Version 1, Program Number 5740-XX2, Release 1.5, including the Data Communication (DC) feature, together with its required associated programs, or a subsequent release unless otherwise specified. In IMS/VS, data management is performed by Data Language/I (DL/I). Communication with the IBM 3730 System is via SLU type P. To identify the appropriate required and optional licensed programs for IMS/VS, refer to the IMS/VS Version 1 Release 1.5 announcement material.
- IBM S/370 Customer Information Control System/Virtual Storage (CICS/VS) Version 1, Program Number 5740-XX1, Release 4, together with its required associated programs, or a subsequent release unless otherwise specified. In CICS/VS, data management is performed by the Virtual Storage Access Method (VSAM). Communication with the IBM 3730 System uses the Full-Function Logical Unit. To identify the appropriate required and optional licensed programs for CICS/VS, refer to the CICS/VS Version 1 Release 4 announcement material.

In addition, the following programming support must be available:

- Either the Virtual Telecommunications Access Method (VTAM) Level 2, or the Advanced Communications Function for VTAM (ACF/VTAM), Program Number 5735-RC2, or the Advanced Communications Function for TCAM (ACF/TCAM) Version 2, Program Number 5735-RC3, Release 2, as required by IMS/VS or CICS/VS, respectively.
- An IBM OS/VS Sort/Merge program product.

**IBM 3704 or IBM 3705**

One of the following, as required by the network:

- 3704/3705 Network Control Program/Virtual Storage (NCP/VS), Program Number 5744-BA2, Release 5.0
- Advanced Communication Function for NCP/VS (ACF/NCP/VS), Program Number 5735-XX1

**DISTRIBUTED OFFICE SUPPORT SYSTEM/3730 (5740-XYK):****HARDWARE REQUIREMENTS**

The minimum machine requirements to execute the Distributed Office Support S/3730 are:

- One IBM 3730 Distributed Office Communication System with Configuration Support (#9171) and Feature Codes (#9275) and (#9285) and with at least one IBM 3732 Text Display Station with keyboard and at least one print device, which can be either an IBM 3736 Printer or the IBM 3791 Line Print Feature. The host attachment is via either the IBM 3791 Local Channel Attachment Feature (#1515) to a byte or block multiplexer channel or the IBM 3791 SDLC Communications Feature (#6301, 6302, or 6303) to an IBM 3704 or 3705 Communications Controller.

**SOFTWARE REQUIREMENTS**

The Distributed Office Support S/3730 is written in IBM 3790 and IBM 3730 programming statements.

The following programming support must be available:

- Program Validation Services (PVS), as modified for the IBM 3730, and Subsystem Support Services (SSS).

**DOCUMENTATION:** (available from Mechanicsburg)

Licensed Program Design Objectives	GH12-5043
General Information Manual	GH12-5124

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where the installation of the Distributed Office Support System causes an exposure to the system integrity of MVS. However, this program is not intended to run in an authorized state at any time and should therefore represent no threat to the system integrity of MVS.

## PROGRAM PRODUCTS

**ADVANCED TEXT MANAGEMENT SYSTEM - III  
ATMS-III FORMATTER FEATURE  
RELEASE 1  
ATMS-III/OS/V5 (5740-XYL)  
ATMS-III/DOS/V5 (5746-XXU)****PURPOSE**

The Advanced Text Management System-III (ATMS-III) is a conversational text processing system designed to enable a terminal user to enter, edit, store, format, proofread and display textual material in an efficient manner.

ATMS-III is based on, and is an extension to, previous versions of the ATMS and ATMS-II program products. ATMS-III runs under control of CICS/VS (5740-XX1 for CICS/OS/VS and 5746-XX3 for CICS/DOS/VS) Version 1 Release 4.0, and subsequent releases, unless otherwise identified. Because ATMS-III executes as a CICS/VS application program, it is capable of being multi-tasked along with other CICS/VS applications.

ATMS-III offers direct interfacing with the SCRIPT/VS Formatter of the Document Composition Facility (5748-XX9) or a separate ATMS-III Formatter Feature, and asynchronous DASD peripheral processing which may be used for archiving in conjunction with the Document Library Facility (5748-XXE).

**DESCRIPTION****APPLICATIONS OF ATMS-III**

Following are some areas for which ATMS-III would prove applicable:

- Preparation of catalogs, manuals, directories, proposals, form letters, engineering changes, price lists and personnel record preparation for manufacturing, transportation or utilities.
- Editing of manuscripts and other copy, promotional literature, subscription handling and form letters for publishing.
- Maintenance of all forms of project documentation, research reports, specifications and documenting of field tests for scientists, engineers, laboratory directors and medical groups.
- Maintenance of wills, briefs, contracts and patent dockets, as well as preparation of specialized legal documents for lawyers and lawyer cooperatives.

ATMS-III also addresses the basic problem of maintaining current and accurate changes to a file of information. The change to a file of information in an ATMS-III data base is immediate, unlike batched updates, with immediate verification and retrieval of the updated information.

ATMS-III includes all the time-tested document-handling capabilities of ATMS and ATMS-II products. Some highlights of these capabilities are:

- Full function editing and variable display formats on the 3270. Providing flexible online entry and edit, the terminal operator can view the information in context, immediately seeing how corrections and modifications to a page will look.
- Support for the APL /Text and Data Analysis -Text Features of the IBM 3270 Information Display System with substitution of up to 217 characters during input for each of 28 assignable keys.
- User exit modules which gain control on unrecognizable commands, or during processes which recognize user processing indicators in text.
- Data Base backup and recovery. Full or partial saving/restoring of the ATMS-III data base is possible through this facility. The partial backup process will only record those documents that have changed since the last full or partial backup. The partial recovery will expand the data base only by the documents that do not already exist. The partial backup/recovery processes allow for time savings.
- Statistics collection of working storage activity and the ability to review, online, the collected statistics to evaluate the effectiveness of working storage blocking factors.
- Acceptance of non-ATMS sequential input to be placed directly in permanent storage as a document when the input contains a recognizable document header.
- Sorting of a document in working storage, by units, to organize the units in EBCDIC collating sequence, ascending or descending. (Due to the online nature of invoking the Sort/Merge program, this function is only available in ATMS-III/OS/VS.)
- Executing a sequential list of previously stored commands and any required command replies stored with the commands, as well as to suspend execution at any point for operator intervention. Up to nine character strings, specified in the command, may be substituted for symbols within the list.
- Generalized Markup Language. This facility allows for the entry of user-defined "tags" in a document. During document processing

for formatted output, or even for online processing, these "tags" are resolved, with user-supplied specifications substituted for them. The flexibility provided by this facility allows for such things as:

- Using different formatters (e.g., SCRIPT/VS or the ATMS-III Formatter Feature), without changing the markup of the document.
- Changing the format of a document by supplying different sets of specifications, without changing the markup of the document.
- Changing the definition of the structure of a document to different postprocessors without changing the document itself.
- Inclusion of repetitively-used information without having to key the information each time it is required.
- Processing of separate documents as a single entity.
- Addressing letters or documents to a distribution list without repetitive typing.
- LEARN Lessons. These online, self-teaching lessons provide a means for learning the basic commands and functions of ATMS-III. Lessons are available for users of both keyboard-printer terminals and 3270 display stations.

The ease of correction provided by ATMS-III allows increased terminal operator entry speed through a minimum amount of interruption needed to immediately correct input errors. An effective text unit numbering technique allows for simplified document editing, alleviating the need for continual review for unit number verification. As units are entered, they are assigned a page and unit number which is retained until renumbering is specifically requested. This number retention allows for efficient production of high-volume publications, such as manuals, reports, parts catalogs and other technical journals.

**Document Formatting Capabilities** provided by the ATMS-III Formatter Feature include the functions of ATMS and ATMS-II products. These include such items as the ability to:

- Vary paragraph styles through the use of controls that allow implicit or explicit paragraphing specification, changing of print tab positions and returning to a previous mode, anywhere within the document.
- Dynamically change the text alignment, left, right or centered, for both formatted or unformatted mode text, allowing for such styles as ragged right, ragged left or ragged right and left.
- Dynamically control page numbering by setting a new value, adding a value to the current page number or resetting the page number to one, as well as specifying the page number style - Arabic or uppercase/lowercase Roman or uppercase/lowercase alphabetic.
- Control, even in conjunction with page numbering, a set of ten counters that may be output in alphabetic or numeric, in either Arabic or Roman styles. The counters may be set, incremented or reset, and output in a selected style with the values of 0 to 65535 or A to Z, AA to ZZ, etc.
- Validate text format controls during entry, edit, unit callout and replace phrase operations.
- Produce a proof printout of a document created for Condensed Text Format, using formatting rules similar to that used for peripheral output.
- Automatically hyphenate formatted output using ATMS-III hyphenation algorithms, as well as being able to specify required hyphenation points.
- Cause formatted or unformatted mode text to be split on a line allowing for automatic leader character insertion.

To provide for the printing of internally generated reports and operator-requested document listings, a basic list/report processor is included in ATMS-III for those users not wishing to include the ATMS-III Formatter Feature.

**SCRIPT/VS INTERFACE**

The SCRIPT/VS Interface provided by ATMS-III allows the user the option of using the ATMS-III Formatter Feature or the SCRIPT/VS Formatter. The SCRIPT/VS formatter offers such additional functions as:

- Multiple column formatting.
- Specification of multiple levels of headings.
- Optional generation of a table of contents.
- Footnotes.
- Boxed Text.

PROGRAM PRODUCTS

ATMS-III (cont'd)

- Extended Generalized Markup Language processes.
- Multiple levels of revision markers.
- Conditional document processing.
- 3800 Printing Subsystem support with multi-font printing including mixed pitch fonts.

Documents are entered with all the necessary SCRIPT/VS formatting control information using the basic ATMS-III entry and edit techniques. Documents created for either ATMS-III formatting or SCRIPT/VS formatting co-reside in the ATMS-III data base. In conjunction with the interface provided by the base ATMS-III system, support will be available when using SCRIPT/VS for the following functions, similar to that when using the ATMS-III Formatter Feature:

- Online text format and print.
- Peripheral text format and print.
- Condensed Text Format proofing and peripheral output.
- Peripheral renumber, format and print.
- Online/peripheral Master Document handling through recognition of SCRIPT/VS imbeds.
- Online/peripheral Generalized Markup Language tag resolution.
- Partially formatted screen display during 3270 editing.

ATMS-III provides the capability to communicate with various components of the IBM Office System 6 for:

- Acceptance of documents from magnetic card or diskette for inclusion in the ATMS-III data base.
- Output to printers or magnetic card, through either the ATMS-III or SCRIPT/VS formatter.
- Input and output translation of special codes and OCL information.
- Receiving of all or selected documents placed on a temporary storage queue by a formatter.
- Standard ATMS-III printer destination control functions for the listing and canceling of output requests.

Output support for these devices is fully integrated into the ATMS-III printer destination capabilities. CICS/VS temporary storage (in lieu of transient data) is used for all printer destination support.

ATMS-III PERIPHERAL PROCESSING

ATMS-III Peripheral Processing continues support of the synchronous functions, command set and queue processing of previous ATMS and ATMS-II products, which include:

- Creation or acceptance of archived documents (tape).
- Data base backup and recovery processes (tape).
- Output of specially formatted documents (using the ATMS-III Formatter) to be used for such post processing activities as:
  - High-speed printing of documents.
  - STAIRS/VS data base creation using documents output in the Condensed Text Format. In the OS/VS environment, an online STAIRS/VS data base creation capability can directly accept this output without manual data handling.
- Retrieval of documents from ATMS or ATMS-II backup or archive tapes, as well as from ATS/360 rollout or archive tapes, providing automatic text format control conversion and unit renumbering during the input processes
- Retrieval of non-ATMS-III produced sequential input, directly to permanent storage as a document, when the input contains a recognizable document header (tape)

Asynchronous peripheral processing, designed expressly for DASD peripheral data sets, consists of an additional set of functions and related commands to support:

- Processing of peripheral tasks asynchronously, at a lower priority than other terminal tasks, to alleviate online degradation during certain peripheral operations.
- Definition of a new type of document-based queue which eliminates the previous limitations on the number of queues and the number of entries for a queue.
- These new style queues are asynchronously processable and can be made automatically initiatable when a user-specified threshold is met, without control terminal operator intervention.
- These queues can be re-created during recovery processes from a master queue document saved during backup.
- Operator monitoring commands for these queues which allow for the listing and deleting of queue request entries.
- Queues which can be defined for system managed archive-in as well as for archive-out. Archiving, related to these asynchronously processable queues, is accomplished in conjunction with the Document Library Facility (5748-XXE) which provides for the storage and accessing of archived documents. Using the service programs of the Document Library Facility, the user may then produce lists of archived documents, as well as having access to the documents of other processing. Each archive queue can be defined for a separate library, if so desired.
- Queues which can be defined for "batch job submission". Documents containing job control statements, and any desired data, can be passed to the operating system's internal reader for batch execution, using a new ATMS-III "Internal Reader

Interface" capability. This internal reader interface is used by the asynchronous peripheral processes to archive documents to the Document Library Facility.

USE

ATMS-III is a modular program. The user selects the options needed to meet the installation's requirements during a system generation process. Activity within ATMS-III is initiated from a terminal, with terminal and file activity controlled by ATMS-III through the facilities of the CICS/VS program product and the operating system. Features are incorporated which assist in the serviceability of components of the system to provide maximum system availability.

CUSTOMER RESPONSIBILITIES

An individual who is thoroughly trained in ATMS-III and has experience in CICS/VS is required to install ATMS-III.

Education of the various types of terminal operators is a customer responsibility and is extremely important for this system. To assist in this education, IBM courses, LEARN lessons and an exercise book are available. Though ATMS-III can run primarily unattended, a control terminal operator should be readily available to monitor the operation of the system.

The customer is responsible for ordering and installing the communications equipment required.

ATMS-III has been designed so that customer-written application programs may be readily added. Although ATMS-III provides a basic set of text processing functions, there may be special cases where additional program functions are required. These additions may be made using ATMS-III programming conventions by a system programmer experienced in Assembler language.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The minimum machine configuration required for execution of ATMS-III corresponds to that required for the applicable CICS/VS program product which includes an IBM S/370 or other IBM processor as supported by CICS/VS.

While not required to be fully dedicated to ATMS-III, the following are required to execute ATMS-III:

- One IBM 2314, 3310 (2314 emulation mode), 3330, 3340 or 3350 Direct Access Storage device.
  - One IBM 2741 Communication Terminal with required Feature #9812 (incorporating the courier printing element, part number 1167043) and associated control unit. (An RPK printing element, part number 1167668, is required for 2741 PTTC/BCD and PTTC/EBCD terminals.)
    - or-
    - One IBM 3270 Information Display System Component as described below.
    - or-
    - One IBM 3767 Communications Terminal as a 2741 (with correspondence keyboard arrangement - feature #9381).
    - or-
    - One IBM Communicating Mag Card SELECTRIC® Typewriter, mdl 6610 with the Communicating Feature with Courier 72 printing element, part number 1167043, and corresponding keyboard and associated control unit.
  - One Magnetic Tape Unit and associated control unit must be available for the installation and maintenance of ATMS-III, and for use with dynamic backup/recovery and the archive facility. For other peripheral operations, the tape unit must be identified to CICS/VS.
- The following can be used to expand the capabilities of ATMS-III:
- Multiple IBM 2314, 3310, 3330, 3340 or 3350 Direct Access Storage devices.
  - Multiple IBM 2741 Communications Terminals and associated control units.
  - Multiple IBM 3767 Communication Terminals as 2741s (with correspondence keyboard arrangement - feature #9381).
  - Multiple IBM Communicating Mag Card SELECTRIC® Typewriters and associated control units.
  - Multiple IBM 3270 Information Display System components of the following types:
    - 3279 mdl 2A or 3A (basecolor) Color Display Station with 75-key or 87-key EBCDIC typewriter keyboard (#4621 or #4627) attached to an appropriate control unit.

PROGRAM PRODUCTS

ATMS-III (cont'd)

- 3279 mdl 2B or 3B (extended color) Color Display station with 75-key or 87-key EBCDIC typewriter keyboard (#4621 or #4627) or 87-key EBCDIC typewriter/Text Keyboard (#4629), supported in base color only, attached to an appropriate control unit. (Attribute Select Keyboards may be used, but no ATMS-III support is provided for color or programmed symbols.)
- 3278 Display Station mdl 2, 3, 4 or 5 with APL/Text Feature (#1120) and Text Keyboard (4629) and appropriately configured control unit.
- 3278 Display Station mdl 2, 3, 4 or 5 with 75-key or 87-key EBCDIC typewriter keyboard (#4621 or #4627) attached to an appropriate control unit.
- 3277 Display Station mdl 2 with Data Analysis - APL Feature (#1066) and Data Analysis - Text Feature keyboard (#4639) and appropriate control unit with Data Analysis - APL Feature (#1066) installed.
- 3277 Display Station mdl 2 with 78-key EBCDIC typewriter keyboard (#4633) attached to an appropriate control unit.
- 3276 Control Unit Display Station mdls 2, 3, 4, 12, 13 or 14 with 75-key or 87-key EBCDIC typewriter keyboard (#4621 or #4627) with appropriate control unit features.
- 3275 mdl 2 or 12 standalone Display Station with 78-key EBCDIC typewriter keyboard (#4633).
- 3268 mdl 2 Printer; APL/TEXT is standard function; the printer must be attached to a 3274 or 3276 Control Unit.
- 3288 mdl 2 printer, with or without Vertical Forms Feature (#9860), and with or without the Text Print Feature (#7800) installed attached to an appropriate control unit.
- 3289 Line Printer mdl 1 or 2 attached to an appropriate control unit. If printing of the 120-character TN/T11 character set is desired, the Text Print Feature (#1130) must be installed.
- 3287 Printer mdl 1 or 2, acting as a 3284/3286 mdl 2 with 3271/3272 Attachment (#8330) and 1920-character Print Operation (#9522) with Data Analysis-APL Feature (#1066) installed if optional text feature character printing is desired.
- 3287 Printer mdl 1 or 2, with 3274/3276 Attachment (#8331) with APL/Text Feature (#1120) and prerequisite Extended Character Set Adapter Feature (#3610) installed if optional text feature character printing is desired. A 3287 mdl 1C or 2C may be used, but no ATMS-III support is provided for color or programmed symbols.
- 3284 or 3286 mdl 2 printers attached to an appropriate control unit with Data Analysis-APL Feature (#1066) installed if optional Text Feature character printing is desired.
- 3284 printer mdl 3 attached to the standalone 3275 Display Station.
- 3262 Printer mdl 3 or 13, attached to an appropriate control unit, with either the 96-character EBCDIC set or the 128-character set.

The 3275 and 3277 Display Stations should have RPO 8K0366 for the display of lowercase characters. For the 3277, the Data Analysis - APL Feature (#1066) and Data Analysis - Text Feature keyboard (#4639) include this capability.

The 3284 and 3286 printers should have RPO 8K0366 for printing of lowercase characters, unless the Data Analysis - APL Feature (#1066) is installed.

- Components of the IBM Office System 6 (as online printers or for document transfer):
  - Mag Card II Communicating Typewriter
  - 6240 Mag Card Communicating Typewriter
  - 6640 Document Printer
  - 6670 Information Distributor (binary synchronous) protocol only
  - OS6/430, OS6/440, OS6/442, OS6/450, OS6/452 Information Processors
- A Card Read/Punch Unit.
- Magnetic Tape Units with associated control units supported by CICS/VS.
- A high speed printer producing at least a 132-character line. Uppercase and lowercase print capability is recommended.
- 3800 Printing Subsystem, as a high speed printer or for mixed font printing when used with the SCRIPT/VS formatter.

**Note:** Not all Office System 6 devices or 3270 features are available in all countries.

ATMS-III SPACE REQUIREMENTS

The address space required for ATMS-III/OS/VS or ATMS-III/DOS/VS is divided into two types:

- Frequently referenced storage areas.
- Infrequently referenced storage areas.

**Frequently Referenced** storage areas contain such components as ATMS-III subroutines, leader programs, communications area and tables and control blocks, as well as the CICS/VS TCA and TWA assigned at signon. They are either resident in storage or tend to reside there because of the frequency with which they are accessed. Estimates for these storage areas can be determined using the sum of the following:

DOKRVTR Module:

ATMS - III Resident Subroutines	7000
Immediate Message Buffer	88
Document Index Section	8(P+1)
Byte Map	(Note 4)
Index Control Block (CAICB)	56+20C
Control Storage Bit Map	R/8
ATMS-III Common Area	390
Table for Permanent Storage (Note 1)	40P
Table for Working Storage (Note 1)	36Wn
Table for Control Storage (Note 1)	56
Logical Unit Pointer Table	8 (P+Wn+3)
Operator Table	70p+2
Printer Destination Definitions	20Pd
Printer Destination Table	16Pt
Synchronous Queue Name Table	8SQ
Asynchronous Queue Function Table	2300
ATMS-III DASD I/O Program (DOKDIO)	1700
ATMS-III Enqueue Facility (DOKENQ)	2560
ATMS-III Peripheral I/O Program (DOKPIX)	1100
Tag Resolution Processor (DOKMR03)	1100
Fetch Document Information Processor (DOKMR04)	700
Generalized Markup Language Index Reserve Area:	
Indexes (each)	Note 8)
- Minimum	54+6E
- Maximum	54+22E
Resident Subdocuments	(Note 2)
LEARN Lesson Indexes	(Note 3)
ATMS-III Control Blocks (CICS/VS TCA with TWA)	2452T
ATMS-III Working Storage Buffers	(Note 5)
ATMS-III Document Enqueue Table	(Note 6)
ATMS-III Asynchronous Queue Table (Note 7)	56+24AQ
ATMS-III Text Leader Program (DOKTLO, 2741)	3400
ATMS-III Display Leader Program (DOKTL1, 3270)	3100
ATMS-III Graphic Display I/O Processor (DOKGIO)	8000
ATMS-III Input Conversion Processor (DOKFP32)	4000
3270 Device Characteristics Tables	2000
3270 Translate and Test Tables	1536

Where:

- AQ = The number of asynchronous peripheral queues defined.
- C = The number of index names in the default SEARCH list.
- E = The number of entries in the index.
- Op = The number of operators SYSGENed into the system.
- P = The number of Direct Access Storage devices containing permanent storage.
- Pd = The number of 3270 or Office System 6 printer destinations specified using DOKPDD statements during SYSGEN.
- Pt = The number of default printer destination table entries specified using DOKPDT statements during SYSGEN.
- R = The number of 132-byte control storage records.
- SQ = The maximum number of synchronous peripheral queues.
- T = The number of active terminals or display units. (The result for the ATMS-III control blocks includes the 384-byte CICS/VS TCA for each user.)
- Wn = The number of Direct Access Storage devices containing working storage.

**Note 1:** ATMS-III has three classes of storage: Working storage (WS), permanent storage (PS) and control storage (CS).

**ATMS-III (cont'd)**

**Note 2:** The amount is dependent upon the installation. If no Type C indexes are to be built (subdocuments made resident), the value is zero. When a greater value is specified, it must be sufficiently large to contain all resident subdocuments associated with the indexes built.

**Note 3:** The space required for LEARN lesson indexes depends on the method used for building the indexes. Using the method shown in the *ATMS-III Operations Guide*, it ranges from 1300 to 15,000 bytes. Any other method can significantly increase this amount.

**Note 4:** Each WS logical device has a corresponding byte map segment, the size of which is equal to the number of working storage blocks on the logical device divided by the number of blocks per assignable group.

**Note 5:** The amount of working storage buffer area required at any given time varies with the number of active terminals, the mix of commands being executed, the working storage blocksize and the allowable number of buffers. A reasonable average value would be:

$T * W S B L K S Z * X / 10$  where:

T = the number of active terminals  
 W S B L K S Z = the user-chosen WS blocksize  
 X = the lesser of the user-allowed buffers, or 3

**Note 6:** Provides for the enqueuing of from 111 to 3638 documents. Maximum is 2,016 bytes, maximum is 65,502 bytes.

**Note 7:** Maximum is 65,502 bytes.

**Note 8:** Maximum is twice the value specified at system generation.

**Infrequently referenced ATMS-III storage areas** are dynamically obtained by CICS/VS for ATMS-III as needed, and are returned when no longer needed. The temporary TIOA assignments, ATMS-III work areas and currently executing ATMS-III programs occupy this dynamically obtained address space. Therefore, the requirements for these storage areas can vary depending on how many terminals are active on the system, and which ATMS-III application functions are being performed.

For estimating infrequently referenced storage requirements, the following values are provided:

- ATMS-III application program sizes (4K - 16K)
- ATMS-III Formatter Feature program size (34K)
- ATMS-III application program work areas (2K - 6K)
- TIOA assignments:
  - 2741 (232T)
  - 3270 (varies by model, SYSGEN options and operator use - output TIOA is slightly larger than screen size).
  - 3270 printers require additional TIOA storage while active.

Inclusion of such items as the Formatter Feature, the Generalized Markup Language facility and LEARN lessons require storage beyond that for the basic ATMS-III program modules and control tables. Use of the SCRIPT/VS formatter requires additional storage during online or peripheral formatting operations. The maximum allowable amounts are a system generation option as described in the *ATMS-III Program Reference Manual*.

**DISK STORAGE REQUIREMENTS**

The following estimates do not include requirements for CICS/VS or the Document Library Facility. Library space, as described below, is increased by 10% when the ATMS-III Formatter Feature is included:

**OS/VS Environment**

- Macro library space required for ATMS-III/OS/VS macro definition is approximately 17 cylinders on a 2314, 9 cylinders on a 3330, 34 cylinders on a 3340 or 3 cylinders on a 3350. Approximately 25 directory blocks will be required.
- ATMS-III/OS/VS source library space required for program modules is approximately 100 cylinders on a 2314, 60 cylinders on a 3330, 165 cylinders on a 3340 or 23 cylinders on a 3350. Approximately 15 directory blocks will be required.
- ATMS-III/OS/VS load library space required is 10 cylinders on a 2314, 5 cylinders on a 3330, 19 cylinders on a 3340 or 3 cylinders on a 3350. Approximately 15 directory blocks will be required.

**DOS/VS Environment**

- ATMS-III/DOS/VS source library space is approximately 132 cylinders on a 2314, 84 cylinders on a 3330 or 3350, or 354 cylinders on a 3340. Approximately 10 directory tracks will be required.
- ATMS-III/DOS/VS phases are loaded into the core image library and require approximately 18 cylinders on a 2314, 8 cylinders on a 3330 or 3350, or 71 cylinders on a 3340. Approximately 10 directory tracks will be required.

**OS/VS or DOS/VS Environment**

- Control storage: One cylinder on a 2314, 3330, 3340 or 3350.
- Permanent storage: One cylinder of permanent storage will contain approximately 3,200 units (50-60 bytes) of text on a 3330, 1,900

units on a 2314, 1,100 units on a 3340 or 6,900 units on a 3350. Actual requirements will depend on unit lengths in use.

- Working storage: One cylinder of working storage using the default working storage block size, will contain approximately 2,300 units (50-60 bytes) of text on a 3330, 1,600 units on a 2314, 1000 units on a 3340 or 6,500 units on a 3350. Actual requirements will depend on unit lengths in use as well as the user-specified working storage blocking factor.
- CICS/VS Temporary Auxiliary Storage: Used for online SCRIPT/VS formatting and online printer destination capabilities. The total amount required is a function of the page limits set for online printing, the number of concurrent ATMS-III users of these capabilities and the number of documents queued for online printing.

**SOFTWARE REQUIREMENTS**

ATMS-III is written in S/370 Assembler language. It runs under control of CICS/VS (5740-XX1 for CICS/OS/VS and (5746-XX3) for CICS/DOS/VS) Version 1 Release 4.0, and subsequent releases, unless otherwise identified. Refer to the CICS/VS pages for operating system support.

Terminal communication is handled by ATMS-III using an appropriate telecommunications method through CICS/VS, except that BTAM is required for ATMS-III support of keyboard-printer terminals.

Data management is handled by ATMS-III using direct buffering through the BDAM (OS) or DAM (DOS) access methods. For certain tape operations, the EXCP access method is used. The CICS/VS file control tables and open/close facilities are also used for data set control.

In addition, the following may also be required:

- OS/VS Sort/Merge (5740-SM1) if working storage sorts are to be done.
- Appropriate VSAM access method for use of CICS/VS auxiliary temporary storage if 3270 or Office System 6 printer destination capabilities are to be used.
- Document Composition Facility (5748-XX9, R2.0) and its ATMS-III Environment Feature if SCRIPT/VS formatting is to be done. CICS/VS temporary storage is used for online formatting, with VSAM required if auxiliary temporary storage is used.
- Document Library Facility (5748-XXE, R 2.0), and supporting VSAM access method, if advantage is to be taken of the asynchronous archive processes. If used in a DOS/VS environment, these functions require DOS/VSE with VSE/Advanced Functions Release 2 (5746-XE8), VSE/VSAM (5746-AM2) and VSE/POWER (5746-XE3).
- JES2 or JES3 (selectable unit in MVS Releases 3.7 or 3.8) in OS/MVS, POWER/VS in DOS/VS or VSE/POWER in DOS/VSE if document archiving to a library of the Document Library Facility or the batch job submit function is to be utilized.
- A user SVC is supplied for installation in an OS/VS1 environment when archiving to the Document Library Facility or batch job submit functions are to be utilized.

**COMPATIBILITY**

ATMS-III, with the Formatter Feature, is functionally upward compatible from ATMS and ATMS-II, as well as from ATMS/360 with the exception of field-oriented-data format change during input and output. A capability for retrieving ATMS backup or archive documents and ATMS/360 rollout or archive documents is provided. An existing ATMS or ATMS/360 data base is readily converted to an ATMS-III data base using these facilities. ATMS-II users will not have to do a backup and recover operation.

The ASP/JES3 licensing exception does not apply to programs, features, and versions announced after July 6, 1976. A license is required for each processor on which this program executes. See DP Marketing Announcement 276-57.

**DATA SECURITY**

Data security, which is a user responsibility, can be enhanced using a variety of means. These take the form of both ATMS-III and CICS/VS controls. These are:

- Selective controls on the use of the CICS/VS master terminal operator functions.
- CICS/VS operator signon and password procedures.
- ATMS-III operator signon and password procedures. The signon area contains multiple overstruck characters on a keyboard-printer terminal and is made non-displayable on a 3270 display station.
- Selective assignment of ATMS-III control terminal operators and privileged operators.

## PROGRAM PRODUCTS

**ATMS-III (cont'd)**

- Operator assigned access words for getting and/or deleting documents and document indexes.
- Operator use of the lock and unlock commands.
- User assignment of 3270 printers for selected document routing

**ADVANCED TEXT MANAGEMENT SYSTEM - III  
ATMS-III FORMATTER FEATURE  
RELEASE 2 MODIFICATION LEVEL 0  
ATMS-III/OS/V5 (5740-XYL)  
ATMS-III/DOS/V5 (5746-XXU)**

**PURPOSE**

The Advanced Text Management System-III (ATMS-III) is a conversational text processing system which enables a terminal user to enter, edit, store, format, proofread and display textual material in an efficient manner.

ATMS-III is based on, and is an extension to, previous versions of the ATMS and ATMS-II program products. ATMS-III runs under control of CICS/VS (5740-XX1 for CICS/OS/V5 and 5746-XX3 for CICS/DOS/V5) Version 1.5.0, and subsequent releases, unless otherwise identified. Because ATMS-III executes as a CICS/VS application program, it is capable of being multi-tasked along with other CICS/VS applications.

ATMS-III offers direct interfacing with the SCRIPT/V5 Formatter of the Document Composition Facility (5748-XX9, R2.0 or R3.0) or a separate ATMS-III Formatter feature, and asynchronous DASD peripheral processing which may be used for archiving in conjunction with the Document Library Facility (5748-XXE, R2.0 or R3.0).

**DESCRIPTION****APPLICATIONS OF ATMS-III**

Following are some areas for which ATMS-III would prove applicable:

- Preparation of catalogs, manuals, directories, proposals, form letters, engineering changes, price lists and personnel record preparation for manufacturing, transportation or utilities.
- Editing of manuscripts and other copy, promotional literature, subscription handling and form letters for publishing.
- Maintenance of all forms of project documentation, research reports, specifications and documenting of field tests for scientists, engineers, laboratory directors and medical groups.
- Maintenance of wills, briefs, contracts and patent dockets, as well as preparation of specialized legal documents for lawyers and lawyer cooperatives.

ATMS-III also addresses the basic problem of maintaining current and accurate changes to a file of information. Unlike batched updates, the changes to the ATMS-III data bases are immediate, allowing immediate verification and retrieval of the updated information.

ATMS-III includes all the time-tested document-handling capabilities of ATMS and ATMS-II products. Some highlights of ATMS III capabilities are:

- Full function editing and variable display formats on the 3270. Providing flexible online entry and edit, the terminal operator can view the information in context, immediately seeing how corrections and modifications to a page will look.
- Support for the APL /Text and Data Analysis -Text features of the 3270 Information Display System with substitution of up to 217 characters during input for each of 28 assignable keys.
- Executing a sequential list of previously stored commands. Included in the list can be replies to the commands and a comprehensive set of control statements which allows for conditional execution, as well as for the creation of full-screen menus for operator input. Variables and counters can be set, and system items can be referenced for substitution purposes within a command list. Nested command list capabilities greatly expand the usefulness of this facility.
- User exit modules which gain control for:
  - Processing unrecognized commands.
  - Various functions which recognize user processing indicators in text.
  - Validating batch submission jobs.
  - Validating project accounting information.
  - Loading variables during command list execution.
- Supports an ATMS III data base using either VSAM or BDAM (DAM in DOS).
- Support for up to 9,999 operator numbers when a VSAM data base is used, and up to 4,000 operator numbers when BDAM is used. Separate operator add and delete commands are supplied for use by authorized operator administrators.
- Data Base backup and recovery. Full or partial saving/restoring of the ATMS-III data base is possible through this facility. The partial backup process will only record those documents that have changed since the last full or partial backup. The partial recovery will expand the data base by only those documents that do not already exist. The partial backup/recovery processes provide significant time savings.

- Statistics collection of working storage activity and the ability to review, online, the collected statistics to evaluate the effectiveness of user-specified working storage blocking factors. Current working storage allocations can be monitored to determine excessive operator use.
- Acceptance of non-ATMS sequential input to be placed directly in permanent storage as a document when the input contains a recognizable document header.
- Sorting of a document in working storage, by units, to organize the units in EBCDIC collating sequence, ascending or descending. (Due to the online nature of invoking the Sort/Merge program, this function is only available in ATMS-III/OS/V5.)
- Generalized Markup Language. This facility allows for the entry of user-defined 'tags' in a document. During document processing for formatted output, or during online processing, these 'tags' are resolved, with user-supplied specifications substituted for them. The flexibility provided by this facility allows for such things as:
  - Using different formatters (e.g., SCRIPT/V5 or the ATMS-III Formatter feature), without changing the markup of the document.
  - Changing the format of a document by supplying different sets of specifications, without changing the markup of the document.
  - Changing the definition of the structure of a document to different postprocessors without changing the document itself.
  - Inclusion of repetitively-used information without having to key the information each time it is required.
  - Addressing letters or documents to a distribution list without repetitive typing.
- LEARN Lessons. These online, self-teaching lessons provide a means for learning the basic commands and functions of ATMS-III. Lessons are available for users of both keyboard-printer terminals and 3270 display stations. Users may create additional lessons to assist in the teaching of unique installation applications.

The ease of correction provided by ATMS-III allows increased terminal operator entry speed by reducing the amount of interruptions needed to immediately correct input errors. An effective text unit numbering technique allows for simplified document editing, alleviating the need for continual review for unit number verification. As units are entered, they are assigned a page and unit number which is retained until renumbering is specifically requested. This number retention allows for efficient production of high-volume publications, such as manuals, reports, parts catalogs and other technical journals.

**Document Formatting Capabilities** provided by the ATMS-III Formatter feature include the functions of ATMS and ATMS-II products. These include such items as the ability to:

- Vary paragraph styles through the use of controls that allow implicit or explicit paragraphing specification, changing of print back positions, and returning to a previous mode, anywhere within the document.
- Dynamically change the text alignment, left, right or centered, for both formatted or unformatted mode text, allowing for such styles as ragged right, ragged left or ragged right and left.
- Dynamically control page numbering by setting a new value, adding a value to the current page number or resetting the page number to one, as well as specifying the page number style - Arabic, uppercase/lowercase Roman, or uppercase/lowercase alphabetic.
- Control, even in conjunction with page numbering, a set of ten counters that may be output in alphabetic or numeric, in either Arabic or Roman styles. The counters may be set, incremented or reset, and output in a selected style with the values of 0 to 65,535 or A to Z, AA to ZZ, etc.
- Validate text format controls during entry, edit, unit callout and replace phrase operations.
- Produce a proof printout of a document created for Condensed Text Format, using formatting rules similar to those used for peripheral output.
- Automatically hyphenate formatted output using ATMS-III hyphenation algorithms, as well as being able to specify required hyphenation points.
- Cause formatted or unformatted mode text to be split on a line allowing for automatic leader character insertion.

To provide for the printing of internally generated reports and operator-requested document listings, a basic list/report processor

## PROGRAM PRODUCTS

**ATMS-III (cont'd)**

is included in ATMS-III for those users not wishing to include the ATMS-III Formatter feature.

**SCRIPT/VS INTERFACE**

The SCRIPT/VS Interface provided by ATMS-III allows the user the option of using SCRIPT/VS Formatter of the Document Composition Facility. The SCRIPT/VS formatter offers such additional functions as:

- Multiple column formatting.
- Specification of multiple levels of headings.
- Optional generation of a table of contents.
- Footnotes.
- Boxed text.
- Extended Generalized Markup Language processes.
- Multiple levels of revision markers.
- Conditional document processing.
- 3800 Printing Subsystem support with multi-font printing, including mixed pitch fonts.
- 4250 Printer with proportional font printing (Release 3, MVS or DOS/VSE environment).

ATMS III provides font library support for the 4250 Printer, which includes font library access, online library listing, and online error diagnostics review of a SCRIPT/VS asynchronous peripheral formatting run.

Documents are entered with all the necessary SCRIPT/VS formatting control information using the basic ATMS-III entry and edit techniques. Documents created for either ATMS-III formatting or SCRIPT/VS formatting co-reside in the ATMS-III data base. With the interface provided by the base ATMS-III system, support is available for the following functions, similar to that when using the ATMS-III Formatter feature:

- Online text format and print.
- Peripheral text format and print.
- Condensed Text Format proofing and peripheral output.
- Peripheral renumber, format and print.
- Online/peripheral Master Document handling through recognition of SCRIPT/VS imbeds.
- Online/peripheral Generalized Markup Language tag resolution.
- Partially formatted screen display during 3270 editing.

**ATMS III to OFFICE SYSTEM 6 (OS/6) COMMUNICATION**

- Acceptance of documents from magnetic card or diskette for inclusion in the ATMS-III data base.
- Output to printers or magnetic card, through either the ATMS-III or SCRIPT/VS formatter.
- Input and output translation of special codes and OCL information.
- Receiving of all or selected documents placed on a temporary storage queue by a formatter.
- Standard ATMS-III printer destination control functions for the listing and canceling of output requests.

Output support for these devices is fully integrated into the ATMS-III printer destination capabilities. CICS/VS temporary storage (in lieu of transient data) is used for all printer destination support.

**ATMS-III PERIPHERAL PROCESSING**

**ATMS-III Peripheral Processing** continues support of the synchronous functions, command set and queue processing of previous ATMS and ATMS-II products, which include:

- Creation or acceptance of archived documents (tape).
- Data base backup and recovery processes (tape).
- Output of specially formatted documents (using the ATMS-III Formatter) to be used for such post processing activities as:
  - High-speed printing of documents.
  - STAIRS/VS data base creation using documents output in the Condensed Text Format. In the OS/VS environment, an online STAIRS/VS data base creation capability can directly accept this output without manual data handling.
- Retrieval of documents from ATMS or ATMS-II backup or archive tapes, as well as from ATS/360 rollout or archive tapes, providing automatic text format control conversion and unit renumbering during the input processes.
- Retrieval of non-ATMS-III produced sequential input, directly to permanent storage as a document, when the input contains a recognizable document header (tape).

Asynchronous peripheral processing, designed expressly for DASD peripheral data sets, consists of an additional set of functions and related commands to support:

- Processing of peripheral tasks asynchronously, at a lower priority than other terminal tasks, to alleviate online degradation during certain peripheral operations.
- Definition of document-based queues which eliminates the previous limitations on the number of queues and the number of entries for a queue.
- These queues are asynchronously processable and can be made automatically initiatable when a user-specified threshold is met, without control terminal operator intervention.

- These queues can be re-created during recovery processes from a master queue document saved during backup.
- Operator monitoring commands for these queues allow for the listing and deleting of queue request entries.
- Queues can be defined for system managed archive-in, as well as for archive-out. Archiving, related to these asynchronously processable queues, is accomplished in conjunction with the Document Library Facility (5748-XXE) which provides for the storage and accessing of archived documents. Using the service programs of the Document Library Facility, the user may then produce lists of archived documents, as well as having access to the documents for other processing. Each archive queue can be defined for a separate library, if so desired.
- Queues can be defined for 'batch job submission'. Documents containing job control statements, and any desired data, can be passed to the operating system's internal reader for batch execution, using a new ATMS-III 'Internal Reader Interface' capability. This internal reader interface is also used by the asynchronous peripheral processes to archive documents to the Document Library Facility.

**USE**

ATMS-III is a modular program. The user selects the options needed to meet the installation's requirements during a system generation process. Activity within ATMS-III is initiated from a terminal, with terminal and file activity controlled by ATMS-III through the facilities of the CICS/VS program product and the operating system. Features are incorporated which assist in the serviceability of components of the system to provide maximum system availability.

**CUSTOMER RESPONSIBILITIES**

An individual who is thoroughly trained in ATMS-III and has experience in CICS/VS is required to install ATMS-III.

Education of the various types of terminal operators is a customer responsibility and is extremely important for this system. To assist in this education, IBM courses, LEARN lessons and an exercise book are available. Additional lessons can be created by the user to assist in the training of unique installation applications. The command list execution capability can be used to build installation-dependent 'help' facilities to describe unique operating characteristics. Though ATMS-III can run primarily unattended, a control terminal operator should be readily available to monitor the operation of the system.

The customer is responsible for ordering and installing the communications equipment required.

ATMS-III has been designed so that customer-written application programs may be readily added. Although ATMS-III provides a basic set of text processing functions, there may be special cases where additional program functions are required. These additions may be made using ATMS-III programming conventions by a system programmer experienced in Assembler language. Many additional functions can be implemented using the supplied user exits, or by taking advantage of the extensive command list processing capabilities.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum machine configuration required for execution of ATMS-III corresponds to that required for the applicable CICS/VS program product which includes an IBM S/370 or other IBM processor as supported by CICS/VS.

While not required to be fully dedicated to ATMS-III, the following are required to execute ATMS-III:

- At least one Direct Access Storage device to contain the ATMS III data base. If an FBA device is used, the VSAM access method is required. Either VSAM or BDAM may be used to support an IBM 2314, 3330, 3340 or 3350. Other Direct Access Storage devices can only be supported using VSAM.
- One IBM 2741 Communication Terminal with required feature #9812 (incorporating the courier printing element, part number 1167043) and associated control unit. (An RPQ printing element, part number 1167668, is required for 2741 PTTC/BCD and PTTC/EBCD terminals.)

-or-

One IBM 3270 Information Display System component as described below.

-or-

One IBM 3767 Communications Terminal as a 2741 (with correspondence keyboard arrangement - feature #9381).

-or-

One IBM Communicating Mag Card Selectric® Typewriter, mdl 6610 with the Communicating feature with Courier 72 printing element, part number 1167043, and corresponding keyboard and associated control unit.

**ATMS-III (cont'd)**

- One IBM Magnetic Tape Unit and associated control unit must be available for the installation and maintenance of ATMS-III, and for use with dynamic backup/recovery and the archive facility. For other peripheral operations, the tape unit must be identified to CICS/VS.

The following can be used to expand the capabilities of ATMS-III:

- Multiple IBM Direct Access Storage devices.
- Multiple IBM 2741 Communication Terminals and associated control units.
- Multiple IBM 3767 Communications Terminals as 2741s (with correspondence keyboard arrangement - feature #9381).
- Multiple IBM Communicating Mag Card Selectric® Typewriters and associated control units.
- Multiple IBM 3270 Information Display System components of the following types:
  - 3279 mdl 2A or 3A (basecolor) Color Display Station with 75-key or 87-key EBCDIC typewriter keyboard (#4621 or #4627) attached to an appropriate control unit.
  - 3279 mdl 2B or 3B (extended color) Color Display Station with 75-key or 87-key EBCDIC typewriter keyboard (#4621 or #4627) or 87-key EBCDIC typewriter/Text Keyboard (#4629), supported in base color only, attached to an appropriate control unit. (Attribute Select Keyboards may be used, but no ATMS-III support is provided for color or programmed symbols.)
  - 3278 Display Station mdl 2, 3, 4 or 5 with APL/Text feature (#1120) and Text Keyboard (#4629) attached to an appropriately configured control unit.
  - 3278 Display Station mdl 2, 3, 4 or 5 with 75-key or 87-key EBCDIC typewriter keyboard (#4621 or #4627) attached to an appropriate control unit.
  - 3277 Display Station mdl 2 with Data Analysis - APL feature (#1066) and Data Analysis - Text feature keyboard (#4639) and appropriate control unit with Data Analysis - APL feature (#1066) installed.
  - 3277 Display Station mdl 2 with 78-key EBCDIC typewriter keyboard (#4633) attached to an appropriate control unit.
  - 3276 Control Unit Display Station mdl 2, 3, 4, 12, 13 or 14 with APL/Text feature (#1120) and Text Keyboard (#4629).
  - 3276 Control Unit Display Station mdls 2, 3, 4, 12, 13 or 14 with 75-key or 87-key EBCDIC typewriter keyboard (#4621 or #4627) with appropriate control unit features.
  - 3275 stand-alone Display Station mdl 2 or 12 with 78-key EBCDIC typewriter keyboard (#4633).
  - 3288 Printer mdl 2, with or without Vertical Forms feature (#9850), and with or without the Text Print feature (#7800) installed for printing of the 120-character TN/T11 character set attached to an appropriate control unit.
  - 3289 Line Printer mdl 1 or 2 attached to an appropriate control unit. If printing of the 120-character TN/T11 character set is desired, the Text Print feature (#1130) must be installed.
  - 3287 Printer mdl 1 or 2, acting as a 3284/3286 mdl 2 with 3271/3272 Attachment (#8330) and 1,920-character Print Operation (#9522) with Data Analysis-APL feature (#1066) installed if optional text feature character printing is desired.
  - 3287 Printer mdl 1 or 2, with 3274/3276 Attachment (#8331) with APL/Text feature (#1120) and prerequisite Extended Character Set Adapter feature (#3610) installed if optional text feature character printing is desired. A 3287 mdl 1C or 2C may be used, but no ATMS-III support is provided for color or programmed symbols.
  - 7436 Printer mdl 1 operating as a 3287 mdl 1 or 2.
  - 3284 or 3286 mdl 2 Printers attached to an appropriate control unit with Data Analysis-APL feature (#1066) installed if optional Text feature character printing is desired.
  - 3284 Printer mdl 3 attached to the stand-alone 3275 Display Station.
  - 3262 Printer mdl 3 or 13, attached to an appropriate control unit, with either the 96-character EBCDIC set or the 128-character set.
  - 3230 or 3268 mdl 2 Printers attached to the appropriate control unit. If operated in non-SCS mode, feature #9507 must not be installed, since ATMS III uses multiple print operations to produce a single output page.

Printers may be operated in SCS mode.

The 3275 and 3277 Display Stations should have RPO 8K0366 for the display of lowercase characters. For the 3277, the Data Analysis - APL feature (#1066) and Data Analysis - Text feature keyboard (#4639) include this capability.

The 3284 and 3286 printers should have RPO 8K0366 for printing of lowercase characters, unless the Data Analysis - APL feature (#1066) is installed.

- Components of the IBM Office System 6 (as online printers or for document transfer):
  - Mag Card II Communicating Typewriter
  - 6240 Mag Card Communicating Typewriter
  - 6640 Document Printer
  - 6670 Information Distributor (SNA or binary synchronous) mode
  - OS6/430, OS6/440, OS6/442, OS6/450, OS6/452 Information Processors
- A Card Read/Punch Unit.
- Magnetic Tape Units with associated control units supported by CICS/VS.
- A high-speed printer producing at least a 132-character line. Uppercase and lowercase print capability is recommended.
- 3800 Printing Subsystem, as a high-speed printer or for mixed font printing when used with the SCRIPT/VS formatter.
- 4250 Printer for proportional font printing when used with the SCRIPT/VS R3.0 formatter in the MVS or DOS/VSE environment, through an asynchronous peripheral queue.

**ATMS-III SPACE REQUIREMENTS**

The address space required for ATMS-III/OS/VS or ATMS-III/DOS/VS is divided into two types:

Frequently referenced storage areas.

Infrequently referenced storage areas.

Frequently referenced storage areas contain such components as ATMS-III subroutines, text leader programs, the communications area, and tables and control blocks, and the CICS/VS TCA and TWA assigned to a user at signon. They are either resident in storage or tend to reside there because of the frequency with which they are accessed.

The *ATMS III Program Reference Manual* contains a complete list of the components residing in this storage, and the individual sizes needed to estimate the total requirements.

Infrequently referenced ATMS-III storage areas are dynamically obtained by CICS/VS for ATMS-III as needed, and are returned when no longer needed. The temporary task work area assignments, ATMS-III work areas and currently executing ATMS-III programs occupy this dynamically obtained address space. Therefore, the requirements for these storage areas vary depending on how many terminals are active on the system, and which ATMS-III functions are being performed.

Inclusion of such items as the Formatter feature, the Generalized Markup Language facility and LEARN lessons require storage beyond that for the basic ATMS-III program modules and control tables. Use of the SCRIPT/VS formatter requires additional storage during online or peripheral formatting operations. The maximum allowable amounts are a system generation option.

Requirements for this type of storage are also discussed in the *ATMS III Program Reference Manual*.

**DISK STORAGE REQUIREMENTS**

The following estimates do not include requirements for CICS/VS or the Document Library Facility. Library space, as described below, is increased by 10% when the ATMS-III Formatter feature is included:

**OS/VS Environment**

- Macro library space required for ATMS-III/OS/VS macro definition is approximately 23 cylinders on a 2314, 12 cylinders on a 3330, 42 cylinders on a 3340, 5 cylinders on a 3350, 5 cylinders on a 3375, or 4 cylinders on a 3380. Approximately 15 directory blocks will be required.
- ATMS-III/OS/VS source library space required for program modules is approximately 112 cylinders on a 2314, 66 cylinders on a 3330, 183 cylinders on a 3340, 26 cylinders on a 3350, 26 cylinders on a 3375 or 20 cylinders on a 3380. Approximately 15 directory blocks will be required.
- ATMS-III/OS/VS load library space required is 11 cylinders on a 2314, 6 cylinders on a 3330, 21 cylinders on a 3340, 4 cylinders on a 3350, 4 cylinders on a 3375, or 3 cylinders on a 3380. Approximately 15 directory blocks will be required.

**DOS/VS Environment**

- ATMS-III/DOS/VS source library space is approximately 158 cylinders on a 2314, 104 cylinders on a 3330, 269 cylinders on a

## PROGRAM PRODUCTS

**ATMS-III (cont'd)**

3340, 58 cylinders on a 3350, or 58 cylinders on a 3375. Approximately 10 directory tracks will be required.

- ATMS-III/DOS/VS phases are loaded into the core image library and require approximately 9 cylinders on a 2314, 5 cylinders on a 3330, 10 cylinders on a 3340, 4 cylinders on a 3350, or 4 cylinders on a 3375. Approximately 10 directory tracks will be required.

**OS/VS or DOS/VS Environment****Using BDAM:**

- Control storage: One cylinder on a 2314, 3330, 3340 or 3350.
- Permanent storage: One cylinder of permanent storage will contain approximately 3,200 units (50-60 bytes) of text on a 2314, 1,900 units on a 2314, 1,100 units on a 3340 or 7,200 units on a 3350. Actual requirements will depend on unit lengths in use.
- Working storage: One cylinder of working storage using the default working storage block size, will contain approximately 2,300 units (50-60 bytes) of text on a 3330, 1,600 units on a 2314, 1,000 units on a 3340 or 6,500 units on a 3350. Actual requirements will depend on unit lengths in use and the user-specified working storage blocking factor.

**Using VSAM:**

- Control Data Set: One cylinder of CDS can contain approximately 1,200 document index records on a 3330, 850 on a 2314, 450 on a 3340, 2,500 on a 3375, and 3,500 on a 3380. Approximately 4 document index records can be contained in one FBA block.

To contain the remaining control records and to support Generalized Markup Language processing, add to the above total amount 6 cylinders for a 2314, 4 cylinders for a 3330, 10 cylinders for a 3340, 2 cylinders for a 3350, 2 cylinders for a 3375, 2 cylinders for a 3380, or 1,000 FBA blocks.

- Permanent storage: One cylinder of permanent storage will contain approximately 3,200 units (50-60 bytes) of text on a 3330, 1,900 units on a 2314, 1,100 units on a 3340, 7,200 units on a 3350, 7,200 units on a 3375 or 8,960 units on a 3380. Three FBA blocks, the minimum allowed, will contain up to 18 units of text. Actual requirements will depend on unit lengths in use.
- Working storage: One cylinder of working storage, using the default working storage blocksize, will contain approximately 2,300 units (50-60 bytes) of text on a 3330, 1,600 units on a 2314, 1,000 units on a 3340, 4,500 units on a 3350, 4,500 units on a 3375 or 6,400 units on a 3380. One FBA block will contain up to 4 units of text. Actual requirements will depend on unit lengths in use.
- CICS/VS Temporary Storage: Used for online SCRIPT/VS formatting and online printer destination capabilities. The total amount required is a function of the page limits set for online printing, the number of concurrent ATMS-III users of these capabilities and the number of documents queued for online printing.

**Note:** New installations may generate storage with the sample values shown in the *ATMS III Program Reference Manual*. If, after a period of time, this space is insufficient for the installation's needs, the space may be expanded.

**SOFTWARE REQUIREMENTS**

ATMS-III is written in IBM S/370 Asembler language. It runs under control of CICS/VS (5740-XX1 for CICS/OS/VS and 5746-XX3 for CICS/DOS/VS) Version 1.5.0, and subsequent releases, unless otherwise identified. Refer to the CICS/VS pages for operating system support.

Terminal communications is handled by ATMS-III using an appropriate telecommunications method through CICS/VS, except that BTAM is required for ATMS-III support of keyboard-printer terminals.

Data management is handled by ATMS-III using either VSAM or direct buffering through the BDAM (OS) or DAM (DOS) access methods. For certain tape operations, the EXCP access method is used. CICS/VS file control tables and open/close facilities are also used for data set control.

In addition, the following may also be required:

- OS/VS Sort/Merge (5740-SM1) if working storage sorts are to be done.
- Appropriate VSAM access method, if it is to be used for the ATMS III data base, or for use of CICS/VS auxiliary temporary storage if 3270 or Office System 6 printer destination capabilities are to be used.
- Document Composition Facility (5748-XX9, R2.0 or R3.0) and its ATMS-III Environment feature if SCRIPT/VS formatting is to be done. If the 4250 Printer is to be used, R3.0 is required. CICS/VS temporary storage is used for online formatting, with VSAM required if auxiliary temporary storage is used.

- Document Library Facility (5748-XXE, R2.0 or R3.0) and supporting VSAM access method, if advantage is to be taken of the asynchronous archive processes. If used in a DOS/VS environment, these functions require DOS/VSE with VSE/Advanced Functions Release 2 (5746-XE8), VSE/VSAM (5746-AM2) and VSE/POWER (5746-XE3).

- JES2 or JES3 (selectable unit in MVS Releases 3.7 or 3.8) in OS/MVS, or VSE/POWER in DOS/VSE if document archiving to a library of the Document Library Facility or the batch job submit function is to be utilized.

- A user SVC is supplied for installation in an OS/VS1 environment when archiving to the Document Library Facility or batch job submit functions are to be utilized.

A minimum OS/VS or DOS/VSE Assembler and Linkage Editor are required for the installation and maintenance of ATMS III.

**COMPATIBILITY**

ATMS-III, with the Formatter feature, is functionally upward compatible from ATMS and ATMS-II, as well as from ATS/360 with the exception of field-oriented-data format change during input and output. A capability for retrieving ATMS backup or archive documents and ATS/360 rollout or archive documents is provided. An existing ATMS or ATS/360 data base is readily converted to an ATMS-III data base using these facilities.

The ASP/JES3 licensing exception does not apply to programs, features, and versions announced after July 6, 1976. A license is required for each processor on which this program executes.

**DATA SECURITY**

Data security, which is a user responsibility, can be enhanced using a variety of means. These take the form of both ATMS-III and CICS/VS controls. These are:

- Selective controls on the use of the CICS/VS master terminal operator functions.
- CICS/VS operator signon and password procedures.
- ATMS-III operator signon and password procedures. The signon area contains multiple overstruck characters on a keyboard-printer terminal and is made non-displayable on a 3270 display station.
- Selective assignment of the ATMS-III control terminal operators, privileged operators, and operator administrators.
- Operator-assigned access words for getting and/or deleting documents and document indexes.
- Operator use of the lock and unlock commands.
- User assignment of 3270 printers for selected document routing



**PROGRAM PRODUCTS**
**MVS/SYSTEM PRODUCT-JES3  
 MVS/SP-JES3 RELEASE 1 (5740-XYN)**
**PURPOSE**

MVS/System Product-JES3 (MVS/SP-JES3) Release 1 provides all the performance and functional benefits of MVS/System Extensions (5740-XE1) and significant new enhancements. MVS/SP-JES3 Release 1 is available for the 4341, 4361-5 or 4381 with ECPS:MVS installed, for the 3031, 3032, 3033 Processors and on the S/370 mdl 158 and 168 Processors with the S/370 Extended Feature installed.

**DESCRIPTION**

**Note:** MVS/System Product (MVS/SP) is a generic term referring to announced releases of MVS/System Product-JES2 (5740-XY2) and MVS/System Product JES3 (5740-XYN) or topics common to both.

The significant new facilities are:

- Support for the 3380 Direct Access Storage with the 3880 Storage Control mdls 2 and 3 with the Data Streaming feature (#4850) on the 3031, 3032 and 3033 Processors or attached to a 3MB channel on the 4341, 4361-5 or 4381, when installed with the *iVVS* Data Facility/Device Support (5740-AM7) program product.
- Support for the 3278 and 3279 Display Stations as operator MCS consoles.
- Support for the 4341, 4361-5, or 4381 Processor with ECPS:MVS installed.

**HIGHLIGHTS**

MVS/SP-JES3 Release 1 installed on MVS 3.8 offers new support for the following:

- The 3380 Direct Access Storage with the 3880 Storage Control mdls 2 and 3 using either:
  - The Data Streaming feature (#4850) on the 4341, 3031, 3032 and 3033 Processors, or
  - the 3MB channel on the 4341, 4361-5 or 4381.

Device support is provided by MVS/SP-JES3 Release 1 installed with the *MVS* Data Facility Device Support Release 1 program product (5740-AM7). This support also permits the 3380 device to be used for paging and for system residence. The 3380 Direct Access Storage provides reduced access times and an increased data transfer rate when compared to previous IBM DASD units. The 3380 Direct Access Storage with the 3880 Storage Control mdls 2 and 3 introduces dynamic path selection facility. Dynamic path selection facility allows the operating system to access a reserved device via any of the available paths.

- The 3279 Color Display Station, all mdls, and the 3278 Display Station, mdls 1, 2, 3 and 4 attached via a 3274 mdl 1D control unit are supported as MCS consoles through device independent display operator console support (DIDOC5). The greater capacity screens are supported on the 3278 mdls 3 and 4 and on the 3279 mdls 3A and 3B. In addition, the color defaults are supported on all mdls of the 3279. These color defaults are blue for all normal traffic, white for all action messages and green for operator commands. Full program function key support is available for the 3278 and 3279 Display Stations.

In addition, the following MVS/System Extensions (5740-XE1) Performance and Functional Benefits are included as part of the MVS/SP-JES3 Release 1.

**Performance Improvements:** MVS/System Extensions test measurements completed on the S/370 158, 168 and 3031, 3032 and 3033 Processors have shown the following results:

A 20 to 27% reduction in control program supervisor state execution time, providing throughput improvements ranging from 14 to 18% for BATCH, TSO/BATCH and IMS/BATCH test environments on uniprocessors and 17 to 20% improvements on multiprocessor configurations as compared to MVS Release 3.7 with SUs 4, 5 and 7 installed.

Actual performance will vary depending upon customer environment, storage and I/O configuration. No assurance can be given that an individual user will achieve the test results.

**SMF Enhancements:** A major revision to SMF provides more data with increased installation control over the amount of data collected and allows a non-disruptive migration to full utilization of the new function.

**SRM Enhancements:** Control of system resources to meet installation-defined goals is necessary for effective usage of the system. The SRM is enhanced to centralize and improve system control, to improve the RMF reporting of certain transactions, and to ease the use of certain SRM facilities.

**Action Message Retention Facility:** Proper and timely handling of operator messages is important. Messages requiring operator action are given particular message descriptor codes. Prior to

MVS/System Extensions Release 2, these messages could roll off the operator's screen with no easy way for the operator to reconstruct the set of unsatisfied action messages. The action message retention facility allows the operator to retrieve all unsatisfied action messages.

See the *General Information Manual* (GC28-1025) for more detailed information.

**CUSTOMER RESPONSIBILITIES**

MVS Release 3.8 and the MVS Processor Support 2 must be installed prior to installing MVS/SP-JES3 Release 1.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

MVS/SP-JES3 Release 1 requires the appropriate S/370 Extended Feature on IBM S/370 mdls 158 (#7730 or #7731) and 168 (#7730) or ECPS:MVS on the IBM 4341, 4361-5 or 4381. MVS/SP-JES3 Release 1 supports the following processors:

IBM mdl 158-1	UP/MP/AP
IBM mdl 158-3	UP/MP/AP
IBM mdl 168-1 with RPO S20579	UP/MP
IBM mdl 168-1 with RPO S20580	AP
IBM mdl 168-3	UP/MP/AP
IBM 4341 Processor Mdl Group 1	UP
IBM 4341 Processor Mdl Group 2	UP
IBM 4361-5 Processor	UP
IBM 4381 Processor	UP
IBM 3031 Processor	UP/AP
IBM 3032 Processor	UP
IBM 3033 Processor	UP/MP/AP
IBM 3033 Processor Mdl Group N	UP
IBM 3033 Processor Mdl Group S	UP

The minimum total storage required by MVS/SP-JES3 Release 1 depends on many factors. These include an installation's configuration, the subsystems, program products and problem programs in use. However, the following information will assist in approximating additional bytes of virtual storage required for the MVS/System Extensions and for MVS/SP-JES3 Release 1. The actual bytes of real storage needed will be less because PLPA and CSA are only partially backed by real storage.

To estimate the additional virtual storage required for MVS/SP-JES3 Release 1, use Chart 1 in the following manner:

- If the installation is running MVS 3.8 with the OS/VS2 MVS Processor Support 2 installed, the additional storage is the combined total of columns 1, 2 and 3.
- If the installation has MVS/System Extensions Release 1 installed, the additional storage is the combined total of columns 2 and 3.
- If the installation has MVS/System Extensions Release 2 installed, the additional storage is the amount in column 3.

**CHART 1**

	MVS/System Extensions Release 1 (Column 1)	MVS/System Extensions Release 2 (Column 2)	MVS/SP-JES3 Release 1 (Column 3)
Nucleus	30,000	6,200	10,500
PLPA	10,000	66,300	- 101,500 (Note 4)
CSA	---	Variable (Note 1)	---
SQA	500	Variable (Note 2)	4,000
LSQA	---	Variable (Note 3)	---

**Notes:**

1. Assuming four SMF buffers - requires an additional 8,000 bytes.
2. The amount of additional storage required in SQA depends on several variables:
  - Assuming 50 address spaces with interval accounting, two recording data sets and three subsystems defined to SMF, requires an additional 8,000 bytes.
  - Subsystem transaction reporting requires a minimum of 4,096 bytes.
  - The installation control specification requires for each subsystem name, an additional 28 bytes ... for each userid, transaction name and transaction class, an additional 20 bytes.
3. Each initiator requires an additional 40 bytes.
4. This reflects a reduction in PLPA of 101,500 bytes. It is achieved by an optional installation step. This step moves infrequently referenced modules from LPALIB to LINKLIB.

For more information, see the *General Information Manual* (GC28-1025-2).



## PROGRAM PRODUCTS

## MVS/SP-JES3 R1 (cont'd)

## SOFTWARE REQUIREMENTS

MVS/SP-JES3 Release 1 requires MVS Release 3.8 with MVS Processor Support 2 installed. MVS/SP-JES3 Release 1 completely replaces MVS/System Extensions (5740-XE1).

In order to support the IBM 3380 or the IBM 3375 Direct Access Storage, the MVS Data Facility Device Support program product (5740-AM7) is required.

RMF users must install RMF Version 2 Release 3.

RMF users of the MVS/SP-JES3 Release 1 Enhancement must install the RMF Version 2 Release 3 Enhancement supporting the MVS/SP-JES3 Release 1 Enhancement.

The specified operating environment may change and will be restated at time of product availability.

## INSTALLATION CONSIDERATIONS

MVS/SP-JES3 Release 1 requires a stage 1 SYSGEN assembly together with a normal SMP Release 4 application. Alternatively, a full SYSGEN can be used for installation. The program directory will contain additional installation information.

To use the functions provided by RMF, the OS/VS2 MVS Resource Measurement Facility Version 2 Release 3 is required.

## MVS/SP-JES3 RELEASE 1 COMPATIBILITY

MVS/SP-JES3 Release 1 operates with the following JES3 products:

JES3 Release 3

Optionally with:

JES3 3800 Enhancements

JES3 Networking PRPQ 5799-AZT

User-written programs that use standard external interfaces should continue to execute on an MVS system with the MVS/SP-JES3 Release 1 installed. Programs that interrogate MVS system control blocks may require modifications. Licensees will receive documentation on changes in control blocks at the time of availability.

When migrating from an MVS Release 3.8 or an MVS/System Extensions Release 1 environment, changes in an installation's accounting procedures may be required because of enhancements to SMF. (See the *General Information Manual*, GC28-1025-0, for details.) IBM devices currently supported by MVS Release 3.8 will continue to be supported by MVS with MVS/SP-JES3 Release 1 installed.

Any Installation Performance Specification (IPS) that is compatible with MVS Release 3.8 or MVS/System Extensions can be used unchanged with MVS/SP-JES3 Release 1.

IBM program products currently supported on MVS Release 3.8 or MVS Release 3.8 with the MVS/System Extensions program product should continue to run with MVS/SP-JES3 Release 1 installed (although for RMF users, the appropriate RMF release must also be installed). APARs will be accepted for MVS/SP-JES3 Release 1 when any such IBM program product does not run successfully after MVS/SP-JES3 Release 1 is installed.

## MVS/SYSTEM PRODUCT-JES3 RELEASE 1 ENHANCEMENT

The enhancement for MVS/System Product-JES3 Release 1 provides the following functions:

- Support of the 3081, 3083 or 3084 Processor Complex.
- Support of the 3375 Direct Access Storage with the 3880 Storage Control mdls 1 and 2 is provided on the 3031, 3032 and 3033 Processors using the Data Streaming Feature. The 3375 Direct Access Storage is also supported on 4341, 4361-5 and 4381 Processors.
- Support of the 3880 Speed Matching Buffer Feature (#6550) with the 3031, 3032 and 3033 Processors and S/370 Mdl's 158 and 168.

DOCUMENTATION  
(available from Mechanicsburg)

OS/VS2 MVS/System Product-JES3 and OS/VS2 MVS/System Product-JES2 General Information Manual (GC28-1025-2).

RPQs ACCEPTED: No.

PROGRAM PRODUCTS

**MVS/SYSTEM PRODUCT-JES3  
MVS/SP-JES3 RELEASE 2 (5740-XYN)**

**PURPOSE**

MVS/System Product-JES3 Release 2 (MVS/SP-JES3 R2) incorporates all of the functional benefits of MVS/System Product-JES3 Release 1 and, in addition, provides functional and device support enhancements to the MVS Base Control Program and JES3. These enhancements offer an installation opportunities to reduce the system virtual storage requirements of system components and major subsystems, provide new facilities in the areas of multi-system support and operations management, as well as providing general functional and device support enhancements.

**DESCRIPTION**

MVS/SP-JES3 R2 consists of enhancements to two MVS components: The MVS Base Control Program (BCP) and JES3. The BCP component incorporates all of the functions of the BCP of MVS/SP-JES3 R1 and requires MVS Release 3.8 with the MVS Processor Support 2 function as prerequisites.

The BCP component of MVS/SP-JES3 R2 will operate with the JES3 component of MVS/SP-JES3 R2 or with the JES3 products that operate with MVS/SP-JES3 R1. The JES3 products supported in the latter case are:

- JES3 R3
- JES3 Networking PRPQ (5799-AZT)

This flexibility will enable an installation to stage its migration to MVS/SP-JES3 R2. When installed, the JES3 component of MVS/SP-JES3 R2 replaces JES3 R3 and the JES3 Networking PRPQ.

Note: JES3 R3 and JES3 R3 with the JES3 Networking PRPQ are supported with and without the JES3 3800 Enhancements.

**BASE CONTROL PROGRAM (BCP) COMPONENT HIGHLIGHTS**

The BCP component of MVS/SP-JES3 R2 incorporates all of the functions of the BCP of MVS/SP-JES3 R1 and, in addition, provides the following facilities:

- Cross Memory Services
- Global Resource Serialization
- Operational Interface enhancements
- Directed VIO
- Subsystem Definition facility

**CROSS MEMORY:** Cross Memory is an architectural extension supported by MVS. This extension facilitates communication among address spaces in an MVS/System Product-JES3 Release 2 environment. By providing a means to transfer data or program control directly between the private areas of address spaces, many benefits result. Because the prime users of Cross Memory services are intended to be MVS system components and subsystems, these benefits can be realized by an installation without any additional user programming. The benefits include:

- **Reduced System Virtual Storage Requirements:** The Cross Memory services of MVS/System Product-JES3 Release 2 enable the system virtual storage (Nucleus, PLPA, SQA, CSA) requirements for specific environments to be reduced. Certain data formerly found in the system virtual storage area can now be stored in new auxiliary address spaces and accessed via Cross Memory services. Such reduction can enable more system or private area virtual storage usage by other subsystems, new applications or current applications growth.
- **Enhanced Isolation:** The multiple address space structure of current MVS provides a considerable amount of data and program isolation. There are instances, however, when two address spaces must communicate with each other. This is generally accomplished through the scheduling of a Service Request Block (SRB) and involves the use of common virtual storage area (CSA/SQA). MVS/SP-JES3 R2 now provides the means by which inter-address space communication can occur without using common virtual storage, thereby isolating the program/data concerned from accidental modification or destruction by system components or authorized programs. Thus, the protection afforded to programs and data by the private area of an address space is extended to include instances of inter-address space communication.
- **Improved System Structure:** Currently, control block information residing in the common virtual storage area (CSA/SQA) is directly addressed by system components and other programs. Cross Memory services enables such control block information to be assigned to the private area of a system or subsystem auxiliary address space and accessed without the overhead of the current Service Request Block (SRB) mechanism. The isolation afforded by the private area of an address space allows controlled access to such data. The information required by system components, subsystems and their users can now be provided via an interface which is independent of the control block structures in the auxiliary address space. Reducing control block dependencies both

enhances system reliability and facilitates migration to new function.

- **Enhanced Authority Mechanism:** Cross Memory services provide the capability for authorized subsystems to define groups of address spaces having different levels of authorization for inter-address space communication. This represents a significant enhancement over existing facilities (for example, SRBs) which provide a single level of authorization to all address spaces (Key 0). Once such groups have been defined, a program may use Cross Memory services for inter-address space communication, but will be prohibited from accessing address space groups for which it has not been authorized.

**Cross Memory Usage:** Examples of system components/subsystems utilizing Cross Memory services in the MVS/SP-JES3 environment.

- Global Resource Serialization
- Operations Interface
  - Display Units (DU) command
- JES3 (optionally)
- IMS/VS

**GLOBAL RESOURCE SERIALIZATION**

- Global Resource Serialization, which extends the current ENQ/DEQ facility, provides additional function and improved RAS.
- Global Resource Serialization extends the ENQ function of resource serialization across system boundaries. Multiple MVS systems, interconnected through Channel-to-channel Adapters (CTCs), will now be able to serialize resource usage across systems.
- Additionally, Global Resource Serialization will run in its own address space utilizing the new Cross Memory architecture. Unlike the current ENQ facility, the Global Resource Serialization control blocks will reside in their own address space, thereby reducing the amount of system virtual storage required and, at the same time, improving the system RAS characteristics. By running in its own address space and by preventing addressability to its control blocks, Global Resource Serialization is isolating itself from accidental modification or destruction by other system components or authorized applications.
- Global Resource Serialization also addresses the need to provide information about resources without requiring that an application look at internal ENQ control blocks. MVS/SP-JES3 R2 eliminates dependencies on the structure of ENQ control blocks by providing a new macro service that allows applications to obtain resource status. Access to these control blocks is available only through this new macro service.
- Current ENQ/DEQ/RESERVE services provide three resource serialization scopes: STEP, SYSTEM and SYSTEMS. In a Global Resource Serialization environment, ENQ/DEQ requests specifying STEP or SYSTEM will be treated as requests for local resources and not communicated to other systems in the defined complex. ENQ/DEQ requests specifying SYSTEMS are requests for global resources and are communicated to all systems within the defined complex.

Global Resource Serialization provides the capability to override the default serialization from local to global, and vice versa, in instances where the SYSTEM and SYSTEMS scopes are used. This override is achieved by the invocation of exits that scan installation-specified 'inclusion' and 'exclusion' resource name lists. Global Resource Serialization invokes the 'inclusion' exit for each ENQ/DEQ request specifying a scope of SYSTEM (local serialization) to determine whether the installation requires that resource to be included in global serialization. For each ENQ/DEQ/RESERVE request specifying a scope of SYSTEMS (global serialization), the 'exclusion' exit is invoked to determine whether the installation requires that resource to be excluded from global serialization.

An exit that scans a RESERVE conversion list is also provided to allow device RESERVE requests to be overridden and converted to SYSTEMS (global serialization) requests, thereby allowing other systems in the defined complex to concurrently access the device.

Default exits and resource name lists are provided by IBM. An installation may modify these lists to meet the specific requirements of its operating environment.

- Thus, in the context of multi-system data set integrity, the conversion capabilities provided by Global Resource Serialization can be used to complement the data set level of serialization provided by JES3 Main Device Scheduling (MDS) by allowing existing RESERVE requests to be mapped to system-wide (global) ENQ requests and thereby avoid the volume level of serialization inherent in the use of the current RESERVE/RELEASE function.
- In order for an installation to achieve resource serialization across systems, the MVS systems must be interconnected via Channel-

**MVS/SP-JES3 R2 (cont'd)**

to-channel Adapters (CTCs). Global Resource Serialization requires dedicated CTCs, and, in order for an installation to obtain maximum configurability with Global Resource Serialization, each MVS system should have a CTC connection with every other system with which it serializes resource usage. To meet the additional CTC requirements of large installations, further CTC capability is provided for the 3033 Processor. For details, see RPQ 8P0882.

**OPERATIONAL INTERFACE ENHANCEMENTS**

A new facility, in conjunction with two enhanced commands, provides significant improvements in the operability of MVS Systems, particularly in large system installations. These enhancements allow the installation to reduce non-essential message traffic on the operator's console and also provide the operator with new system status information which will allow better control of job traffic and the I/O configuration.

- **Message Processing Facility (MPF):** The Message Processing Facility provides a means of reducing the number of messages to be displayed on the operator's console. The installation can determine the messages which it considers to be important and, through the use of this facility, suppress many non-essential ones.

The messages an installation wishes to suppress are listed by identifiers in a member of SYS1.PARMLIB. The SYS1.PARMLIB member selection may be changed at any time via the SET command and the message identifiers in use can be displayed by use of the DISPLAY MPF command. Suppressed messages are included in the hardcopy log with an indicator denoting the message has been suppressed.

**Note:** Action messages, command responses, responses from the Monitor (MN) command and Write to Operator with Reply (WTOR) messages (message codes 1, 2, 3, 5 and 11) will not be suppressed, even if they had been so specified by the installation.

- **Display Active (DA) Enhancements:** The DISPLAY A command is changed to provide additional information. It allows for improved operator awareness and displays information relevant to other operator commands. Included in this display are address space status, type of user, ASID, PER indicator, step must complete count, performance group number, domain number, CPU affinity, elapsed time, and CPU time for each address space.

The organization of the display is changed to better utilize the screen of the operator's console. The DISPLAY A command can also be restricted to one particular user (job, TSO user, etc.) or group of users with similar names so that it is easier to obtain the required pertinent information for specific users.

- **Display Units (DU) Enhancements:** Determining which jobs are using a device is important to a system operator or programmer trying to resolve why a device cannot be varied offline. With the enhancement to DISPLAY U, the operator can display the job names and ASIDs of device users, in order to decide what action should be taken. Improved recovery is also added to the allocation end of memory resource manager for shareable DASD devices. The additional system status information required for this extension is collected in a separate address space and accessed via Cross Memory services.

**DIRECTED VIO**

Directed VIO enables an installation to more effectively utilize high speed paging volumes for paging of critical response-oriented applications by separating VIO pages from these volumes. In addition, this facility will allow installations to utilize VIO more extensively and experience its benefits in environments where the limitation on high speed paging space was previously a concern.

A new keyword (NONVIO) is being provided as a system parameter, or as a PAGEADD option, to allow installations to specify local page data sets which are not to receive VIO pages. If enough other local page data set space is available, VIO pages will be directed to those local page data sets that were not on the directed VIO data set list. Only in the case of constrained VIO paging space can VIO pages potentially spill to the NONVIO local page data sets.

**OTHER ENHANCEMENTS**

- A Subsystem Definition Facility is provided to give an installation the capability of defining subsystems at IPL via one or more members of SYS1.PARMLIB, thereby eliminating the need to modify the Subsystem Name Table (IEFJSSNT).
- Several other enhancements have been made to the Base Control Program of MVS/System Product-JES3 Release 2 to facilitate the use of subsystems. Details of these enhancements will be documented in the *General Information Manual*, GC28-1025-0.

**JES3 COMPONENT**

The JES3 component of MVS/SP-JES3 R2 provides a generally compatible replacement to the JES3 R3 product, together with the functions of the JES3 3800 Enhancement, and is designed to improve the operational environment for JES3 users through enhancements to existing functions and the provision of new facilities. These include enhancements to the reliability and recovery aspects of the spooling subsystems, early tape volume release for jobs creating multi-volume tape data sets, two additional user exits, support of the 3375 and the 3380 Direct Access Storage devices in the JES3 spool environment, and support of the 3278 and 3279 display units in the JES3 console environment. New facilities include the option for the installation to reduce JES3's usage of system virtual storage, the support of the Message Processing Facility see BCP component of R2) in the JES3 console environment, and the provision of job networking capabilities for the JES3 Global Processor to enable its communication with other networking nodes (MVS/SP-JES3 R2, MVS/SP-JES2 R2, VM/SP with RSCS Networking program product, etc.) via Channel-to-channel adapters (CTCs) or binary synchronous communication lines. The job networking function was previously available only through the JES3 Networking PRPQ (5799-AZT).

**JES3 HIGHLIGHTS of MVS/SP-JES3 R2**

- **Spool Partitioning and RAS Facilities:** JES3 RAS characteristics are improved by permitting an installation to partition the JES3 spool. This reduces the likelihood that a single volume failure will result in the loss of the entire spool. New inquiry and modify capabilities allow an operator to determine those jobs affected by a volume failure and take actions consistent with installation objectives.
- **3375 and 3380 Direct Access Storage Support:** The 3375 and 3380 Direct Access Storage devices are supported as JES3 spool devices.
- **Common Service Area (CSA) Reduction:** Optionally, JES3's use of Common Service Area can be substantially reduced through the use of Cross Memory facilities and a new JES3 auxiliary address space. This allows for expanded CSA or private area for the subsystems, new applications or current application growth.
- **Job Networking:** Provides for the transmission of selected jobs and in-stream data sets, operator commands and messages, system output data sets, and job accounting information from one computer system to another across a communications link (binary synchronous or Channel-to-channel). This incorporates the functions previously available through the JES3 Networking PRPQ (5799-AZT).
- **Early Volume Release:** The user can specify that the tape volume used by a job is to be made available to other jobs at end of volume.
- **Message Processing Facility (MPF):** Users can elect to suppress the display of particular non-action JES3 messages which will appear only on the log devices.
- **3278/3279 Display Unit Support:** Support of these terminals by JES3 allows the user to take advantage of larger screen size and the 24 Program Function Keys.

**MVS/SP-JES3 RELEASE 2: JES3 COMPONENT DESCRIPTION**

**Job Entry Subsystem 3 - JES3:** The JES3 component of MVS/SP-JES3 Release 2 is designed to improve the operational environment of the computer installation by aiding many of the operator functions. JES3 can improve installation workload scheduling, increase the workload capacity, and reduce turnaround time. JES3 provides a single system image for the execution of many jobs concurrently on the connected processors.

JES3 can support up to eight JES3 processors, any of which can be a tightly coupled multiprocessor, operating under the control of MVS/SP-JES3 Release 2. A JES3 configuration consists of a global processor that controls all job input and output, and the scheduling of time sharing users, batch jobs and, optionally, devices. One to seven additional JES3 processors, called *JES3 local processors*, can be connected to the JES3 global processor. Each processor is attached to the JES3 global processor by a channel-to-channel (CTC) adapter which is used to interchange control information. The JES3 global processor handles all SYSIN and SYSOUT to and from peripheral devices.

JES3 design and the shared spool concept help to improve the overall complex availability by permitting any JES3 local processor, if properly configured, to assume JES3 global functions. Should the JES3 global processor fail in a loosely coupled multiprocessing configuration, the operator can move the JES3 global function to any properly configured JES3 local processor. The degree of this availability depends on the presence of appropriate alternate CTC paths and switchable peripheral devices.

The JES3 global processor must operate under MVS/SP-JES3 R2. Remote job processing from binary synchronous communications (BSC) and systems network architecture (SNA) terminals is supported. JES3

PROGRAM PRODUCTS

**MVS/SP-JES3 R2 (cont'd)**

also provides multiprogrammed background utilities which the operator can invoke.

As the installation workload grows, capacity can be increased by increasing the size of processors, by using multiprocessor configurations, and/or by adding additional JES3 local processors, operating under the control of MVS/SP-JES3 R2. JES3 enables such expansion with minimal disruption to the operational environment. Jobs are distributed to available processors depending on job priority, device requirements, user specification, and processor dependencies. (A processor dependency is an attribute of a job that requires it to execute on a specific JES3 processor. For example, if a job uses a device that is attached to only one processor, then the job has a processor dependency and must execute on the processor that can access the device).

**Some of the features of JES3 are:**

- Single operator interface to the entire system.
- Complex-wide data set integrity.
- Job Networking (BSC).
- Automatic scheduling of interdependent jobs (dependent job control).
- Optional auxiliary address space to reduce CSA requirements.
- Generalized peripheral scheduling and improved output service that includes related INQUIRY/MODIFY processing.
- Performance features, for example:
  - Ordered seek I/O queuing
  - SIO drivers for RJP, CTCs, spool and printers
  - Unserialized path for allocation
  - VTAM authorized path
  - Main store resident control blocks
- Extensive RAS capability, for example:
  - Functional recovery routines
  - ESTAE recovery routines
  - Alternate Path Channel-to-channel (ACTC)
  - Dynamic system interchange
  - Spool I/O error recovery, partitioning and RAS support
  - HOTSTART of JES3 address space
  - WARMSTART of JES3 system
- Automatic scheduling of up to seven attached local processors (including multiprocessors).
- Centralized console service with message suppression.
- Logical device grouping with consoles defined for the group.
- Installation-specified, operator-controlled job selection algorithms for scheduling local processors.
- Numerous user exits.
- Deadline scheduling.
- Simulated console support for non-programmable remote terminals (2770, 2780, 3780).
- Multitasking of the Converter/Interpreter and locates.
- Checkpoint/Restart support for jobs.
- SMF support.
- Early JCL diagnosis through JES3's use of the VS2 Converter and Interpreter.
- Support of TSO Foreground Initiated Background functions.

**Job Networking:** This facility provides for the transmission of selected jobs, in-stream data sets, operator commands and messages, system output data sets and job accounting information from one computer complex to another across binary synchronous telecommunications facilities or channel-to-channel adapters. The use of standard interface protocols enables communication among similar and dissimilar operating systems such as MVS/SP-JES3 R2, MVS/SP-JES2 R2 and VM/SP and the RSCS Networking program product. Routing from the originating network node to the destination node is controlled by a routing table at each node in the path. Strings of duplicated characters are compressed into shorter representations, reducing data flow between nodes. Operator commands permit manual intervention to control the network. JES3 Networking utilizes the security functions normally in effect at each node.

**REMOTE JOB PROCESSING (RJP)**

**Binary Synchronous Communication (BSC):** JES3 Remote Job Processing (RJP) permits the input, processing and output of jobs to and from terminals remote from the installation. This function is achieved through the use of the 3704 or 3705 Communications Controller (emulator mode), the 2701 Data Adapter, or the 2703 Transmission Control Unit to interface with binary synchronous communication (BSC) terminals. BSC remote terminals are used as remote card readers, printers and card punches, with job output routed optionally to any remote terminal or local output device.

For detailed information related to JES3 BSC RJP, see *Introduction to JES3*, GC28-0607.

**Synchronous Data Link Control (SDLC):** JES3 SNA RJP provides JES3 remote job processing support for SNA terminals in a terminal-sharing environment where multiple applications may establish logical connections with the terminal on a per-session basis. To achieve this flexibility of terminal-sharing, JES3 uses the VTAM or ACF/VTAM Version 1 or ACF/VTAM Version 2 application program interface for the support of the SDLC terminals which are attached to a 3704/3705 in network control mode.

SDLC job entry stations supported by JES3 are the 8100 Information System under DPPX or DPPX/SP, the 8100/DPCX Information System, the 5280 Distributed Data System, the 3790 Communication System and the 3770 Data Communication System (except for the 3773 mds P1, P2 and P3, all SDLC models are supported). Multiple Logical Unit (MLU) 3776 mds 3, 4 and 3777 mds 3, 4 with up to six independent and concurrent sessions are supported and System/36 is supported by Multiple Logical Units. Also supported are the 3262 Line Printer mds 2, 12, the 3784 Line Printer, the 3203 Printer mdl 3, the 3521 Card Punch, the 3501 Card Reader, and the 2502 Card Reader when attached to a 3770. In addition, JES3 supports the 6670 Information Distributor (SNA version) through the MVS/Information Distribution Workstation Support (see program product 5740-AMA). The 3790 Communication System and 8100/DPCX Information System support a single RJE workstation which can handle up to five logical concurrent processing sessions with JES3.

Functional characteristics of the JES3 SNA RJP support for SDLC terminals are as follows:

- Half duplex session flow.
- Multidrop operation.
- 3770 diskette, 8100/DPPX or DPPX/SP disk operations, 8100/DPCX disk operations, and 3790 disk operations are transparent to JES3.
- Data stream provides compression of repeated characters outbound to the 8100 Information System under DPPX or DPPX/SP with DPPX/RJE or DPPX/SP RJE, the 3790 Communication System, the 8100/DPCX Information System, the System/34, the System/36, and to the 3770 Data Communication System.
- Data compaction is supported outbound to the 8100 Information System under DPPX with DPPX/RJE or DPPX/SP with DPPX/SP RJE, the 3790 Communication System, the 3776 mds 3 and 4, the 3777 mds 1, 3 and 4 of the 3770 Data Communication System, and the 8100/DPCX Information System.
- Single or multiple LUs (allowing multiple sessions) in a job entry station.
- Provides device setup for the 3790 and the 8100 Information System under DPPX with DPPX/RJE or DPPX/SP with DPPX/SP RJE, and 8100/DPCX by use of the Peripheral Data stream Information Record (PDIR).

**JES3 JOB MANAGEMENT**

**Input Service:** Input Service consists of two phases, each consisting of several non-resident modules:

- **Reader phase:** Jobs are read from an input device and placed on a spool in batches.
- **Control statement processing phase:** Jobs are read from the spool and processed.

**Interpreter Service:** Interpreter service converts JCL statements to scheduler control blocks (SCBs) for use by the scheduler component. It also determines resource requirements and creates control blocks for use by JES3 main device scheduler (MDS) function. Every job must pass through the interpreter service before it can be scheduled for execution. This service comprises primarily the converter/interpreter (C/I) dynamic support programs (DSPs).

The critical option in creating MDS control blocks is choosing the type of setup for JES3-managed devices. The setup options available with JES3 are:

1. **Job Setup:** The interpreter assigns each unique volume used throughout the job to a separate device, except where JCL explicitly indicates otherwise. This type of setup generally improves job turnaround at the expense of efficient device usage.
2. **High Watermark Setup:** The interpreter assigns a number of mountable devices (discounting permanently resident or reserved

**MVS/SP-JES3 R2 (cont'd)**

volumes) of each device type equal to the maximum number of volumes required in any single job step, unless the JCL explicitly indicates otherwise. This type of setup makes efficient use of devices, but may slow job turnaround due to dismounting and mounting of volumes.

3. **Explicit Setup:** The programmer specifies in a JES3 control statement which DD statements are (and which are not) to be setup.

The entire MDS function is optional, and additionally, the automatic setup options (job and high watermark) are separately selectable for DASD, tape and MSS virtual devices. These options are supplied as an installation default and can be overridden by JES3 control statements.

**Data Resource Management:** The main device scheduler (MDS) is a JES3 facility that controls the setup of resources (devices, volumes and data sets) associated with job execution on a processor. MDS services consist of volume fetching, allocation of data resources, volume mounting and verification, and deallocation of data resources. MDS services are part of the main scheduler element in normal job processing. Once a job is in execution, MDS services can also be invoked to process dynamic allocation requests.

**Volume Fetching:** MDS determines a job's requirements for mountable volumes and issues operator messages to a tape or DASD library, requesting that the required volumes be "fetched" to the computer area. As an installation option, after the issuing of these messages, MDS will either make the job immediately eligible for data resource allocation, or will wait for operator "go ahead" that the required volumes are available.

**Data Resource Allocation:** Data resource allocation facilities fall into three overlapping categories: (1) Selection of a job relative to other jobs competing for resources; (2) selection of an eligible processor on which to attempt allocation; (3) assignment of devices, volumes and data sets to the selected job.

**Selecting a Job:** In general, jobs are considered for data resource allocation in priority order. The first job that can acquire data resources on an eligible processor will be granted those resources.

**Selecting a Processor:** This choice of a "setup" processor does not restrict the eligibility of that job to run on only that processor. In allocating devices, preference is given to devices that are shared by other processors eligible to execute the job. If all devices allocated to the job are shared by another processor, that processor also remains eligible to run the job.

**Allocating Data Sets, Volumes and Devices:** JES3 provides data set integrity protection across processors in the JES3 complex in accordance with the JCL-specified data set disposition and dynamic allocation. This means that a job which holds exclusive access to a data set will prevent other jobs from allocating successfully.

MDS keeps track of the volume currently mounted on each device to minimize volume movement and attempts to satisfy further requests for the volume on the device where it is already mounted. MDS supports dynamic device reconfiguration (DDR) through the subsystem interface.

**Volume Mounting and Verification:** Once all required resources have been assigned to a job, MDS issues "mount" messages, requesting that the operator mount the first required volume on a specified device. MDS then verifies that each volume has been correctly mounted by reading its volume label.

Once all required volumes for a job have been mounted and verified, the job is passed to the generalized main scheduler (GMS) for execution processing selection.

**JES3 3850 MSS Features include:** Allocation to mounted volumes for non-specific requests for new, non-VSAM data sets.

Access to Mass Storage Volumes can be shared by all JES3 system processors physically connected to the same 3850.

Virtual units may be partitioned (fenced) for use by specific job class groups or dependent job networks.

Data reuse is encouraged (without access to 3850 controller tables).

JES3 algorithms attempt to equalize the amount of staging/destaging activity across Staging Drive Groups.

Multiple 3850s can be supported in a JES3 loosely coupled processor configuration, where each 3850 is attached to a separate host (as previously announced, one operating system can only be attached to one MSS).

**Deallocation of Data Resources:** During job execution, MDS or DYNAL is notified, as each step completes, to deallocate resources that are not required by subsequent steps of the job (early resource release). Data resources may also be returned in the midst of job step execution via the dynamic deallocation subsystem interface. Finally, any resources still held at job end are released at that time. In all cases, returned resources immediately become available for assignment to other jobs.

**Job Scheduling:** JES3 functions as a resource manager and job scheduler. The scheduling and selection of jobs for execution are major functions of the job entry subsystem. JES3 provides a unique set of these functions that are especially designed for the multiprocessing environment. These functions are generalized main scheduling, which determines which jobs should be scheduled to execute on a processor; deadline scheduling, increasing the priority of a job when it has been scheduled to make the best use of the available resources; and dependent job control which allows jobs to be executed in a specified order.

Selection of a job for a processor is based on the capacity of that processor to provide sufficient resources. JES3 supports pooled devices among processors to further control job/processor selection.

**Generalized Main Scheduling:** Jobs are selected for execution by the generalized main scheduling (GMS) facility of JES3. Initialization parameters define the characteristics of each processor, job-selection mode criteria, and jobs categorized by class.

GMS uses the priority parameters specified at initialization to help select jobs for execution. The hierarchy of priorities is:

1. Processor priority (dynamic)
2. Job Class priority.

The priority aging feature allows JES3 to increase the priority of a job after it has been passed over for selection by JES3 an installation-specified number of times, because of a low priority relative to that of other jobs in the system. At an installation-specified priority barrier, JES3 will attempt to prevent lower priority jobs from capturing idle resources if they are known to be needed by a job at or above the barrier priority.

**Deadline Scheduling:** Deadline scheduling provides job scheduling algorithms that increase the probability of a job being scheduled by a specific time. The job's selection priority may be dynamically incremented as the job approaches its deadline for entering execution.

The deadline scheduling feature allows the installation to specify a time of day by which the job should be scheduled. If the job is not scheduled by this time, JES3 will increase the priority of the job at user-defined intervals until it is scheduled.

**Dependent Job Control:** Dependent Job Control (DJC) allows jobs to be executed in a specific order. DJC is a function within the JES3 system that manages jobs that are dependent upon each other. Job dependencies may occur because of data dependencies; they may be defined so as to achieve better device utilization; or they may be defined so as to manage job streams.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

MVS/System Product-JES3 Release 2 requires the appropriate S/370 Extended Feature on IBM S/370 mdls 158 (#7730 or #7731) and 168 (#7730). MVS/System Product-JES3 Release 2 supports the following processors:

IBM mdl 158-1	UP/MP/AP
IBM mdl 158-3	UP/MP/AP
IBM mdl 168-1 with RPQ S20579	UP/MP
IBM mdl 168-1 with RPQ S20580	AP
IBM mdl 168-3	UP/MP/AP
IBM 4341 Processor Mdl Group 1	UP
IBM 4341 Processor Mdl Group 2	UP
IBM 4361 Processor Mdl Group 5	UP
IBM 4381 Processor	UP
IBM 3031 Processor	UP/AP
IBM 3032 Processor	UP
IBM 3033 Processor	UP/MP/AP
IBM 3033 Processor Mdl Group N	UP
IBM 3033 Processor Mdl Group S	UP
IBM 3081 Processor Complex	Dyadic
IBM 3083 Processor Complex	UP
IBM 3084 Processor Complex	Dyadic

Details concerning optional 3033 Extension feature for 3033 processors may be found in the Machines section.

**SOFTWARE REQUIREMENTS**

MVS/System Product-JES3 Release 2 requires MVS Release 3.8 with MVS Processor Support 2 installed.

In order to support the following functions and devices in MVS/SP-JES3 Release 2, Data Facility Device Support program product (5740-AM7) is required:

- JES3 Early Volume Release
- Checkpoint/Restart facilities
- 3375 Direct Access Storage
- 3380 Direct Access Storage

Details of the MVS Data Facility Device Support program product may be found in the announcement letter.

RMF users must install RMF Version 2 Release 4.

**MVS/SP-JES3 R2 (cont'd)**

MVS/System Product-JES3 Release 2 consists of enhancements to two MVS components: The MVS Base Control Program (BCP) and JES3. The BCP component of MVS/System Product-JES3 Release 2 replaces the BCP component of MVS/System Product-JES3 Release 1. The JES3 component of MVS/System Product-JES3 Release 2 replaces both JES3 R3 and the JES3 Networking PRPQ (5799-AZT). In addition, the 3800 Enhancements provided for JES3 R3 are incorporated into the JES3 component of MVS/SP-JES3 R2. Installation details for MVS/SP-JES3 R2 will be provided at availability.

**MVS/SYSTEM PRODUCT-JES3 RELEASE 2 COMPATIBILITY**

User-written programs that use standard external interfaces should continue to execute on MVS Release 3.8 with the MVS/System Product-JES3 Release 2 installed. Programs that interrogate MVS system control blocks may require modifications. Documentation on MVS/System Product-JES3 Release 2 control blocks will be available March, 1981.

When migrating from an MVS Release 3.8 or an MVS/System Extensions R1 environment, changes in an installation's accounting procedures may be required because of enhancements to SMF (see the *General Information Manual*, GC28-1025-0).

IBM devices currently supported by MVS Release 3.8 will continue to be supported by MVS with the MVS/System Product-JES3 Release 2 installed.

Any Installation Performance Specification (IPS) that is compatible with MVS Release 3.8, the MVS/System Extensions program product or MVS/System Product-JES3 Release 1 can be used unchanged with MVS/System Product-JES3 Release 2.

IBM program products currently supported on MVS Release 3.8, or MVS 3.8 with the MVS/System Extensions program product, or MVS 3.8 with MVS/System Product-JES3 Release 1 should continue to run with MVS/System Product-JES3 Release 2 installed (although for RMF users, the appropriate RMF release, RMF V2 R4, must also be installed). APARs will be accepted for MVS/System Product-JES3 Release 2 when any such IBM program product does not run successfully after MVS/System Product-JES3 Release 2 is installed.

**DOCUMENTATION**  
(available from Mechanicsburg)

*OS/VS2 MVS/System Product-JES3 and OS/VS2 MVS/System Product-JES2 General Information Manual (GC28-1025-2).*

**RPQs ACCEPTED:** No.

PROGRAM PRODUCTS

**MVS/SYSTEM PRODUCT-JES3  
MVS/SP-JES3 RELEASE 3 (5740-XYN)**

**PURPOSE**

MVS/System Product-JES3 Release 3 provides all of the functions of MVS/System Product-JES3 Release 2 together with: The ability to achieve new levels of capacity and responsiveness on 3033 processors via performance improvements implemented in conjunction with the 3033 Extension Feature; support for the Extended Addressing Feature, permitting up to 32 megabytes of addressable storage on 3033, 3081, 3083 and 3084 processors, thereby providing potential for further capacity and responsiveness; significant improvements in System RAS; extensions to the reconfiguration and recovery aspects of Global Resource Serialization; and the potential further savings in the system virtual storage requirements. RMF support for MVS/System Product-JES3 Release 3 is provided by a feature for RMF Version 2 Release 4.

**BASE CONTROL PROGRAM HIGHLIGHTS**

**Performance:** The performance improvements are achieved through:

- Reduction in processor execution time for high frequency control program functions.

Usage of the 3033 Extension Feature by many MVS components in combination with code optimization has resulted in shorter path lengths and reduced processor execution time for several highly used system functions. In particular, several system functions have been restructured to perform more effectively on IBM's large processors (3033 UP and above).

- Reduction in I/O wait time.

Restructure of the MVS paging subsystem and use of new slot allocation algorithms results in reduced I/O wait time for paging and swapping.

- Reduction in I/O through use of extended real storage.

MVS/SP R3 will utilize extended real storage to eliminate demand paging and swapping I/O operations, thereby freeing processor capacity for additional productive work and reducing I/O wait time.

These improvements yield increased system throughput and responsiveness:

- Measurement and projection of test environments indicate that the MVS/System Product Release 3 will provide the following performance benefits to 3033 users with the 3033 Extension Feature installed in comparison to MVS/System Extensions Release 2:
  - Throughput improvements generally of the order of 11% (UP) and 12% (AP/MP) for TSO/Batch environments.
  - Throughput improvements of approximately 6% on UP and AP/MP for Batch intensive environments.
  - Throughput improvements of approximately 7% on Batch, more on AP/MP for IMS/Batch environments. The IMS/VS projections utilized the then most current level of IMS/VS Version 1 Release 2 available in the fourth quarter of 1981.
  - Throughput improvements generally of the order of 6% for intensive Batch and online IMS/Batch environments, with 3033 AP/MP environments experiencing additional throughput. The IMS/VS projections utilize the then most current level of IMS/VS Version 1 Release 2 available in the fourth quarter of 1981.
- Further throughput gains of up to 5% are expected for large multi-system establishments. Some of the performance improvements within MVS/SP R3 are sensitive to user I/O configuration and workload, the performance benefit increasing as size of I/O configuration and I/O rates increase, with the largest benefit accruing to processors configured for multi-system environments.
- New paging algorithms allow TSO environments to improve response time with increased capacity.

**Extended Addressing:** For customers who install the Extended Addressing Feature of the 3033 and additional storage, potential throughput improvements greater than those described above may be realized. MVS efficient use of additional real storage to eliminate paging I/O operations allows interactive environments such as TSO and IMS/VS to experience improved response time.

The actual performance benefit that an installation will experience will vary depending upon such considerations as customer environment and customer usage of the product improvements. The working sets of new system address spaces created in MVS/SP R2 and R3 may result in an increased real storage requirement and increased paging rates for some installations. No assurance can be given that an individual user will achieve the projected results.

**New Levels of System RAS:** The RAS enhancements provided by MVS/System Product Release 3 are a result of detailed studies of large MVS installations in 1978. They seek to avoid unscheduled IPLs caused by problems in the areas of I/O equipment, the MVS control program and operations.

Estimates indicate that over 20% of the unscheduled IPLs resulting from problems in these areas in the 1978 study have already been addressed by the general solutions in currently available products such as MVS Processor Support 2. MVS/System Product Release 3 now provides additional general solutions to detect and recover from such problems.

Projections for a 3033 environment indicate that MVS/System Product Release 3 addresses a further 19% of the unscheduled IPLs that resulted from problems in these areas in the 1978 study.

In addition, extensions have also been made to the recovery aspects of the Global Resource Serialization facility introduced in MVS/SP-JES3 R2.

**Other Enhancements:**

- The potential for additional savings in Common Service Area virtual storage.
- Utilization of Cross Memory Services by the Console Communications task provides the potential for further savings in Common Service Area virtual storage requirements.

**JES3 Considerations:** The JES3 component of MVS/SP-JES3 Release 3 provides a service update to the JES3 component of MVS/SP-JES3 Release 2.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

MVS/SP-JES3 Release 3 is designed to operate with the Extended Control Program Support Facility for MVS (ECPS:MVS) on IBM 4341, 4361-5 or 4381 Processors and the appropriate S/370 Extended Feature on S/370 mds 158 (feature #7730 or #7731) and 168 (feature #7730). MVS/SP-JES3 JES3 Release 3 is designed to operate on the following IBM machines:

Model 158-1	UP/MP/AP
Model 158-3	UP/MP/AP
Model 168-1 with RPQ S20579	UP/MP
Model 168-1 with RPQ S20580	AP
Model 168-3	UP/MP/AP
4341 Processor Model Group 1	UP
4341 Processor Model Group 2	UP
4361 Processor Model Group 5	UP
4381 Processor	UP
3031 Processor	UP/AP
3032 Processor	UP
3033 Processor	UP/MP/AP
3033 Processor Model Group N	UP
3033 Processor Model Group S	UP
3081 Processor Complex	Dyadic
3083 Processor Complex	UP
3084 Processor Complex	Dyadic

**SOFTWARE REQUIREMENTS**

MVS/SP-JES3 Release 3 is designed to operate with MVS 3.8 with the MVS Processor Support 2 installed. The functions provided by either Data Facility Device Support Release 1 (5740-AM7) program product, or the MVS/370 Data Facility Product (5665-295) program product are required by the users of one or more of the following:

- The IBM 3375 Direct Access Storage
- The IBM 3380 Direct Access Storage
- Checkpoint/restart
- Extended Addressing feature and additional main storage beyond 16 megabytes

RMF users must install the RMF Version 2 Release 4 Enhancement that supports MVS/SP R3.

MVS/SP-JES3 Release 2 consists of enhancements to the MVS Base Control Program (BCP). The BCP component of MVS-SP-JES3 Release 3 replaces and enhances the BCP component of MVS/SP-JES3 Release 2. The JES3 component of MVS/SP-JES3 Release 3 is a service update to the JES3 component of MVS/SP-JES3 Release 2. Release 2 users who have the JES3 component of Release 2 installed will not be required to reinstall this component when migrating to Release 3.

**DOCUMENTATION**  
(available from Mechanicsburg)

*MVS/System Product General Information Manual (GC28-1025-2)*

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**MVS/SYSTEM PRODUCT-JES3  
VERSION 1 RELEASE 3.1  
MVS/SP-JES3 (5740-XYN)**

**PURPOSE**

MVS/SP-JES3 Version 1 Release 3.1 is a JES3-only update to MVS/SP-JES3 Version 1 Release 3. It consists of a complete replacement for the JES3 component in MVS/SP-JES3 Version 1 Release 3. The JES3 component of MVS/SP-JES3 Version 1 Release 3 provided a generally compatible replacement to the JES3 Release 3 (SU 26) product, together with the functions of the JES3 3800 Enhancement and the JES3 Networking PRPQ (5799-AZT).

**JES3 HIGHLIGHTS OF MVS/SP-JES3 V1 R3.1**

- Performance Improvements
  - Writer Output Multitasking
 

Enhancements to the JES3 output writer that permit a JES3 global to utilize IBM's tightly coupled processors more effectively are included in MVS/SP - JES3 Release 3.1. Writer output multitasking is a new feature that can be optionally invoked to offload a part of the JES3 writer processing from the primary JES3 task to a new task in the JES3 address space. The new task will support writer processing for the JES3 output writers - both local and remote.
- RAS Improvements
  - CTC Recovery Improvements
 

START command keywords and WTOR options allow the operator to redrive the primary CTC or switch to an alternate CTC on error situations.
  - JES3 Hotstart After MEMTERM
 

JES3 is changed to allow a hotstart without a re-IPL after the JES3 address space abnormally terminates (MEMTERM).
  - Initialization Recovery
 

JES3 initialization recovery provides increased flexibility in bringing up JES3, even though there may be certain errors in the initialization parameters, by substituting JES3 defaults for those parameters. Previously, JES3 terminated if such errors were detected in the initialization stream. This change allows an installation to correct the initialization stream errors using an active JES3. JES3 must be restarted to incorporate these corrections.
  - Out-of-Storage Errors
 

JES3 recovery processing is changed to free two 8K blocks of storage upon detection of an out-of-storage condition (80A, 878, or 804 ABEND) in the primary JES3 address space. This action increases the probability that recovery routines will complete without also encountering an out-of-storage condition. The operator will be notified of the out-of-storage condition when the next JES3 function is dispatched.
  - DD Statement Limits
 

The DD statement limits allow an installation to prevent an out-of-storage condition in the JES3 address space due to control block space required for DD statements. The installation will be able to specify limits for the number of DD statements in a job and/or the total number of DD statements allowed in JES3 converter/interpreter processing at one time. If a job exceeds the job DD statement limit, JES3 will cancel the job unless the installation overrides this decision in a new JES3 user exit routine.

If a JES3 converter/interpreter (C/I) subtask detects that the installation-defined limit for total number of DD statements in C/I processing is exceeded, the C/I subtask will WAIT until the limits are no longer exceeded. C/Is dedicated to TSO LOGONS do not participate in the DD limiting actions.

Operator commands are provided to allow dynamic installation control over both limits.
- DDR for Shared Tape
 

JES3's capacity to swap tape drives if a device fails or at the request of the operator is increased by allowing tape drives to be swapped with other tape drives regardless of the shared/nonshared status of the drives. Also, the eligible tape drives can be devices that are:

  - Being used by jobs that have not completed job set up processing.
  - Fenced for jobs of a different group than the job using the original tape drive.

- Operational Characteristics Enhancements

- Networking User Exit Standardization

The seven nonstandard user exits in JES3 networking are upgraded to make the networking user exits compatible with the rest of the JES3 user exits.

- SMF Exploitation

With SMF exploitation, the JES3 installation can selectively record the JES3-related SMF records and selectively invoke the JES3-related SMF user exit routines based on the work category of the associated job. The work categories include started tasks, TSO-related work, and batch work.

- MSS VUA Checkpoint

JES3 support for the 3850 Mass Storage System (MSS) is enhanced to include the offline/online status of MSS virtual units in new checkpoint records. This will allow the status of MSS virtual units to be preserved over a JES3 hotstart

- TSO Extensions (TSO/E) Support

JES3 supports the Interactive Data Transmission Facility (TRANSMIT and RECEIVE) commands included in the TSO/E Program Product (5665-285). JES3 interfaces with TSO to allow the transmission and receipt of data between specific users at different nodes in a network. JES3 will also issue a TSO SEND command to notify JES3 users of the receipt of data at their node. A new JES3 user exit is provided to allow the installation control over this TSO SEND function.

**MVS/SP-JES3: JES3 COMPONENT DESCRIPTION**

**JOB ENTRY SUBSYSTEM 3 - JES3:** The JES3 component of MVS/SP-JES3 is designed to improve the operational environment of the computer installation by aiding many of the operator functions. JES3 can improve installation workload scheduling, increase the workload capacity, and reduce turnaround time. JES3 provides a single system image for the execution of many jobs concurrently on the connected processors.

JES3 can support up to eight JES3 processors, any of which can be a tightly coupled multiprocessor, operating under the control of MVS/SP-JES3. A JES3 configuration consists of a global processor that controls all job input and output, and the scheduling of time sharing users, batch jobs and, optionally, devices. One to seven additional JES3 processors, called JES3 local processors, can be connected to the JES3 global processor. Each processor is attached to the JES3 global processor by a channel-to-channel (CTC) adapter which is used to communicate control information. The JES3 global processor handles all SYSIN and SYSOUT data to and from peripheral devices.

JES3 design and the shared spool concept help to improve the overall complex availability by permitting any JES3 local processor, if properly configured, to assume JES3 global functions. Should the JES3 global processor fail in a loosely coupled configuration, the operator can move the JES3 global function to any properly configured JES3 local processor. The degree of this availability depends on the presence of appropriate alternate CTC paths and switchable peripheral devices.

As the installation workload grows, capacity can be increased by increasing the size of processors, by using multiprocessor configurations, and/or by adding additional JES3 local processors, operating under the control of MVS/SP-JES3. JES3 enables such expansion with minimal disruption to the operational environment. Jobs are distributed to available processors depending on job priority, device requirements, user specification, and processor dependencies. (A processor dependency is an attribute of a job that requires it to execute on a specific JES3 processor. For example, if a job uses a device that is attached to only one processor, then the job has a processor dependency and must execute on the processor that can access the device).

Remote job processing from binary synchronous communications (BSC) and systems network architecture (SNA) terminals is supported. JES3 also provides multiprogrammed background utilities which the operator can invoke.

**SOME OF THE FEATURES OF JES3 ARE:**

- Single operator interface to the entire system.
- Complex-wide data set integrity.
- Job Networking (BSC).
- Automatic scheduling of interdependent jobs (dependent job control).
- Optional auxiliary address space to reduce CSA requirements.
- Generalized peripheral scheduling and improved output service that includes related INQUIRY/MODIFY processing.
- Performance features, for example:

PROGRAM PRODUCTS

MVS/System Product-JES3 V1 R3.1 (cont'd)

- Ordered seek I/O queuing.
- SIO drivers for RJP, CTCs, spool and printers.
- Unserialized path for allocation.
- VTAM authorized path.
- Main store resident control blocks.
- Optional invocation of JES3 writer processing as a separate JES3 task in the JES3 address space. This provides more utilization of IBM's tightly coupled processors.
- Extensive RAS capability, for example:
  - Functional recovery routines.
  - ESTAE recovery routines.
  - Alternate Path Channel-to-channel (ACTC).
  - Dynamic system interchange.
  - Spool I/O error recovery, partitioning and RAS support.
  - HOTSTART of JES3 address space.
  - HOTSTART without an IPL after JES3 abnormal termination (MEMTERM).
  - WARMSTART of JES3 system.
- Facilities to help prevent and recover from JES3 out-of-storage conditions.
- Automatic scheduling of up to seven attached local processors (including multiprocessors).
- Centralized console service with message suppression.
- Logical device grouping with consoles defined for the group.
- Installation-specified, operator-controlled job selection algorithms for scheduling local processors.
- Numerous user exits.
- Deadline scheduling.
- Simulated console support for non-programmable remote terminals (2770, 2780, 3780).
- Multitasking of the Converter/Interpreter and locates.
- Checkpoint/Restart support for jobs.
- SMF support.
- Early JCL diagnosis through JES3's use of the VS2 Converter and Interpreter.
- Support of TSO Foreground Initiated Background functions.

**JOB NETWORKING:** This facility provides for the transmission of selected jobs, in-stream data sets, operator commands and messages, system output data sets and job accounting information from one computer complex to another across binary synchronous telecommunications facilities or channel-to-channel adapters. The use of standard interface protocols enables communication among similar and dissimilar operating systems such as MVS/SP-JES3, MVS/SP-JES2 and VM/SP and the RSCS Networking program product. Routing from the originating network node to the destination node is controlled by a routing table at each node in the path. Strings of duplicated characters are compressed into shorter representations, reducing data flow between nodes. Operator commands permit manual intervention to control the network. JES3 Networking utilizes the security functions normally in effect at each node.

**REMOTE JOB PROCESSING (RJP)**

**BINARY SYNCHRONOUS COMMUNICATION (BSC):** JES3 Remote Job Processing (RJP) permits the input, processing and output of jobs to and from terminals remote from the installation. This function is achieved through the use of the 3704 or 3705 Communications Controller (emulator mode), the 2701 Data Adapter, or the 2703 Transmission Control Unit to interface with binary synchronous communication (BSC) terminals. BSC remote terminals are used as remote card readers, printers and card punches, with job output routed optionally to any remote terminal or local output device.

For more detailed information related to JES3 BSC RJP, see *JES3 Introduction* (GC23-0039).

**SYNCHRONOUS DATA LINK CONTROL (SDLC):** JES3 SNA RJP provides JES3 remote job processing support for SNA terminals in a terminal-sharing environment where multiple applications may establish logical connections with the terminal on a per-session basis. To achieve this flexibility of terminal-sharing, JES3 uses the VTAM application program interface for the support of the SDLC terminals which are attached to a 3704/3705 in network control mode.

SDLC job entry stations supported by JES3 are the 8100 Information System under DPPX or DPPX/SP, the 8100/DPCX Information System, the 5280 Distributed Data System, the 3790 Communication System and the 3770 Data Communication System (except for the 3773 mdls P1, P2 and P3, all SDLC models are supported). Multiple Logical Unit (MLU) 3776 mdls 3, 4 and 3777 mdls 3, 4 with up to six independent and concurrent sessions are supported and System/36 is supported by multiple logical units. Also supported are the 3262 Line Printer mdls 2, 12, the 3784 Line Printer, the 3203 Printer mdl 3, the 3521 Card

Punch, the 3501 Card Reader, and the 2502 Card Reader, when attached to a 3770. In addition, JES3 supports the 6670 Information Distributor (SNA version) through the MVS/Information Distribution Workstation Support (see program product 5740-AMA). The 3790 Communication System and 8100/DPCX Information System support a single RJE workstation which can handle up to five logical concurrent processing sessions with JES3.

Functional characteristics of the JES3 SNA RJP support for SDLC terminals are as follows:

- Half duplex session flow.
- Multidrop operation.
- 3770 diskette, 8100/DPPX or DPPX/SP disk operations, 8100/DPCX disk operations, and 3790 disk operations are transparent to JES3.
- Data stream provides compression of repeated characters outbound to the 8100 Information System under DPPX with DPPX/RJE or DPPX/SP with DPPX/SP RJE, the 3790 Communication System, the 8100/DPCX Information System, the System/34, the System/36, and to the 3770 Data Communication System.
- Data compaction is supported outbound to the 8100 Information System under DPPX with DPPX/RJE or DPPX/SP with DPPX/SP RJE, the 3790 Communication System, the 3776 mdls 3 and 4, the 3777 mdls 1, 3 and 4 of the 3770 Data Communication System, and the 8100/DPCX Information System.
- Single or multiple LUs (allowing multiple sessions) in a job entry station.
- Provides device setup for the 3790 and the 8100 Information System under DPPX with DPPX/RJE and 8100/DPCX by use of the Peripheral Data stream Information Record (PDIR).

**JES3 JOB MANAGEMENT**

**INPUT SERVICE:** Input Service consists of two phases, each consisting of several non-resident modules:

- **READER PHASE:** Jobs are read from an input device and placed on a spool in batches.
- **CONTROL STATEMENT PROCESSING PHASE:** Jobs are read from the spool and processed.

**INTERPRETER SERVICE:** Interpreter service converts JCL statements to scheduler control blocks (SCBs) for use by the scheduler component. It also determines resource requirements and creates control blocks for use by JES3 main device scheduler (MDS) function. Every job must pass through the interpreter service before it can be scheduled for execution. This service comprises primarily the converter/interpreter (CI) dynamic support programs (DSPs).

The critical option in creating MDS control blocks is choosing the type of setup for JES3-managed devices. The setup options available with JES3 are:

1. **JOB SETUP:** The interpreter assigns each unique volume used throughout the job to a separate device, except where JCL explicitly indicates otherwise. This type of setup generally improves job turnaround at the expense of efficient device usage.
2. **HIGH WATERMARK SETUP:** The interpreter assigns a number of mountable devices (discounting permanently resident or reserved volumes) of each device type equal to the maximum number of volumes required in any single job step, unless the JCL explicitly indicates otherwise. This type of setup makes efficient use of devices, but may slow job turnaround due to dismounting and mounting of volumes.
3. **EXPLICIT SETUP:** The programmer specifies in a JES3 control statement which DD statements are (and which are not) to be setup.

The entire MDS function is optional, and additionally, the automatic setup options (job and high watermark) are separately selectable for DASD, tape and MSS virtual devices. These options are supplied as an installation default and can be overridden by JES3 control statements.

**DATA RESOURCE MANAGEMENT:** The main device scheduler (MDS) is a JES3 facility that controls the setup of resources (devices, volumes and data sets) associated with job execution on a processor. MDS services consist of volume fetching, allocation of data resources, volume mounting and verification, and deallocation of data resources. MDS services are part of the main scheduler element in normal job processing. Once a job is in execution, MDS services can also be invoked to process dynamic allocation requests.

**VOLUME FETCHING:** MDS determines a job's requirements for mountable volumes and issues operator messages to a tape or DASD library, requesting that the required volumes be "fetched" to the computer area. As an installation option, after the issuing of these messages, MDS will either make the job immediately eligible for data

**MVS/System Product-JES3 V1 R3.1 (cont'd)**

resource allocation, or will wait for operator 'go ahead' that the required volumes are available.

**DATA RESOURCE ALLOCATION:** Data resource allocation facilities fall into three overlapping categories: (1) Selection of a job relative to other jobs competing for resources; (2) selection of an eligible processor on which to attempt allocation; (3) assignment of devices, volumes and data sets to the selected job.

**SELECTING A JOB:** In general, jobs are considered for data resource allocation in priority order. The first job that can acquire data resources on an eligible processor will be granted those resources.

**SELECTING A PROCESSOR:** This choice of a 'setup' processor does not restrict the eligibility of that job to run on only that processor. In allocating devices, preference is given to devices that are shared by other processors eligible to execute the job. If all devices allocated to the job are shared by another processor, that processor also remains eligible to run the job.

**ALLOCATING DATA SETS, VOLUMES AND DEVICES:** JES3 provides data set integrity protection across processors in the JES3 complex in accordance with the JCL-specified data set disposition and dynamic allocation. This means that a job which holds exclusive access to a data set will prevent other jobs from allocating successfully.

MDS keeps track of the volume currently mounted on each device to minimize volume movement and attempts to satisfy further requests for the volume on the device where it is already mounted. MDS supports dynamic device reconfiguration (DDR) through the subsystem interface for JES3 managed tape and disk drives.

**VOLUME MOUNTING AND VERIFICATION:** Once all required resources have been assigned to a job, MDS issues 'mount' messages, requesting that the operator mount the first required volume on a specified device. MDS then verifies that each volume has been correctly mounted by reading its volume label.

Once all required volumes for a job have been mounted and verified, the job is passed to the generalized main scheduler (GMS) for execution processing selection.

**DEALLOCATION OF DATA RESOURCES:** During job execution, MDS or DYNAL is notified, as each step completes, to deallocate resources that are not required by subsequent steps of the job (early resource release). Data resources may also be returned in the midst of job step execution via the dynamic deallocation subsystem interface. Tape volumes used by a job can be optionally made available to other jobs at the end of volume. Finally, any resources still held at job end are released at that time. In all cases, returned resources immediately become available for assignment to other jobs.

**JOB SCHEDULING:** JES3 functions as a resource manager and job scheduler. The scheduling and selection of jobs for execution are major functions of the job entry subsystem. JES3 provides a unique set of these functions that are especially designed for a loosely coupled environment. These functions are generalized main scheduling, which determines which jobs should be scheduled to execute on a processor; deadline scheduling, increasing the priority of a job when it has been scheduled to make the best use of the available resources; and dependent job control which allows jobs to be executed in a specified order.

Selection of a job for a processor is based on the capacity of that processor to provide sufficient resources. JES3 supports pooled devices among processors to further control job/processor selection.

**GENERALIZED MAIN SCHEDULING:** Jobs are selected for execution by the generalized main scheduling (GMS) facility of JES3. Initialization parameters define the characteristics of each processor, job-selection mode criteria, and jobs categorized by class.

GMS uses the priority parameters specified at initialization to help select jobs for execution. The hierarchy of priorities is:

1. Processor priority (dynamic).
2. Job Class priority.

The priority aging feature allows JES3 to increase the priority of a job after it has been passed over for selection by JES3 an installation-specified number of times, because of a low priority relative to that of other jobs in the system. At an installation-specified priority barrier, JES3 will attempt to prevent lower priority jobs from capturing idle resources if they are known to be needed by a job at or above the barrier priority.

**DEADLINE SCHEDULING:** Deadline scheduling provides job scheduling algorithms that increase the probability of a job being scheduled by a specific time. The job's selection priority may be dynamically incremented as the job approaches its deadline for entering execution.

The deadline scheduling feature allows the installation to specify a time of day by which the job should be scheduled. If the job is not scheduled by this time, JES3 will increase the priority of the job at user-defined intervals until it is scheduled.

**DEPENDENT JOB CONTROL:** Dependent Job Control (DJC) allows jobs to be executed in a specific order. DJC is a function within the JES3 system that manages jobs that are dependent upon each other. Job dependencies may occur because of data dependencies; they may be defined so as to achieve better device utilization; or they may be defined so as to manage job streams.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The machine configurations specified for MVS/SP-JES3 Release 3 are unchanged for MVS/SP-JES3\* Release 3.1.

**SOFTWARE REQUIREMENTS**

The JES3 component in MVS/SP-JES3\* Release 3.1 is a complete replacement of the JES3 component in MVS/SP-JES3\* Releases 2 and 3. If the JES3 component of MVS/SP-JES3\* Release 3.1 is installed on any processor in a loosely coupled JES3 Complex, then it must be installed on all processors in the Complex.

The functions provided by either Data Facility Device Support Release 1 (5740-AM7) program product or the MVS/370 Data Facility Product (5666-265) program product are required by the users of one or more of the following:

- The IBM 3375 Direct Access Storage
- The IBM 3380 Direct Access Storage
- The IBM 3880 Storage Control mdl 11 or 13
- Checkpoint/restart
- JES3 early volume release facilities
- Extended Addressing feature and additional main storage beyond 16 megabytes

The JES3 component of MVS/SP-JES3\* Release 3.1 requires MVS/SP Base Control Program (BCP) component.

\* = Version 1.

**COMPATIBILITY**

The compatibility considerations for MVS/SP-JES3 Release 3.1 are unchanged from MVS/SP-JES3\* Release 3.

**DOCUMENTATION**

(available from Mechanicsburg)

*OS/VS2 MVS/System Product-JES3 and OS/VS2 MVS/System Product-JES2 General Information Manual (GC28-1025).*

RPQs ACCEPTED: No.



PROGRAM PRODUCTS

**DATA FACILITY EXTENDED FUNCTION  
RELEASE 1 (5740-XYQ)**

**PURPOSE**

Data Facility Extended Function Release 1 consists of the following: A functional replacement for the VSAM and OS (CVOL) catalogs, to be called the Integrated Catalog Facility ... additional extensions to VSAM. The DFEF Integrated Catalog Facility may be used to replace all catalog functions and facilities.

**HIGHLIGHTS**

- New Catalog Structure
- Enhanced reliability and integrity
- Usability enhancements
- Performance improvements
- Backup and recovery facilities
- Elimination of VSAM catalog volume ownership
- Improved direct access storage utilization
- VSAM space management via DADSM
- VSAM SRB or cross-memory processing.
- Additional VSAM data sharing facilities.
- Implicit verify at OPEN.
- Improved VSAM TRACE processing.
- VSAM data set reference and change indicators.
- Supported by current versions of CICS/OS/VS and IMS/VS.

**DESCRIPTION**

**NEW CATALOG STRUCTURE:** The Integrated Catalog Facility defines two new catalog data sets: The Basic Catalog Structure and the VSAM Volume Data Set. These new data sets replace the current VSAM or CVOL catalog data sets.

The Basic Catalog Structure contains volume information for both VSAM and non-VSAM data sets. The Basic Catalog Structure may be located on any volume and multiple Basic Catalog Structure data sets may be defined on a single volume.

The VSAM Volume Data Set contains the data set characteristics for VSAM format data that resides on the same volume. There is one VSAM Volume Data Set on each volume that contains VSAM format data controlled by the Integrated Catalog Facility.

**ENHANCED RELIABILITY AND INTEGRITY:** The Integrated Catalog Facility offers major improvements to the reliability and integrity of the VSAM catalog.

The Integrated Catalog Facility is designed to reduce the potential of damaging the catalog and limits the scope of damage in the event of system failure during catalog processing.

The Integrated Catalog Facility also validity checks critical data during catalog processing.

**USABILITY ENHANCEMENTS:** By utilizing VSAM data sets, the Integrated Catalog Facility provides Access Method Services functions to:

- Reorganize catalogs
- Move catalogs to different device types
- Merge two catalogs into a single catalog
- Split a single catalog into two or more catalogs.

**PERFORMANCE IMPROVEMENT:** The Integrated Catalog Facility offers significant performance improvements over the current VSAM catalog and equal or better performance than OS (CVOL) Catalogs by:

1. Reductions in I/O requests.
  - Improved buffer handling for catalogs shared between systems will provide significant reductions in I/O requests. Comparisons with VSAM user catalogs provided savings for:
    - Locate -- 25 to 75 percent improvement
    - Define non-VSAM -- 50 to 70 percent improvement
    - Delete non-VSAM -- 60 to 70 percent improvement
 depending upon catalog request activity. Requests for VSAM entities will achieve even greater improvements.
  - Performance for OS (CVOL) Catalogs is highly dependent upon naming conventions, catalog size, and whether the catalog is regularly reorganized. Comparisons with an unorganized catalog provided savings for:
    - Locate -- 50 to 75 percent improvement
    - Define non-VSAM -- 20 to 50 percent improvement
    - Delete non-VSAM -- 25 to 50 percent improvement
 depending upon catalog request activity. A properly organized OS CVOL only occasionally out-performed DFEF:
    - Locate -- 0 to 50 percent improvement

- Define non-VSAM -- 12 percent loss to 30 percent improvement
  - Delete non-VSAM -- 0 to 40 percent improvement.
2. Improved concurrent catalog requests when searching and updating for all catalog entries.
  3. Concurrent processing is improved during VSAM OPEN/CLOSE processing.
  4. Catalogs not shared between loosely coupled systems can now be placed on shared direct access storage devices. The Integrated Catalog Facility will not issue a RESERVE under these conditions.
  5. The RECOVERABLE attribute for VSAM catalogs (catalog recovery area) does not exist with the Integrated Catalog Facility. This eliminates the overhead of duplexing all catalog updates.

In addition, VSAM KSDS performance options may be specified for the Basic Catalog Structure data set.

This performance data is derived from a select set of test cases and is given for information purposes only. There is no warranty or guarantee that the same performance characteristics will apply to other users or system configurations. Actual performance improvements are dependent on many factors, including control interval size, number of catalog entries, and the devices involved.

**BACKUP AND RECOVERY FACILITIES:** The catalog backup and recovery facilities provided allow the user to define simple and consistent recovery procedures for the catalog.

The Extended Function catalog supports catalog recovery without the RECOVERABLE attribute of VSAM catalogs. VSAM data set attributes, including the physical location on direct access storage, are maintained in the VSAM Volume Data Set which is on the same volume as the VSAM data set. This allows periodic EXPORTs of the Basic Catalog Structure, and a subsequent IMPORT in the event of failure of Basic Catalog Structure without concern for catalog and VSAM data set synchronization.

A new Access Method Services DIAGNOSE function is provided by DFEF. The DIAGNOSE function may be used to validate the content, format and consistency of the new Integrated Catalog Facility data sets. Additional enhancements to Access Method Services are included to support catalog backup and recovery.

The Integrated Catalog Facility allows the use of full volume backup and recovery for volumes containing either Basic Catalog Structure or VSAM data sets by maintaining VSAM data set attributes in the VSAM Volume Data Set on the data volume.

**ELIMINATION OF VSAM CATALOG VOLUME OWNERSHIP:** VSAM catalog volume ownership is eliminated. Data sets on any volume may be cataloged in any Basic Catalog Structure and multiple Basic Catalog Structure data sets may be defined on a single volume.

Users of the Resource Access Control Facility (RACF) are restricted from protecting identically-named VSAM data sets which are cataloged in separate Basic Catalog Structures residing on the same volume.

**IMPROVED DIRECT ACCESS STORAGE UTILIZATION:** All Integrated Catalog Facility records are VSAM logical records. This allows a considerable savings in the amount of direct access storage space required. For most non-VSAM data sets, only 20 percent of the space required by the current VSAM catalog will be used by Integrated Catalog Facility.

**VSAM SPACE MANAGEMENT:** All direct access storage space management for VSAM data sets in the Extended Function catalog environment will be performed by the system direct access device space management (DADSM) function. VSAM data spaces will not exist, and all VSAM data sets will appear as "UNIQUE-like" data sets. Functional equivalency to the current VSAM catalog will be maintained by removing the restrictions associated with current UNIQUE data sets.

**VSAM SRB/Cross-Memory Mode Processing:** In order to minimize the need for a VSAM application to switch execution modes, VSAM Record Management is extended to allow SRB and limited Cross-Memory Mode processing. This support includes:

- An additional User Processing Exit (UPAD) for request resumption (POST) when the user is operating in SRB/Cross-Memory mode.
- The elimination of SVC calls where possible, and new RPL codes to indicate to the VSAM application that the request must be issued in TCB mode.

**Additional VSAM Data Sharing Facilities:** The following VSAM Data Sharing facilities are supported to provide the VSAM application program more control of shared data:

- Exclusive Control Feedback. When an exclusive control conflict occurs, the address of the RPL which owns the resource and the RBA of the control interval will be returned to the user.

PROGRAM PRODUCTS

**Data Facility Extended Function R1 (cont'd)**

- A new Control Block Update facility is available to simplify programming for cross-system and cross-region VSAM data sharing under Share Option 3.
- The current restriction which prohibits Control Area (CA) splits under Cross-Region Share Option 4 will be eliminated. The restriction still applies to Cross-System Share Option 4 data sets.
- VSAM will support new facilities for shared resource processing which allow the user to invalidate VSAM data and index buffers (MRKBFR) or to cause VSAM to write a modified buffer to DASD storage (WRBFR).
- Extensions to the JRNAD exit are provided which allow the application program to maintain control over data and index control intervals.

of any other catalog. In an environment where an Integrated Catalog Facility is shared by multiple host systems, DFEF Release 1 program product must be installed on all systems that can access the shared catalog.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information (GC26-3960) ... Licensed Program Specifications (GC26-3964).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes.

**Improved ERASE Processing:** Improved Control Interval (CI) ERASE processing allows previously used, empty CIs to be reused for any new records whose keys fall anywhere within the Control Area's range of keys.

**Implicit VERIFY:** When VSAM OPEN detects a condition requiring a VERIFY, it will automatically initiate VERIFY processing, unless otherwise specified by the user or when sharing VSAM data. The current warning message will still be issued. A message will indicate successful VERIFY processing.

**VSAM Data Set Reference and Change Indicators:** The last-accessed-date field and change data set indicators in the VTOC Format 1 data set control block (DSCB) are now maintained under control of a user exit for VSAM data sets which have been cataloged by DFEF.

**CUSTOMER RESPONSIBILITIES**

Primary among the customer responsibilities for using DFEF are: [1] have the prerequisite programs installed, [2] order and install DFEF.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Data Facility Extended Function is designed to operate on the following IBM processors:

S/370 Model 158	UP/MP/AP
S/370 Model 158-3	UP/MP/AP
S/370 Model 168 with RPQ S20579	UP/MP
S/370 Model 168 with RPQ S20580	AP
S/370 Model 168-3	UP
4341 Processor Model Group 1	UP
4341 Processor Model Group 2	UP
4361-5 Processor	UP
4381 Processor	UP
3031 Processor	UP/AP
3032 Processor	UP
3033 Processor	UP/MP/AP
3033 Processor Model Group N	UP
3033 Processor Model Group S	UP
3081 Processor Complex	Dyadic

The approximate real and virtual storage changes for DFEF Release 1 are:

Nucleus (Real)	1K
PLPA (Virtual)	219K

The OS/VS2 MVS Data Facility Extended Function Program Directory contains information to enable the user to modify the contents of the PLPA following migration to Data Facility Extended Function for the purpose of removal of modules no longer required to support current VSAM catalogs.

**SOFTWARE REQUIREMENTS**

Data Facility Extended Function Release 1 requires the functions provided by the OS/VS2 MVS Data Facility Device Support Release 1 program product (5740-AM7) installed with MVS/System Product - JES2 Release 1 (5740-XY5) or MVS/System Product JES3 Release 1 (5740-XYN). Subsequent releases and modification levels of the prerequisite program product will also provide the necessary functions for Data Facility Extended Function, unless otherwise identified.

DFEF Release 1 users who intend to use the VSAM SRB/Cross-Memory Mode Processing will require the functions provided by either MVS/System Product - JES2 Release 2 program product or MVS/System Product JES3 Release 2 program product, when that release is available.

**DATA FACILITY EXTENDED FUNCTION RELEASE 1 CONVERSION CONSIDERATIONS**

The Integrated Catalog Facility may be used to replace and will coexist with all currently available catalog functions and facilities. Access Method Services CNVTCAT function will convert an existing VSAM user catalog or OS (CVOL) Catalog to an Integrated Catalog Facility. Individual catalogs may be converted without requiring the conversion

**IBM DATABASE 2 (DB2) RELEASE 1**  
**5740-XYR**
**PURPOSE**

IBM Database 2 (DB2) is IBM's relational data base management system program product for the MVS/XA and MVS/370 environments. It may coexist with and complements Information Management System/Virtual Storage Version 1 Data Base System in these environments.

DB2 supports a relational data model. A DB2 data base can be thought of as a collection of tables. Data is defined in terms of tables and accessed through operations on tables. Data definition, retrieval, manipulation, and control operations are supported by the structured query language (SQL). SQL is a high-level, non-navigational data language available to users through an interactive terminal and through application programs written in COBOL, FORTRAN, PL/I, or Assembler language.

IBM Database 2 may be accessed concurrently by the IMS/VS Data Communication feature, by CICS/OS/VS, by TSO users, and by batch jobs. Figure 1 shows the configurations that are possible using IMS/VS Data Base System and/or DB2 as data base managers. Application programs running under control of the IMS/VS Data Communication feature or CICS/OS/VS may access DB2 data, IMS/VS Data Base data, or both.

DB2 operates as an MVS subsystem. DB2 is designed to utilize the XA architecture, including 31-bit virtual addressing and large real storage. DB2's architecture provides for very large data bases (up to 64 billion (64 x 10<sup>9</sup>) bytes per table). It is supported by a comprehensive set of data base utilities which operate online. Its security and authorization mechanism offers field content security and allows various levels of authority to be delegated to users as appropriate.

To assist IBM in introducing the significant new IBM Database 2 product, DB2 is currently being tested in a number of customer and IBM locations. Early experience with a limited number of users will assist IBM in evaluating the product in varied environments and in developing additional support material prior to general availability. An Early Support Program (ESP) is being planned for DB2. This ESP will be conducted by the NAD Dallas Systems Center; nominations will be through the NAD regions and NMD areas.

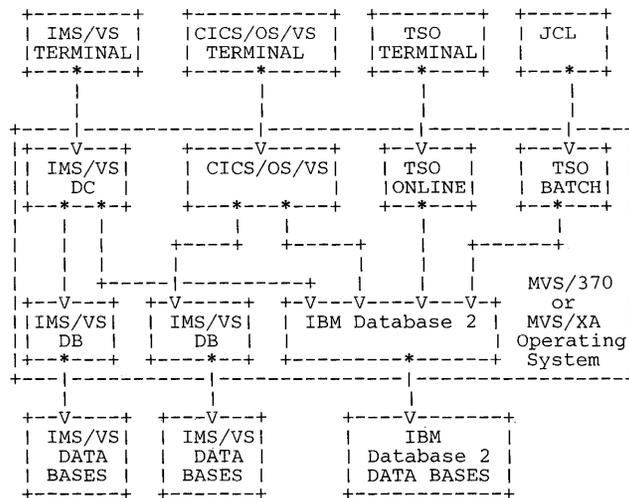


Figure 1. The IBM Database 2 environment.

**HIGHLIGHTS**

IBM Database 2 is an easy-to-install, easy-to-use program product supporting the relational data model with a high level language to access DB2 data. DB2 offers many functions in support of both traditional data base application areas and the information center. Specific highlights include:

- **Relational data model:** DB2 provides a basic tabular data structure. Data is viewed by the user as a series of rows and columns.
- **Structured Query Language (SQL):** SQL is an easy-to-use high-level language used for data manipulation, data definition, and control. It is not dependent on data paths, placement or order when accessing the relational data bases.
- **Continuous operations:** Data definitions may be dynamically changed without stopping DB2. Also, data base utilities can be run without stopping DB2.
- **Concurrent access to data:** DB2 may be accessed concurrently by the IMS/VS Data Communication feature, by CICS/OS/VS, by TSO users and by batch jobs. Additionally, application programs running under control of the IMS/VS Data Communication feature

or CICS/OS/VS may access DB2 data, IMS/VS Data Base data, or both.

- **Application programming:** Users may access and manipulate DB2 data using SQL through application programs written in COBOL, FORTRAN, PL/I and Assembler language.
- **DB2 Interactive (DB2I):** DB2I is an interactive facility based on Interactive System Productivity Facility (ISPF). Users may access and manipulate DB2 data interactively through DB2I. Additionally, other operations such as the DB2 data base utilities may be invoked through DB2I.
- **Base for Query Management Facility (QMF):** QMF operates with DB2 data in the MVS/XA and MVS/370 environments. See the QMF Announcement Letter for details on this product.
- **Large processor support:** DB2 operates in the MVS/XA and MVS/370 environments, thus providing support for the full range of processors supported by those operating systems.

**DESCRIPTION**

**RELATIONAL DATA MODEL:** DB2's relational data model is easy to learn and easy to use.

- **Simple Data Structure -** The basic data structures in DB2 are tables. A DB2 data base may contain many tables; the simple tabular data format protects the user from having to know and cope with more complicated representations of the data in storage. All relationships are represented by data in tables so users do not have to 'navigate' through data structures. The user may experience an increase in productivity, because there is no need to concentrate on how the data is to be accessed, but only on what data is to be accessed. DB2 determines how the data is to be accessed. This capability enables applications to be independent of the order and structure of the data base and contributes largely to the ease of learning and using DB2.
- **Structured Query Language (SQL) -** SQL is a high-level non-navigational language that helps application programmers to be more productive by allowing them to concentrate on the essential logic and data requirements of their applications. SQL statements reference data by name and/or value and not by data access paths, data placement, or order.

SQL, in a single statement, can access:

- One or more columns from a row of a table
- One or more columns from multiple rows of a single table
- One or more columns from multiple rows of multiple tables
- One or more columns calculated from other columns

Based on the data names and values specified in SQL statements, DB2 determines which operations are required to access or change the specified data.

SQL can be used for retrieval, insertion, deletion, updating, data definition, commitment of changes, and granting and revoking of DB2 authorization. SQL is consistent; it provides essentially the same features and syntax whether it is used interactively or invoked from a COBOL, FORTRAN, PL/I, or Assembler program. Most SQL statements can be tested interactively prior to including them in a program. Because of the scope, simplicity, and uniformity of this language, better communication among application analysts, programmers, data base administrators, and end users can be achieved.

- **High Productivity -** Both the data structures and the data language are simple. As a result:
  - The amount of data processing knowledge, training, and experience required to become productive with DB2 is minimal.
  - Data base administrators can design, define, and modify data bases quickly.
  - Application programmers can develop programs quickly, and hence can be highly productive.
  - Using SQL interactively, some users may create and maintain their own data bases without traditional application programming or data administration.

Therefore, the application program backlog in many data base installations can be reduced.

- **Continuous Operation -** DB2 can operate for long periods without interruption. Many of the activities that may require other systems to stop running do not stop DB2's operation.
  - DB2 is a separate MVS subsystem and can be available even when IMS/VS, CICS/OS/VS or TSO is unavailable.
  - Data definitions may be added, deleted, or changed interactively without stopping DB2.

## DB2 R1 (cont'd)

- DB2 utilities can perform their functions without stopping activity on other data bases. In some cases, concurrent activity on the same data base is permitted.

From time to time data base administrators or application programmers may want to make changes to information stored in data bases. Sometimes it will be necessary to add new tables or indexes to a data base or drop tables or indexes that are no longer being used. It is extremely important that transactions proceed as usual on unaffected parts of the system when such changes are being made.

These capabilities allow user data bases to evolve without disrupting ongoing processes and tables that have already been established.

**ACCESS to DATA:** IBM Database 2 data may be accessed concurrently by the IMS/VS Data Communication feature, by CICS/OS/VS, and by TSO users. TSO programs may be invoked interactively or by using JCL. Application programs running under the control of the IMS/VS Data Communication feature or CICS/OS/VS may access DB2 data, IMS/VS Data Base data, or both.

Users can operate on DB2 data interactively and/or through applications written in COBOL, FORTRAN (for TSO users only), PL/I, and Assembler language. In all cases, they access and manipulate the data using the SQL language.

DB2 Interactive (DB2I) is an ISPF-based interactive facility (ISPF means Interactive System Productivity Facility (see "Software Requirements"). Using DB2I, an authorized user can:

- Enter most SQL statements and view the results at the terminal
- Enter DB2 commands
- Perform other programming-related DB2 functions such as precompilation
- Run TSO-based applications
- Invoke the DB2 data base utilities

For example, using DB2I, application programmers can create and edit most SQL statements they plan to include in their programs, execute those statements, and receive and review the results at their terminals. They can also create, load, and delete test tables. They can use DB2I to check the contents of existing tables. DB2I is a powerful tool for application programmers, data base administrators, and system administrators.

The Query Management Facility (QMF) program product (5668-972) provides query and report writing capability for DB2 data bases. It allows non-DP professionals to create, save, modify, and execute queries and produce reports. QMF provides these functions in an easy-to-use way. Queries may be created using either SQL or query-by-example (QBE) syntax. Subject to DB2 authorization, QMF allows creation and maintenance of DB2 data bases, tables, indexes, etc..

DB2I and QMF are complementary. DB2I will be used primarily by DP professionals in the application development process. QMF will be used primarily by non-DP professionals as an easy-to-use alternative to writing application programs.

**TECHNOLOGY EXTENDED:** DB2 operates in the MVS/XA and MVS/370 environments. DB2 takes advantage of many new and existing hardware and software technologies. It operates with IMS/VS and CICS/OS/VS, so users familiar with these systems don't have to learn a new data communication (online) system. At the same time, DB2 provides a simple data base system for new users who may not be concerned with data communications. DB2 is designed to utilize the XA architecture, including 31-bit virtual addressing and large real storage.

- **Large Tables** - DB2's architecture allows tables to be very large, up to 64 billion (64 x 10<sup>9</sup>) bytes in size. Large tables can be divided into smaller parts that can be reorganized and recovered individually to improve their manageability.
- **Integrated Recovery** - DB2 has a comprehensive and integrated recovery mechanism. It has disk logging and automatic log archiving capabilities, automatic recovery on restart, and utilities to perform commonly needed recovery functions, such as image copy (see a list of the utilities and their functions under "Security, Recovery, Utilities and Installation". DB2 recovery is fully coordinated with the recovery of IMS/VS and CICS/OS/VS, with which it may operate. DB2 communicates with both IMS/VS and CICS/OS/VS so that potential inconsistencies can be resolved without loss of data.
- **Security** - DB2 has a very flexible and comprehensive authorization mechanism. For example, execution of a single SQL statement can grant someone the authority to retrieve data from a particular table, but might not allow that person to change any data in the table.

The flexibility and power of the authorization mechanism allows installations to choose to centralize control, decentralize control, or use these in combination. For example, the authority to control particular data bases can be delegated to individual users or to groups of users outside the central organization.

IMS/VS and CICS/OS/VS also have security capabilities. (See those program products' pages for details.) Also, through the security access facility (SAF) router of the operating system, Resource Access Control Facility (RACF, 5740-XXH) may be used to control access at the data set level.

## ADDITIONAL DB2 DETAILS

### Relational Data Model

- **Data Storage** - A relational data base is one that users perceive as a collection of tables. Tables in a relational data base are no different from any other tables. They are the same familiar and easy-to-use data structures seen and used every day in telephone books, airline schedules, newspapers, and many other places. They are made up of columns and rows. At the intersection of every column and row is a specific item of data. This specific item of data is called a 'value'.

In DB2, tables are not structurally related, so the user does not have to 'navigate' through structures to get to data. Instead, DB2 does the navigation. With DB2, all information is specified as data values. SQL provides statements to retrieve, update, insert, and delete data values.

- **Tables and Table Spaces** - Tables are logical data structures consisting of rows and columns. One or more tables are stored in a table space. In DB2, table spaces, not data bases, are the recoverable structure. A table space, and therefore the tables it contains, can be very large, up to approximately 64 billion (64 x 10<sup>9</sup>) bytes.

The relational operation that allows the user to retrieve data from two or more tables by matching them on a common column is called a 'join'. The join operation allows retrieval of data from two or more tables by joining on the basis of the common data they contain (for example, department numbers); then the needed information (for example, department numbers, department names, and managers' names) is selected from the combined tables.

- **Partitioned Table Spaces** - To make large table spaces manageable, DB2 supports partitioned table spaces. A table space can be divided into partitions on the basis of ranges of data values. Partitions also can be reorganized or recovered independently, reducing the time the table space is unavailable. Partitioning also allows active data to be stored on fast devices and inactive data on slower devices.

- **Views** - A DB2 view is an alternative representation of the data in one or more tables. Once a view has been defined, it can be used in most SQL statements just as a table would be. A view has two important advantages as a means of representing data in DB2: Views protect sensitive data and views further reduce complexity.

- **Storage Groups** - With DB2, users need not be concerned with defining MVS data sets. One or more storage groups can be defined indicating which DASD volumes are available for use. DB2 then invokes access method services of the Data Facility Product functions to define, extend, and delete data sets within the storage groups as required.

Alternatively, the user may choose to invoke access method services to predefine VSAM data sets to be used for DB2 tables. This approach allows placement of data and indexes on particular areas of DASD volumes.

The user may choose to use storage groups for some tables and to define his own data sets for others.

If neither storage groups nor user-defined data sets are specified, tables are built in a default storage group.

- **Data Bases** - A DB2 data base is a collection of table spaces (and, by extension, tables and indexes). The data base is an operational tool. Data bases may be started and stopped independently. A data base can be considered an entity for authorization purposes.

- **Indexes** - Indexes can be defined by the user to provide for faster access to data in a table. The index key is made up of one or more columns. Indexes can be defined interactively and created and deleted online. Users accessing DB2 data never explicitly name indexes in the data access statements. An index is used by DB2 if DB2 determines the index will provide fast access to the data. The following special types of indexes can be created:

- **Unique index** - This index forces uniqueness on the rows in a table. If a user wants to be sure that no duplicate employee numbers are entered into the employee table, a unique index, based on employee number, must be defined before the entries are attempted.

- **Clustering index** - A clustering index determines the physical order in which rows will be stored. A clustering index can be used to store data the way it will be most frequently accessed,

## DB2 R1 (cont'd)

for example, by employee number or account number, or alphabetically by name.

- **DB2 Catalog** - The DB2 system catalog is a set of maintained tables that contain information about the data and objects that DB2 manages. Authorized users can retrieve the data in these tables in the same way as any other DB2 table -- with SQL statements. DB2 catalog tables contain information about, for example, tables, columns, indexes, storage, and authorization.
- **Structured Query Language (SQL)** - SQL is much more than a query language. It is also an easy-to-use data manipulation, data definition, and control language. Administrators, analysts, programmers, and interactive users all use SQL.
  - Application programmers may embed SQL statements in COBOL, FORTRAN, PL/I, and Assembler language programs to define a complete application. They can also test the 'data base' portions of these applications by trying out their SQL statements using the DB2 interactive facility (DB2I) before embedding them in their programs. SQL has similar capabilities and syntax whether entered interactively or embedded in an application program.
  - Data base administrators use SQL to define or change data base descriptors. They can also define and delete tables, indexes, and entire data bases.
  - System administrators use SQL to grant and revoke authorization of all other users to data. Properly authorized interactive users can use SQL to retrieve, create, and modify data from a terminal.
- **Automatic Access Path Selection** - DB2 uses information maintained within the DB2 system to 'navigate' to requested data. DB2 users don't have to know how data is represented in storage in order to retrieve and use it.

In many data base management systems the application programmer or data base administrator must decide whether to process data sequentially or to use one of possibly several indexes defined for that data. DB2 makes these decisions for the user. In fact, programmers never reference indexes in their programs. After the program is written, the programmer pre-compiles and binds his program. Bind is a procedure during which DB2 selects an access path to the data. DB2 will consider any indexes that exist when choosing the access path. Therefore, the program is insulated from additions and deletions of indexes.

DB2's ability to select access paths is important in minimizing program maintenance. For example, an administrator might decide to eliminate a seldom-used index. Programs which previously used the index would have their access paths automatically and dynamically reestablished by DB2 the next time they were executed. The logic of the application programs themselves is unaffected, and no program maintenance is required to cope with this change.

- **Set Level Operation** - The SQL language is based on mathematical set-level operations. Therefore, when DB2 processes data, it returns, updates, or deletes the entire set of data that meets the conditions specified by the user. This can reduce the application programming necessary to accomplish a given task.
- **Automated Declarations Generation** - Application programs must contain data declaration statements for data they read and process. To simplify the task of creating these statements, DB2 provides a declarations generator which uses information in the DB2 catalog to construct declaration statements for use in COBOL or PL/I programs.

Application programmers can invoke the declarations generator through DB2I, from TSO, or as a batch job. The generator produces a complete SQL description of the table and a complete PL/I or COBOL structure that corresponds to the DB2 table or view. Output from the declarations generator can be kept in libraries to provide a central, controllable repository for declarations.

The declarations generator saves application programmers the time they would otherwise spend coding data declarations. It also eliminates coding and keying errors that might result if the programmers entered their own declarations.

**Access to Data:** IBM Database 2 data may be accessed concurrently by IMS/VS Data Communications feature, by CICS/OS/VS, and by TSO users. TSO programs may be invoked interactively or by using JCL.

**DB2I - An Interactive Tool** - DB2 provides users an interactive online tool. Called DB2I for DB2 interactive, it uses Interactive System Productivity Facility (ISPF) to help users perform tasks interactively. To use DB2I, users sign on to TSO, enter ISPF, and select the menu for DB2I. That menu supports several activities. For example:

- SQL processor using file input (SPUFI) is an online function through which DB2 users can submit SQL statements. They can execute those statements and receive the results at the terminal. Using SPUFI, for example, application programmers can create their own

test tables and can test SQL statements prior to inclusion in programs; data base administrators can use SPUFI to define and administer data and to grant and revoke the authority to access data and programs; and system administrators can use it to grant and revoke privileges or to query the DB2 system catalog.

- **DECLARATIONS** - The DECLARATIONS panel is used to produce data declaration statements for tables and for COBOL or PL/I data structures.
- **BIND/REBIND/FREE** - This panel allows programmers to bind, rebind, and free their applications. These operations are integral to the application programming process.
- **PROGRAM PREPARATION** - Programmers can use this panel to prepare their programs for execution. They can pre-compile, compile, bind, link-edit, and run TSO applications.
- **RUN** - This panel is used to run TSO programs.
- **DB2 COMMAND** - Administrators can use this panel to enter DB2 commands. They can start, stop, and monitor data bases from this panel.
- **UTILITIES** - This panel can be used to invoke any of the data base utility programs provided with DB2.

**Online Help** - To help ensure ease-of-use, DB2 provides online help information. By pressing a program function key on the display terminal, DB2I users can retrieve panels of information that explain DB2 functions in detail. Over 500 panels are available.

TSO help text is also provided to aid the application programmer or data base administrator who is entering DB2 commands, precompiling, or using utilities directly from TSO.

**The Application Programming Process** - DB2 programmers write source programs containing embedded SQL statements. After programs are written, four steps must be performed before they can be run.

- **Precompilation** -- to check SQL syntax, produce a modified source program, and produce a DBRM (data base request module)
- **Compilation** -- to translate the modified source program (either a COBOL, FORTRAN, or PL/I compiler or an Assembler performs this step)
- **Bind** -- to process DBRM(s) to produce an application plan which is stored in the data base. At execution time, DB2 uses the application plan to control access to data.
- **Link-edit** -- to produce the final object module

The compiling and link-editing steps are the same using DB2 as they are in any other programming process. The precompile and bind, however, are unique and are discussed in the sections that follow.

**The DB2 Precompiler** - Before a DB2 COBOL, FORTRAN, PL/I, or Assembler program is compiled (or assembled), the DB2 precompiler processes it to extract the SQL statements for subsequent processing within DB2. In addition, the precompiler checks the syntax of the statements and copies them into a module called the DBRM (data base request module), which is input to the bind process.

Since the precompiler executes independently of DB2, programmers may precompile programs without access or reference to the rest of the DB2 system. Thus, programmers can have the syntax of data base calls checked before they bind or run their programs, avoiding unnecessary multiple runs and waste of processing time.

**The BIND Process** - Binding is the activity which converts the DBRM, a set of syntactically correct SQL statements, into a set of instructions to DB2. These instructions, called an 'application plan', tell DB2 where data is, how to get to it, and what to do with it. Binding does four things:

- It validates that the SQL statements are executable.
- It determines whether the person doing the bind is authorized to use the resources named in the SQL statements.
- It chooses the access path to the data.
- It builds a control structure to allow DB2 to access the data when the application program is executed.

The major advantage of the precompilation and bind process is that it can, at the user option, remove operations that can be done once from the program's normal processing. Then when a DB2 application runs, it simply processes data. Data base calls would not be translated or semantically checked. Access paths would not be built. All that processing would happen once, before the program runs. If a table or index used by an application plan is dropped, rebinding occurs automatically.

### SECURITY, RECOVERY, UTILITIES, and INSTALLATION

**Security and Authorization** - DB2 provides two mechanisms that allow installations to protect data.

PROGRAM PRODUCTS

DB2 R1 (cont'd)

- **Authorization Statements** - Authorization statements in SQL are used to grant and revoke authority for all levels of data, command, and program access in DB2. Using these statements, administrators or data owners (users who have defined tables) can limit the data other users may see. They can even authorize the use of commands and data base utility programs. These authorization statements permit an installation to ensure that only properly authorized users perform data base operations.

- **Views** - Views play an important role in controlling access to sensitive data. A view that presents only certain rows or columns in a table can be defined. The user or application program accesses only the data defined in the view; other data in the table is not available.

The ability to define views combined with the ability to grant and revoke authorization to access those views and the tables on which they are based gives DB2 installations the control they need to keep valuable and sensitive data secure from both unauthorized and inadvertent activities.

**Recovery** - DB2 protects data from three types of failure: System, media, and application. Applications and transactions that use DB2 data operate across subsystem boundaries; DB2 supports fully synchronized recovery across these boundaries. The points at which changes to the data base are committed are synchronized so that recovery can be coordinated if a failure occurs at any point.

- On system failure, a restart of DB2 automatically restores data to a consistent state by backing out uncommitted changes and completing the processing of the committed changes.

Restart can be speeded and simplified since not all the data bases that were online at the time of failure need to be available when DB2 is restarted. Some data bases can be started later if the installation chooses.

- DB2 makes provisions for media recovery (e.g., failure of a disk device or failure of a read or write to disk) by providing disk logging and, optionally, dual logging. DB2 tracks log data sets and image copies so that recovery from media failures is simplified. Media recovery is accomplished through the use of image copy and recovery utilities. An incremental image copy capability speeds the image copy function by copying only blocks changed since the last image copy.

- If an application program fails, DB2 isolates the work associated with the failing program. It then backs out all uncommitted data changes dynamically, without interfering with other system activities.

**Utilities** - DB2 provides a number of fully integrated data base utility programs. They are executed online. The long-running ones are restartable. These utilities may be initiated by JCL, using supplied TSO CLISTS (command list, a set of TSO commands that perform a complete task when executed), or through the use of ISPF panels supplied with DB2. The major utilities provided with DB2 are:

- **Load** - from sequential media, SQL/DS unloaded data, or data extracted from other sources by the Data Extract (DXT).
- **Image Copy** - creates an image copy or incremental image copy
- **Recovery** - using image copy and log records
- **Reorganize** - unload and reload a full table space or a partition of a table space
- **Statistics** - updates the DB2 catalog with Bind and reorganization statistics

**Installation** - DB2 has been designed for easy installation in an MVS/XA and MVS/370 environment. No system generation process is required. Tailoring a DB2 system is accomplished by supplying parameters to supplied TSO CLISTS. Tailoring is simplified through use of supplied ISPF dialogs.

**CUSTOMER RESPONSIBILITIES**

A customer installing DB2 must:

- Have ordered and installed at least the minimum machine configuration.
- Have ordered and installed the prerequisite products.
- Assure that appropriate system and software training be given to system analysts, application programmers, system programmers, and system operators.
- Have personnel educated in DB2.
- Provide adequate protection against the accidental loss or misuse of his data (functions exist in DB2 to assist in providing security).
- Make sure personnel are trained in COBOL, FORTRAN, PL/I, or Assembler language.
- Have a knowledge and competency in VSAM.
- Specify and implement application programs.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

IBM Database 2 will operate on any IBM processor supported by MVS/SP V2 R1.1 or MVS/SP V1 R3. For the IBM 3033 Processor, it is recommended that hardware cross-memory extension feature (#6850) be used. The processors must have sufficient real storage to satisfy the combined requirements of IBM Database 2, MVS/XA or MVS/370, appropriate Data Facility Product, appropriate access methods, batch requirements, and other customer-required applications. The configuration must include sufficient I/O devices to support the requirements for system output, system residence, and system data sets. Sufficient direct access storage must be available to satisfy the user information storage requirements and may consist of any direct access facility supported by the system configuration and the programming system.

**External Storage:** DB2 is independent of both DASD and tape device type. Any DASD or tape device supported by Data Facility Product may be used. The following data sets are supported by the device types shown:

Active recovery log data sets	DASD
Archive recovery log data sets	DASD, tape, MSS
Image copy data sets	DASD, tape, MSS
Bootstrap data set	DASD
Data base data sets	DASD, MSS
DB2 catalog data sets	DASD
Work data sets (for utilities)	DASD, tape, MSS

**Note:** DB2 may be used with MSS (IBM 3850 Mass Storage Subsystem), with appropriate prerequisite program support but cannot be used with the MVS Hierarchical Storage Manager (HSM) (5740-XXB).

**Data Communications Devices**

DB2 uses the system console. An installation can control DB2 operations from:

- The system console
- Authorized IMS/VS terminals
- Authorized CICS/OS/VS terminals
- TSO terminals operated by authorized users

For the data communication devices supported by IMS/VS, CICS/OS/VS, and TSO, see the appropriate documentation.

**SOFTWARE REQUIREMENTS**

**Operating System and Support Programs:** IBM Database 2 requires the following licensed programs (or their equivalents):

For MVS/Extended Architecture (MVS/XA) environment (with the appropriate prerequisites for each product):

- MVS/System Product-JES2 (5740-XC6) or -JES3 (5665-291) Version 2 Release 1.1
- MVS/XA Data Facility Product Release 1.1 (5665-284)
- MVS TSO Extensions (TSO/E) Release 1 (5665-285)

For MVS/370 environment (with the appropriate prerequisites for each product):

- MVS/System Product-JES2 (5740-XY5) or -JES3 (5740-XYN) Version 1 Release 3
- MVS/370 Data Facility Product (5665-295) Release 1
- MVS TSO Command Package Release 1.1 (5740-XT6) or MVS TSO Extensions (TSO/E) Release 1 (5665-285)

For both MVS/370 and MVS/XA environments:

- OS/VS Sort/Merge Release 5 (5740-SM1)

For functional ease-of-use:

- Interactive System Productivity Facility (ISPF) (5668-960) and ISPF/Program Development Facility (ISPF/PDF)(5665-268)
- System Modification Program (SMP) Release 4

The other programs (or their equivalents) that may be used with IBM Database 2 are:

- Query Management Facility (QMF) Release 1 (5668-972)
- Data Extract (DXT) Release 1 (5668-973)
- Information Management System/Virtual Storage (IMS/VS) Version 1 Release 3 (5740-XX2)
- Customer Information Control System/OS/Virtual Storage (CICS/OS/VS) Version 1 Release 6 (5740-XX1)
- Resource Access Control Facility (RACF) Release 5 (5740-XXH)
- OS/VS COBOL Compiler and Library (5740-CB1)
- TSO Assembler Prompter (5734-CP2)
- TSO COBOL Prompter (5734-CP1)
- OS PL/I Optimizing Compiler and Libraries (5734-PL1, 5734-LM4, 5734-LM5, or composite 5734-PL3)
- VS FORTRAN Compiler and Library (5748-FO3)
- OS Assembler H (5734-AS1)
- Assembler H Version 2 (5668-962)

**DB2 R1 (cont'd)****COMPATIBILITY/CONVERSION**

**SQL/DS:** The SQL language used by IBM's relational data base management system for DOS/VSE and VM systems, the SQL/DS program product (5748-XXJ), is broadly compatible with DB2's SQL. It is possible to move most data from SQL/DS to DB2 by unloading it from SQL/DS tables with the SQL/DS data base services utility and then loading it into DB2 tables with the DB2 load utility.

Information on conversion of SQL/DS programs and data to DB2 will be provided in the *IBM Database 2 Application Programming Guides* and the *IBM Database 2 Data Base Planning and Administration Guide*.

**Virtual Storage Considerations:** The DB2 storage requirements are dependent on various configuration and workload parameters including the number of users and their usage patterns, the number and size of data bases, and the number and complexity of applications. The following estimates of virtual storage requirements are provided for general guidance.

- For MVS/XA systems:

**Common Storage Area (CSA)** - Most of the DB2-required areas reside in the extended CSA. The residual CSA requirement is expected to be less than 100K bytes.

**Private Address Space** - Most modules, control blocks, and buffers reside in the extended private area. The minimum residual private address space requirement is approximately 2.5M bytes.

- For MVS/370 systems:

**CSA** - The minimum CSA is approximately 512K bytes. The typical CSA requirement is expected to be 512-532K bytes.

**Private Address Space** - For planning purposes the practical minimum virtual storage requirements for private address space should be considered to be 4.5-5.0M bytes. However, some users with minimum requirements may have DB2 systems requiring less than 4.5M bytes. Virtual storage requirements grow as the number of concurrent users and/or defined tables grows. Thus, the user should consider the maximum address space size that will be available to DB2 as part of his or her overall capacity planning procedures.

**DATA SECURITY and AUDITABILITY**

The IBM Database 2 function is subject to all the controls in its environment such as those provided by the operating system, access methods, and subsystems with which it is communicating. Customer management is responsible for the selection, application, and adequacy of those controls. For further description of the security available in DB2, see "Security, Recovery, Utilities and Installation".

IMS/VS and CICS/OS/VS also have security capabilities. (See those program products' descriptions for details.) Also, through the security access facility (SAF) router of the operating system, Resource Access Control Facility (RACF) (5740-XXH) may be used to control access at the data set level.

**PERFORMANCE CONSIDERATIONS**

The performance of IBM Database 2 in a virtual storage environment is highly dependent on the system resources available, the programs that operate concurrently and their relative priorities, and system and application data set placement. Performance also depends on the paging characteristics and storage reference patterns of DB2 and its application programs, the allocation of data sets to particular devices, table sizes, indexes created, and many other factors.

Performance of DB2 is also dependent upon the amount of concurrent demand for processor time by DB2 and other users of the system.

It is IBM's intent to provide improved DB2 utilization of 308X-class processors through the facilities of MVS/XA.

**DOCUMENTATION**

(available from Mechanicsburg)

The following 'task-oriented' documentation will be provided for IBM Database 2 users: *IBM Database 2 General Information ... IBM Database 2 Introduction to SQL ... IBM Database 2 Application Programming Guide for TSO Users ... IBM Database 2 Application Programming Guide for IMS/VS Version 1 Users ... IBM Database 2 Application Programming Guide for CICS/OS/VS Users ... IBM Database 2 Data Base Planning and Administration Guide ... IBM Database 2 System Planning and Administration Guide ... IBM Database 2 Operation and Recovery Guide ... IBM Database 2 Reference ... IBM Database 2 Reference Summary ... IBM Database 2 Sample Application Guide ... IBM Database 2 Installation ... IBM Database 2 Diagnosis Guide ... IBM Database 2 Diagnosis Reference ... IBM Database 2 Messages and Codes ... IBM Database 2 Program Directory ... IBM Database 2 Licensed Specifications.*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing situations where the installation of IBM Database 2 introduces an exposure to the system integrity of MVS. This program is intended to run authorized. Refer to Programming Announcement dated October 21, 1981.

**RPQs ACCEPTED:** No



PROGRAM PRODUCTS

5740-XYS - MVS/SYSTEM PRODUCT-JES2 R1

PURPOSE

MVS/System Product-JES2 Release 1 provides all the performance and functional benefits of MVS/System Extensions (5740-XE1) and significant new enhancements. MVS/SP-JES2 Release 1 is available for the 4341, 4361-5 and 4381 with ECPS:MVS installed, for the 3031, 3032, 3033 Processors and on the S/370 mdl 158 and 168 Processors with the S/370 Extended Feature installed.

DESCRIPTION

Note: MVS/System Product (MVS/SP) is a generic term referring to announced releases of MVS/System Product-JES2 (5740-XYS) and MVS/System Product-JES3 (5740-XYN) or topics common to both.

The significant new Base Control Program facilities are:

- Support for the 3380 Direct Access Storage with the 3880 Storage Control mdls 2 and 3 with the Data Streaming feature (#4850) on the 3031, 3032 and 3033 Processors or attached to a 3MB channel on the 4341, 4361-5 and 4381, when installed with the MVS Data Facility/Device Support (5740-AM7) program product.  
Data Streaming feature and on 4341 Processors.
- Support for the 3278, 3278 mdl 2A and 3279 Display Stations as operator MCS consoles.
- Support for the 4341, 4361-5 and 4381 Processors with ECPS:MVS.

HIGHLIGHTS

MVS/SP-JES2 Release 1 installed on MVS 3.8 offers new support for the following:

- The 3380 Direct Access Storage with the 3880 Storage Control mdls 2 and 3 using either:
  - the Data Streaming feature (#4850) on 3031, 3032 and 3033 Processors, or
  - the 3MB channel on the 4341, 4361-5 or 4381.

Device support is provided by MVS/SP-JES2 Release 1 installed with the MVS Data Facility/Device Support Release 1 program product (5740-AM7). This support also permits the 3380 device to be used for paging and for system residence. The 3380 Direct Access Storage provides reduced access times and an increased data transfer rate when compared to previous IBM DASD units. The 3380 Direct Access Storage with the 3880 Storage Control mdls 2 and 3 introduces dynamic path selection facility. Dynamic path selection facility allows the operating system to access a reserved device via any of the available paths.

- The 3279 Color Display Station, all mdls, and the 3278 Display Station, mdls 1, 2, 3 and 4 attached via a 3274 mdl 1D control unit are supported as MCS consoles through device independent display operator console support (DIDOCs). The greater capacity screens are supported on the 3278 mdls 3 and 4 and on the 3279 mdls 3A and 3B. In addition, the color defaults are supported on all mdls of the 3279. These color defaults are blue for all normal traffic, white for all action messages and green for operator commands. Full program function key support is available for the 3278 and 3279 Display Stations.

In addition, the following MVS/System Extensions (5740-XE1) Performance and Functional Benefits are included as part of the MVS/SP-JES2 Release 1.

**Performance Improvements:** MVS/System Extensions test measurements completed on the S/370 158, 168 and 3031, 3032 and 3033 Processors have shown the following results:

A 20 to 27% reduction in control program supervisor state execution time, providing throughput improvements ranging from 14 to 18% for BATCH, TSO/BATCH and IMS/BATCH test environments on uniprocessors and 17 to 20% improvements on multiprocessor configurations as compared to MVS Release 3.7 with SUs 4, 5 and 7 installed.

Actual performance will vary depending upon customer environment, storage and I/O configuration. No assurance can be given that an individual user will achieve the test results.

**SMF Enhancements:** A major revision to SMF provides more data with increased installation control over the amount of data collected and allows a non-disruptive migration to full utilization of the new function.

**SRM Enhancements:** Control of system resources to meet installation-defined goals is necessary for effective usage of the system. The SRM is enhanced to centralize and improve system control, to improve the RMF reporting of certain transactions, and to ease the use of certain SRM facilities.

**Action Message Retention Facility:** Proper and timely handling of operator messages is important. Messages requiring operator action are given particular message descriptor codes. Prior to MVS/System Extensions Release 2, these messages could roll off

the operator's screen with no easy way for the operator to reconstruct the set of unsatisfied action messages. The action message retention facility allows the operator to retrieve all unsatisfied action messages.

See the *General Information Manual* (GC28-1025-0) for more detailed information.

CUSTOMER RESPONSIBILITIES

MVS Release 3.8 and the MVS Processor Support 2 must be installed prior to installing MVS/SP-JES2 Release 1.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

MVS/SP-JES2 Release 1 requires the appropriate S/370 Extended Feature on IBM S/370 mdls 158 (#7730 or #7731) and 168 (#7730) or ECPS:MVS on the 4341, 4361-5 or 4381. MVS/SP-JES2 Release 1 supports the following processors:

IBM mdl 158-1	UP/MP/AP
IBM mdl 158-3	UP/MP/AP
IBM mdl 168-1 with RPO S20579	UP/MP
IBM mdl 168-1 with RPO S20580	AP
IBM mdl 168-3	UP/MP/AP
IBM 4341 Processor Mdl Group 1	UP
IBM 4341 Processor Mdl Group 2	UP
IBM 4361-5 Processor	UP
IBM 4381 Processor	UP
IBM 3031 Processor	UP/AP
IBM 3032 Processor	UP
IBM 3033 Processor	UP/MP/AP
IBM 3033 Processor Mdl Group N	UP
IBM 3033 Processor Mdl Group S	UP

The minimum total storage required by MVS/SP-JES2 Release 1 depends on many factors. These include an installation's configuration, the subsystems, program products and problem programs in use. However, the following information will assist in approximating additional bytes of virtual storage required for the MVS/System Extensions and for MVS/SP-JES2 Release 1. The actual bytes of real storage needed will be less because PLPA and CSA are only partially backed by real storage.

To estimate the additional virtual storage required for MVS/SP-JES2 Release 1, use Chart 1 in the following manner:

- If the installation is running MVS 3.8 with the OS/VS2 MVS Processor Support 2 installed, the additional storage is the combined total of columns 1, 2 and 3.
- If the installation has MVS/System Extensions Release 1 installed, the additional storage is the combined total of columns 2 and 3.
- If the installation has MVS/System Extensions Release 2 installed, the additional storage is the amount in column 3.

CHART 1

	MVS/System Extensions Release 1 (Column 1)	MVS/System Extensions Release 2 (Column 2)	MVS/SP-JES2 Release 1 (Column 3)
Nucleus	30,000	6,200	10,500
PLPA	10,000	66,300	- 101,500 (Note 4)
CSA	---	Variable (Note 1)	---
SQA	500	Variable (Note 2)	4,000
LSQA	---	Variable (Note 3)	---

Notes:

1. Assuming four SMF buffers - requires an additional 8,000 bytes.
2. The amount of additional storage required in SQA depends on several variables:
  - Assuming 50 address spaces with interval accounting, two recording data sets and three subsystems defined to SMF, requires an additional 8,000 bytes.
  - Subsystem transaction reporting requires a minimum of 4,096 bytes.
  - The installation control specification requires for each subsystem name, an additional 28 bytes ... for each user, transaction name and transaction class, an additional 20 bytes.
3. Each initiator requires an additional 40 bytes.
4. This reflects a reduction in PLPA of 101,500 bytes. It is achieved by an optional installation step. This step moves infrequently referenced modules from LPALIB to LINKLIB.

For more information, see the *General Information Manual* (GC28-1025-2).

SOFTWARE REQUIREMENTS

MVS/SP-JES2 Release 1 requires MVS Release 3.8 with MVS Processor Support 2 installed. MVS/SP-JES2 Release 1 completely



## PROGRAM PRODUCTS

**MVS/SP-JES2 R1 (cont'd)**

replaces MVS/System Extensions (5740-XE1).

In order to support the IBM 3380 or the IBM 3375 Direct Access Storage, the MVS Data Facility/Device Support program product (5740-AM7) is required.

RMF users must install RMF Version 2 Release 3.

RMF users of the MVS/SP-JES2 Release 1 Enhancement must install the RMF Version 2 Release 3 Enhancement supporting the MVS/SP-JES2 Release 1 Enhancement.

The specified operating environment may change and will be restated at time of product availability.

**INSTALLATION CONSIDERATIONS**

MVS/SP-JES2 Release 1 requires a stage 1 SYSGEN assembly together with a normal SMP Release 4 application. Alternatively, a full SYSGEN can be used for installation. The program directory will contain additional installation information.

To use the functions provided by RMF, the OS/VS2 MVS Resource Measurement Facility Version 2 Release 3 is required.

**MVS/SP-JES2 RELEASE 1 - JES COMPATIBILITY**

MVS/SP-JES2 Release 1 operates with the following JES2 products:

Either JES2 Release 4.1  
Optionally with:  
JES2 3800 Enhancements.

or NJE for JES2 (5740-XR8)  
Optionally with:  
NJE for JES2 3800 Enhancements.

User-written programs that use standard external interfaces should continue to execute on an MVS system with the MVS/SP-JES2 Release 1 installed. Programs that interrogate MVS system control blocks may require modifications. Licensees will receive documentation on changes in control blocks at the time of availability.

When migrating from an MVS Release 3.8 or an MVS/System Extensions Release 1 environment, changes in an installation's accounting procedures may be required because of enhancements to SMF. (See the *General Information Manual*, GC28-1025-0, for details.) IBM devices currently supported by MVS Release 3.8 will continue to be supported by MVS with MVS/SP-JES2 Release 1 installed.

Any Installation Performance Specification (IPS) that is compatible with MVS Release 3.8 or MVS/System Extensions can be used unchanged with MVS/SP-JES2 Release 1.

IBM program products currently supported on MVS Release 3.8 or MVS Release 3.8 with the MVS/System Extensions program product should continue to run with MVS/SP-JES2 Release 1 installed (although for RMF users, the appropriate RMF release must also be installed). APARs will be accepted for MVS/SP-JES2 Release 1 when any such IBM program product does not run successfully after MVS/SP-JES2 Release 1 is installed.

**MVS/SYSTEM PRODUCT-JES2 RELEASE 1 ENHANCEMENT**

The enhancement for MVS/System Product-JES 2 Release 1 provides the following functions:

- Support of the 3081, 3083 or 3084 Processor Complex.
- Support of the 3375 Direct Access Storage with the 3880 Storage Control mdls 1 and 2 is provided on the 3031, 3032 and 3033 Processors using the Data Streaming Feature. The 3375 Direct Access Storage is also supported on the 4341, 4361-5 and 4381 Processors.
- Support of the 3880 Speed Matching Buffer Feature (#6550) with the 3031, 3032 and 3033 Processors and S/370 Mdl's 158 and 168.

RPQs ACCEPTED: No.

**DOCUMENTATION**  
(available from Mechanicsburg)

OS/VS2 MVS/System Product-JES3 and OS/VS2 MVS/System Product-JES2 General Information Manual (GC28-1025-2).

PROGRAM PRODUCTS

5740-XYS - MVS/SYSTEM PRODUCT-JES2 R2

PURPOSE

MVS/System Product-JES2 Release 2 incorporates all of the functional benefits of MVS/System Product-JES2 Release 1 and, in addition, provides functional and device support enhancements to the MVS Base Control Program and JES2. These enhancements offer an installation opportunities to reduce the system virtual storage requirements of major subsystem and system components, provide new facilities in the areas of multi-system support and operations management, as well as providing general functional and device support enhancements.

DESCRIPTION of RELEASE 2

MVS/SP-JES2 R2 consists of enhancements to two MVS components: The MVS Base Control Program (BCP) and JES2. The BCP component incorporates all of the functions of the BCP of MVS/SP-JES2 R1 and requires MVS Release 3.8 with the MVS Processor Support 2 function as prerequisites.

The BCP component of MVS/SP-JES2 R2 will operate with the JES2 component of MVS/SP-JES2 R2 or with the JES2 products that operate with MVS/SP-JES2 R1. The JES2 products supported in the latter case are:

- JES2 R4.1
- NJE for JES2 R3 (program product 5740-XR8)

This flexibility will enable an installation to stage its migration to MVS/SP-JES2 R2. When installed, the JES2 component of MVS/SP-JES2 R2 replaces JES2 R4.1 and NJE for JES2 R3.

BASE CONTROL PROGRAM (BCP) COMPONENT HIGHLIGHTS

The BCP component of MVS/SP-JES2 R2 incorporates all of the functions of the BCP of MVS/SP-JES2 R1 and, in addition, provides the following facilities:

- Cross Memory Services
- Global Resource Serialization
- Operational Interface enhancements
- Directed VIO
- Subsystem Definition facility

**CROSS MEMORY:** Cross Memory is an architectural extension supported by MVS. This extension facilitates communication among address spaces in an MVS/System Product-JES2 Release 2 environment. By providing a means to transfer data or program control directly between the private areas of address spaces, many benefits result. Because the prime users of Cross Memory services are intended to be MVS system components and subsystems, these benefits can be realized by an installation without any additional user programming. The benefits include:

- **Reduced System Virtual Storage Requirements:** The Cross Memory services of MVS/System Product-JES2 Release 2 enable the system virtual storage (Nucleus, PLPA, SQA, CSA) requirements for specific environments to be reduced. Certain data formerly found in the system virtual storage area can now be stored in new auxiliary address spaces and accessed via Cross Memory services. Such reduction can enable more system or private area virtual storage usage by other subsystems, new applications or current applications growth.
- **Enhanced Isolation:** The multiple address space structure of current MVS provides a considerable amount of data and program isolation. There are instances, however, when two address spaces must communicate with each other. This is generally accomplished through the scheduling of a Service Request Block (SRB) and involves the use of common virtual storage area (CSA/SQA). MVS/SP-JES2 R2 now provides the means by which inter-address space communication can occur without using common virtual storage, thereby isolating the program/data concerned from accidental modification or destruction by system components or authorized programs. Thus, the protection afforded to programs and data by the private area of an address space is extended to include instances of inter-address space communication.
- **Improved System Structure:** Currently, control block information residing in the common virtual storage area (CSA/SQA) is directly addressed by system components and other programs. Cross Memory services enables such control block information to be assigned to the private area of a system or subsystem auxiliary address space and accessed without the overhead of the current Service Request Block (SRB) mechanism. The isolation afforded by the private area of an address space allows controlled access to such data. The information required by system components, subsystems and their users can now be provided via an interface which is independent of the control block structures in the auxiliary address space. Reducing control block dependencies both enhances system reliability and facilitates migration to new function.
- **Enhanced Authority Mechanism:** Cross Memory services provide the capability for authorized subsystems to define groups

of address spaces having different levels of authorization for inter-address space communication. This represents a significant enhancement over existing facilities (for example, SRBs) which provide a single level of authorization to all address spaces (Key 0). Once such groups have been defined, a program may use Cross Memory services for inter-address space communication, but will be prohibited from accessing address space groups for which it has not been authorized.

**Cross Memory Usage:** Examples of system components/subsystems utilizing Cross Memory services in the MVS/SP-JES2 R2 environment.

- Global Resource Serialization
- Operations Interface
- Display Units (DU) command
- IMS/VS

GLOBAL RESOURCE SERIALIZATION

- Global Resource Serialization, which extends the current ENQ/DEQ facility, provides additional function and improved RAS.
- Global Resource Serialization extends the ENQ function of resource serialization across system boundaries. Multiple MVS systems, interconnected through Channel-to-channel Adapters (CTCs), will now be able to serialize resource usage across systems.
- Additionally, Global Resource Serialization will run in its own address space utilizing the new Cross Memory architecture. Unlike the current ENQ facility, the Global Resource Serialization control blocks will reside in their own address space, thereby reducing the amount of system virtual storage required and, at the same time, improving the system RAS characteristics. By running in its own address space and by preventing addressability to its control blocks, Global Resource Serialization is isolating itself from accidental modification or destruction by other system components or authorized applications.
- Global Resource Serialization also addresses the need to provide information about resources without requiring that an application look at internal ENQ control blocks. MVS/SP-JES2 R2 eliminates dependencies on the structure of ENQ control blocks by providing a new macro service that allows applications to obtain resource status. Access to these control blocks is available only through this new macro service.
- Current ENQ/DEQ/RESERVE services provide three resource serialization scopes: STEP, SYSTEM and SYSTEMS. In a Global Resource Serialization environment, ENQ/DEQ requests specifying STEP or SYSTEM will be treated as requests for local resources and not communicated to other systems in the defined complex. ENQ/DEQ requests specifying SYSTEMS are requests for global resources and are communicated to all systems within the defined complex.

Global Resource Serialization provides the capability to override the default serialization from local to global, and vice versa, in instances where the SYSTEM and SYSTEMS scopes are used. This override is achieved by the invocation of exits that scan installation-specified 'inclusion' and 'exclusion' resource name lists. Global Resource Serialization invokes the 'inclusion' exit for each ENQ/DEQ request specifying a scope of SYSTEM (local serialization) to determine whether the installation requires that resource to be included in global serialization. For each ENQ/DEQ/RESERVE request specifying a scope of SYSTEMS (global serialization), the 'exclusion' exit is invoked to determine whether the installation requires that resource to be excluded from global serialization.

An exit that scans a RESERVE conversion list is also provided to allow device RESERVE requests to be overridden and converted to SYSTEMS (global serialization) requests, thereby allowing other systems in the defined complex to concurrently access the device.

Default exits and resource name lists are provided by IBM. An installation may modify these lists to meet the specific requirements of its operating environment.

- Thus, in the context of multi-system data set integrity, the conversion capabilities provided by Global Resource Serialization can be used to provide a data set level of serialization for MVS/JES2 installations.
- In order for an installation to achieve resource serialization across systems, the MVS systems must be interconnected via Channel-to-channel Adapters (CTCs). Global Resource Serialization requires dedicated CTCs, and, in order for an installation to obtain maximum configurability with Global Resource Serialization, each MVS system should have a CTC connection with every other system with which it serializes resource usage. To meet the additional CTC requirements of large installations, further CTC capability is provided for the 3033 Processor. For details, see RPO 8P0882.

**OPERATIONAL INTERFACE ENHANCEMENTS:** A new facility, in conjunction with two enhanced commands, provides significant improvements in the operability of MVS Systems, particularly in large

## MVS/SP-JES2 R2 (cont'd)

system installations. These enhancements allow the installation to reduce non-essential message traffic on the operator's console and also provide the operator with new system status information which will allow better control of job traffic and the I/O configuration.

- **Message Processing Facility (MPF):** The Message Processing Facility provides a means of reducing the number of messages to be displayed on the operator's console. The installation can determine the messages which it considers to be important and, through the use of this facility, suppress many non-essential ones.

The messages an installation wishes to suppress are listed by identifiers in a member of SYS1.PARMLIB. The SYS1.PARMLIB member selection may be changed at any time via the SET command and the message identifiers in use can be displayed by use of the DISPLAY MPF command. Suppressed messages are included in the hardcopy log with an indicator denoting the message has been suppressed.

**Note:** Action messages, command responses, responses from the Monitor (MN) command and Write to Operator with Reply (WTOR) messages (message codes 1, 2, 3, 5 and 11) will not be suppressed, even if they had been so specified by the installation.

- **Display Active (DA) Enhancements:** The DISPLAY A command is changed to provide additional information. It allows for improved operator awareness and displays information relevant to other operator commands. Included in this display are address space status, type of user, ASID, PER indicator, step must complete count, performance group number, domain number, CPU affinity, elapsed time, and CPU time for each address space.

The organization of the display is changed to better utilize the screen of the operator's console. The DISPLAY A command can also be restricted to one particular user (job, TSO user, etc.) or group of users with similar names so that it is easier to obtain the required pertinent information for specific users.

- **Display Units (DU) Enhancements:** Determining which jobs are using a device is important to a system operator or programmer trying to resolve why a device cannot be varied offline. With the enhancement to DISPLAY U, the operator can display the job names and ASIDs of device users, in order to decide what action should be taken. Improved recovery is also added to the allocation end of memory resource manager for sharable DASD devices. The additional system status information required for this extension is collected in a separate address space and accessed via Cross Memory services.

**DIRECTED VIO:** Directed VIO enables an installation to more effectively utilize high speed paging volumes for paging of critical response-oriented applications by separating VIO pages from these volumes. In addition, this facility will allow installations to utilize VIO more extensively and experience its benefits in environments where the limitation on high speed paging space was previously a concern.

A new keyword (NONVIO) is being provided as a system parameter, or as a PAGEADD option, to allow installations to specify local page data sets which are not to receive VIO pages. If enough other local page data set space is available, VIO pages will be directed to those local page data sets that were not on the directed VIO data set list. Only in the case of constrained VIO paging space can VIO pages potentially spill to the NONVIO local page data sets.

### OTHER ENHANCEMENTS

- A Subsystem Definition Facility is provided to give an installation the capability of defining subsystems at IPL via one or more members of SYS1.PARMLIB, thereby eliminating the need to modify the Subsystem Name Table (IEFJSSNT).
- Several other enhancements have been made to the Base Control Program of MVS/System Product-JES2 Release 2 to facilitate the use of subsystems. Details of these enhancements will be documented in the *General Information Manual*, GC28-1025-0.

### JES2 COMPONENT

The JES2 component of MVS/System Product-JES2 Release 2 (MVS/SP-JES2 R2) provides a generally compatible replacement of both JES2 R4.1 and the NJE for JES2 program product (5740-XR8), together with the functions of the JES2 3800 Enhancements.

The JES2 component is designed to improve the operational environment for the JES2 user through the extension of existing functions and the provision of new facilities. Enhancements include improvements to the reliability and recovery aspects of the spooling subsystem, output processing, RJE and NJE, and extensions to RAS facilities. New facilities include the provision of user exit capabilities to assist the installation in tailoring JES2 to its operational environment, a spool offload program to help mitigate the effects of any future JES2 cold starts, and support of the 3375 and 3380 Direct Access storage devices as a JES2 spool and checkpoint device.

### JES2 HIGHLIGHTS of MVS/SP-JES2 R2

#### Spool Device and RAS Support

- The new 3375 and 3380 Direct Access Storage devices are supported as spool and checkpoint devices.
- The means of defining a track group has been changed to more efficiently use the capacity of current devices and the 3380 and/or 3375 Direct Access Storage in a mixed spool environment.
- A new facility called Spool Partitioning provides a means of reducing the impact of the failure of a single storage device on the total spool space. The total number of volumes eligible for spool space allocation for each job can be limited. Through the use of this facility, the probability of a job's data becoming inaccessible due to a device failure can be reduced. Exit points are provided to enable the installation to control the allocation of spool space. The installation will also have the option of doing a warm start without all previously mounted volumes available.
- Bad Track Group Isolation attempts to prevent transient and/or limited failures of the media or device from affecting large numbers of jobs by propagation. Track groups in which an I/O error has occurred will be isolated in order to prevent them from being reassigned. Information about the error will be displayed on the operator's console.
- The JES2 User Exit facilities will enable installations to individually tailor the JES2 component of MVS/System Product-JES2 R2 to the requirements of their own operating environment.
- Specific IBM-defined exit points are provided at strategic points in JES2 code. The installation-supplied exit routines are 'logical extensions' of the JES2 environment. The exit code is assumed to be authorized.
- The installation is also provided with the general facility to specify its own exit points by coding the exit macros in the source code of JES2.
- Individual exit points can be controlled by initialization parameters and by system operator commands.

#### Improvements to the Operational Characteristics of Output Processing

- Released 'held' data sets (primarily those held by interactive system users) will be, when possible, gathered and printed with other non-held or released data sets, thereby minimizing the scattering of data sets across printers and reducing the amount of paper used for separator pages.
- Output devices, including both local and remote printers and punches, will now be allowed to select work based upon several route codes. An installation can, therefore, use a local printer to print work originally destined for a currently unavailable RJE station while still permitting that printer to continue selecting locally routed output.
- The line/card count displayed at the time an output group is selected for processing will be updated as the output is processed, thereby enabling a running count to be kept. Various operator commands will provide the updated count. In contrast, the current JES2 environment only provides an initial count.
- New operator commands and system messages give system operators the capability to specify output processing characteristics for groups of SYSOUT data sets, thus providing the installation with greater control of output groups.
- For printers with a forms flashing feature, a standard page format can now be defined as an installation default. JES2 will use the default when no forms flashing is specified via a job's JCL.
- JOB LOG, JCL Images, and System Messages data sets are now addressable using the JES2 JECL Output statement.
- Logical page size (LINECT) support of JES2 JECL JOBPARM statement is extended to the data set level via JES2 JECL output statement.

#### Improvements to RJE and NJE Facilities

- Support for RJE and NJE networks is expanded to 1,000 remotes and 1,000 nodes.
- Verification of successful signon is provided at remote workstations.
- The "JES2 JOB STATISTICS" will now be a part of the Job Log data set and will be transmitted to an RJE workstation or NJE node as part of the job, thus providing more complete job statistics.
- A transparent "STORE and FORWARD" facility is provided to allow jobs and data to be transmitted through a JES2 node.
- Data compression may now be specified on a line basis in addition to the currently supported workstation basis.

## MVS/SP-JES2 R2 (cont'd)

### Spool Offload Facility

- A new facility is provided to give the installation the capability to dump and later restore the data from the JES2 spool. This facility will function using either tape, DASD or MSS virtual volumes as the offload media.
- Release and spool device-independent data formats allow customers to use the spool offload facility as a future JES2 cold start circumvention mechanism when migrating from release to release or changing spool devices. At present, a cold start can cause loss of jobs and sysout data; this facility would permit a cold start to be performed without such losses or the need to drain the system.

### RAS Improvements

- **Command Default Improvements:** Several commands have been changed to reduce their wide ranging effects if issued inadvertently by an operator. An 'ALL' subparameter will now have to be explicitly specified with commands having the potential to adversely impact the system operation.
- **Event Trace Extensions:** This facility has been enhanced to allow for the tracing of internal JES2 "processors" which do not have devices associated with them. This enhancement will assist in diagnosing problems in the areas of the command processor, conversion processor, line manager processor, etc.
- **Error Recovery Facility:** This new facility, similar in structure to the operating system's ESTAE/FRR recovery scheme, has been implemented to allow internal JES2 "processors" to deal with programming errors which previously caused JES2 termination. SYS1.LOGREC recording of all JES2 errors, regardless of whether recovery is successful, is also provided.

### Other JES2 Enhancements

- **Resource Utilization Thresholds:** The installation will now be able to specify the threshold at which warning messages will be issued when the supply of key JES2 resources is about to become exhausted. The resources for which utilization thresholds will be monitored are: Console message buffers, local buffers, TP buffers, SMF buffers, JOEs, JOEs and track groups.
- **Operator Control of Pre-Execution Jobs:** The system operator is now able to change the class and priority of a job at any time through the use of the \$T command.
- **JES2 Message Identification:** The JES2 command responses now carry unique identifiers instead of the commonly used HASP000. This will expedite operator access to explanatory text in the system messages manual. In general, command response texts will remain unaltered. The HASP000 identifier will still be used but merely for the simple affirmative response 'OK'.
- **Extended \$Z Control:** The \$Z command is extended to enable operators at remote locations to control printers and punches at those locations.
- **Unlike Data Set Concatenation of SYS1.PARMLIB:** Installations will now be able to specify data sets of unlike attributes to be concatenated to the initialization parameter library, thereby providing greater flexibility for testing environments.
- **HASPRTAM Restructure:** To improve serviceability, the HASPRTAM module has been split into smaller modules by subfunctions.

### MVS/SP-JES2 R2: JES2 COMPONENT DESCRIPTION

JES2 is a specialized component of MVS/SP-JES2 R2 which operates in the same Processor with MVS to perform the peripheral functions associated with batch job processing. JES2 is started as a job entry subsystem. Control of designated unit-record devices is taken, the specified intermediate storage direct access device(s) are initialized, and job processing begins. JES2 has four major processing stages which relate to its four major external functions. These are:

1. **INPUT STAGE** - This stage reads jobs simultaneously from a variable number of various types of online card readers and remote terminals. These jobs are then entered into a priority queue to await processing by the next stage.
2. **CONVERTER STAGE** - This stage passes the Job Control Language (JCL) to the MVS Converter which merges the specified procedures from the appropriate Procedure Library, performs a basic syntactical scan, and converts the JCL statements into an "internal text" format which JES2 SPOOLS for later use by the MVS Interpreter. The jobs are then queued by job class to await processing by the next stage.
3. **EXECUTION STAGE**- This stage removes jobs based upon priority and class from the queue established by the Converter Stage and passes those jobs to MVS for processing. Input cards are supplied as required to the executing program and print and punch records are received and written onto JES2 intermediate

storage. At the completion of a job, it is placed in a queue to await processing by the next stage.

4. **OUTPUT STAGE** - This stage transcribes the print and punch output generated by jobs in the previous stage to printers and punches. A variable number of various types of printers, punches and remote terminals can be operated simultaneously.

### JES2 Standard Features: The standard features of JES2 include:

- **Job input service** provides for low-overhead reading of job streams and storing of data on SPOOLING volumes for later high-speed retrieval for up to 99 concurrently active local card readers in any combination of devices as follows: 2540 reader ... 2501 reader ... 2520 punch (with read feature) ... 3505 reader (80-column punched cards only) ... 3525 punch (with read feature).
- **Converter service** provides for the merging of the submitted JCL with user- or installation-selected procedure libraries and for an early scan of this combined JCL for syntactical errors.
- **Execution service** provides for selection of jobs and execution monitoring for up to 99 concurrently executing jobs as follows: Selection of jobs based upon job class and initiator priority class list of up to 36 classes for each initiator ... automatic delaying of jobs with duplicate OS jobnames ... automatic deblocking and blocking of user SYSIN/SYSOUT data ... counting of lines, cards, and execution duration with optional operator notification and/or cancellation ... interface for SMF counting of SYSIN data.
- **Multiple SPOOLING volume support** provides for balanced utilization of up to 36 volumes for any combination of any mdl of the following devices (one required): 2314 ... 3330 ... 2305 ... 3340 ... 3350 ... 3375 ... 3380.
- **Warm start capability** provides for checkpointing critical JES2 information sufficient for: Optionally restarting jobs which were executing ... restarting print and punch at the last checkpoint.
- **Job output print service** provides for low overhead printing of job streams, system message, and user data print output for up to 99 concurrently active local printers in any combination of devices as follows: 1403 Printer ... 3211 Printer ... 3800 Printing Subsystem ... 3203 mdl 4 and 5 ... 4245 Printer.
- **Special forms support** provides for the routing of print (on a job or data set basis) and punch data (on a data set basis) to special forms output queued for output as directed by the operator.
- **Internal Reader facility** provides the ability for any task within the system to submit jobs to JES2 for batch execution as though entered from a JES2 card reader.
- **Console Support** provides for direct entry for JES2 commands and JES2 abbreviated replies to WTORS through MVS operator consoles.
- **JES2 interfaces directly with the MVS SMF writer** to produce seven SMF records (types 6, 26, 43, 45, 47, 48 and 49). JES2 also provides two user SMF exits (IEFUSO and IEFUJP).
- **Job output punch service** provides for low overhead punching of job stream user punch output for up to 99 concurrently active local punches in any combination of devices as follows: 2520 punch ... 2540 punch ... 3525 punch.
- **Execution Batching** provides the facility for passing jobs directly to a processing program such as a "one-step" monitor, reducing the overhead of OS scheduling and allocation for short running jobs requiring limited system facilities.
- **Priority Aging** provides for automatically increasing the JES2 scheduling priority of jobs which have been in the system for extended periods of time.
- **Remote Job Entry** provides for high speed communications with binary synchronous and SDLC batch workstations which may be used for job stream input and output as well as operator control of the devices and jobs associated with the remote (see "JES2 RJE Features").

### Use Exit Facilities

- The JES2 User Exit facilities enable installations to individually tailor the JES2 component of MVS/System Product-JES2 Release 2 to the requirements of their own operating environment.
- Specific IBM-defined exit points are provided at strategic points in JES2 code. The installation-supplied exit routines are "logical extensions" of the JES2 environment. The exit code is assumed to be authorized.
- The installation is also provided with the general facility to specify its own exit points by coding the exit macros in the source code of JES2.
- Individual exit points can be controlled by initialization parameters and by system operator commands.

## MVS/SP-JES2 R2 (cont'd)

### Spool Offload Facility

- A facility is provided to give the installation the capability to dump and later restore the data from the JES2 spool. This facility will function using either tape, DASD or MSS virtual volumes as the offload media.
- Release and spool device-independent data formats allow customers to use the spool offload facility as a future JES2 cold start circumvention mechanism when migrating from release to release or changing spool devices. At present, a cold start can cause loss of jobs and sysout data; this facility would permit a cold start to be performed without such losses or the need to drain the system.

### Spool Partitioning Facility

- Spool Partitioning provides a means of reducing the impact of the failure of a single storage device on the total spool space. The total number of volumes eligible for spool space allocation for each job can be limited. Through the use of this facility, the probability of a job's data becoming inaccessible due to a device failure can be reduced. Exit points are provided to enable the installation to control the allocation of spool space: The installation will also have the option of doing a warm start without all previously mounted volumes available.

### Error Recovery Facility

- This facility, similar in structure to the operating system's ESTAE/FRR recovery scheme, has been implemented to allow internal JES2 "processors" to deal with programming errors which previously caused JES2 termination. SYS1.LOGREC recording of all JES2 errors, regardless of whether recovery is successful, is also provided.

**JES2 Multi-Access Spool Feature (MAS):** JES2 in R3 MVS/SP-JES2 R2 allows from two to seven MVS Systems to share the JES2 input, job and output queues through the use of Shared DASD. This feature may be used to share the workload or a pool of JES2-controlled devices among processors. Jobs may be routed to any specific system or all systems in this multi-access spool complex. Furthermore, JES2-controlled unit record and remote devices need not, but may, be attached to each processor.

Each processor operates asynchronously within the multi-access spool complex, i.e., there is no master-slave relationship. Because of this operating design, any system in the complex can recover the workload accepted into the complex by any other system. Another system in the complex can have the RJE, TSO and unique unit record devices of the failing system physically switched to it and continue processing those jobs previously entered into the spool queue.

Another function supplied by the JES2 multi-access spool feature is the ability to isolate a processor for testing purposes. A processor may be designated as operating in independent mode, and in so doing, will only process jobs that are both routed to it and are themselves designated to be executed on that processor in independent mode.

**JES2 RJE Features:** Those features common to all JES2 RJE configurations are as follows:

- JES2 RJE supports up to 1,000 remote workstations communicating over nonswitched (point-to-point) or switched lines.
- JES2 RJE provides for concurrent operations over up to 1,000 lines assigned to unique communication line adapter addresses of the following types: SDA Type II on a 2701 for Binary Synchronous ... Synchronous Base on a 2703 for Binary Synchronous ... 3704 providing 270X emulation ... 3705 providing 270X emulation ... 3704/3705 SDLC.
- Output routing control provides for print and punch output to be directed to the devices attached to the remote, to the central system, or to other remotes as designated by JES2 initialization parameters, by control cards submitted with the job, or by operator command.
- Remote operator control provides a subset of the JES2 operator commands for display of information and control of jobs and devices associated with the remote.
- Operator message output provides for transmission of messages and responses to remote operators with online MULTI-LEAVING workstations with consoles immediately and optional saving of messages for all other remotes until the remote is online and has a printer available.
- Workstation programs, when required, are supplied as extensions of JES2 and are contained on the MVS distribution libraries in source form.
- Terminal support on the central system provides for communication with: 2772 (Binary Synchronous) ... 2780 (Binary Synchronous) ... 3780 (Binary Synchronous) ... 5110 Computer (as a 2772 BSC) ... S/360 mdls 20, 25, 30, 40, 50, 65, 65MP, 67 (in 65 mode), 75, 85, and 195 (MULTI-LEAVING) ... All virtual storage S/370 processors

(MULTI-LEAVING) ... 1131 (MULTI-LEAVING) ... System/3 (MULTI-LEAVING) ... System/32 or System/34 (MULTI-LEAVING as a System/3) and System/32 or System/34 (SDLC as a 3770) (MULTI-LEAVING) ... 8100/DPPX or 8100/DPPX/SP (multiple logical unit SDLC).

To achieve this flexibility of terminal-sharing, JES2 uses the VTAM application program interface for the support of the SDLC terminals which are attached to a 3704/3705 in network control mode.

SDLC terminals supported by JES2 in MVS are the non-programmable mdls of the 3771, 3773, 3774, 3775, 3776 and 3777 Communication Terminals, the S/32 (as a 3770), the S/34 (as a 3770), the 6670 Information Distributor (through the program product MVS/Information Distribution Workstation Support, 5740-AMA), the 3790 Communication System and the 8100/DPCX Information System. Support for the 3770 family of devices includes the the 3262 Line Printer mdls 2 and 12, the 3784 Line Printer, the 3521 Card Punch, the 3501 Card Reader and the 2502 Card Reader.

- The signon feature provides for remote identification and line security through remote and line passwords.
- Remote characteristics support utilizes the unique features on each remote as follows: Full text transparency (required for object decks) ... text compression ... print line width truncation ... outer size and blocking capabilities. **Note:** Multipoint or multidrop line features are prohibited.
- Remote job priority adjustment provides for favoring or limiting the JES2 scheduling priority of jobs submitted from each remote workstation.
- Line restart feature provides for warm starting of print output after remote workstation or line failures.

**NJE Features:** The Network Job Entry (NJE) facility provides for the transmission of selected jobs and in-stream data sets, system output (SYSOUT) data sets, operator commands and messages, and job accounting information from one computer system to another across a communication link.

A job entry network consists of one or more interconnected computer systems (called nodes), running under OS/VS2 MVS. These nodes have the capability of communicating with one another and passing the information indicated above from one node to the next. The number of nodes which can exist within a job entry network ranges from one to 1,000.

The nodes can be single processors (UP/AP), tightly coupled multiprocessing processors or multi-access spool systems.

A job may enter the network via any JES2 local or remote input device and will be queued for transmission to another node if the node of entry is not the execution mode. A job designated for execution at another node is either transmitted directly to that node or is transmitted through intermediate nodes located along a path to the execution node. Transmission of jobs along BSC communications links is handled on a store-and-forward basis; that is, a job must be completely received by a node before any action will be taken to either execute the job or transmit the job to another node. Once a job has been completely received by a node, the transmitting node frees the resources that were allocated to the transmitted job. Transmission of jobs through ACF/VTAM links is logically direct to the execution node.

At each stage of processing, appropriate accounting information is collected and produced on the processing node for local accounting. In addition, network accounting number support is included. This permits accounting numbers to be assigned across the network and provides initialization parameters, conversion tables and routines and user exits to convert local accounting numbers to network accounting numbers and vice versa. All accounting information is produced through standard System Management Facilities (SMF).

**Network Path Manager:** A network path manager running in each processor in the job network interfaces with JES2 and the multi-access spool facility to communicate with all other network path managers. The network path managers control the routing of data through the network by providing best-path and alternate-path information to other NJE components. No single node is designated as a network manager; any subset of an NJE network can function entirely on its own.

### CUSTOMER RESPONSIBILITIES

A customer using the Network Job Entry Facility for JES2 should be a prior user of JES2 with appropriate personnel trained and experienced in OS/VS2 MVS. When planning NJE, every effort should be made to keep the initial configuration to a minimum number of nodes. After experience is obtained, additional nodes may be planned and added individually. Large network configurations require careful planning by experienced IBM and customer personnel to help ensure that maximum benefits are achieved through the proper use of the system.

PROGRAM PRODUCTS

**MVS/SP-JES2 R2 (cont'd)**

**Prerequisites:** The Network Job Entry Facility for JES2 requires the installation of Selectable Unit 10 as a prerequisite to the use of the 3800 Printing Subsystem. Use of SNA devices for RJE workstations will require either VTAM2, or the SCP for ACF/VTAM and ACF/VTAM Version 1 or ACF/VTAM Version 2 as well as the appropriate level of MVS. Use of SDLC communicating links in the NJE network will require installation of ACF/VTAM Version 1 with Multisystem Networking Facility for ACF/VTAM or ACF/VTAM Version 2.

**Channel-to-channel Adapter:** NJE supports the CTC adapter as a communication link when it is attached to a block multiplexer channel. The use of the CTC adapter by NJE for JES2 must be separate from any other use of the CTC adapter.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

MVS/System Product-JES2 Release 2 requires the appropriate S/370 Extended Feature on IBM S/370 mdls 158 (#7730 or #7731) and 168 (#7730). MVS/System Product-JES2 Release 2 supports the following processors:

IBM mdl 158-1	IIP/MP/AP
IBM mdl 158-3	UP/MP/AP
IBM mdl 168-1 with RPO S20579	UP/MP
IBM mdl 168-1 with RPO S20580	AP
IBM mdl 168-3	UP/MP/AP
IBM 4341 Processor Mdl Group 1	UP
IBM 4341 Processor Mdl Group 2	UP
IBM 4361 Processor Mdl Group 5	UP
IBM 4381 Processor	UP
IBM 3031 Processor	UP/AP
IBM 3032 Processor	UP
IBM 3033 Processor	UP/MP/AP
IBM 3033 Processor Mdl Group N	UP
IBM 3033 Processor Mdl Group S	UP
IBM 3081 Processor Complex	Dyadic
IBM 3083 Processor Complex	UP
IBM 3084 Processor Complex	Dyadic

Details concerning optional 3033 Extension feature for 3033 processors may be found in the Machines section.

**SOFTWARE REQUIREMENTS**

MVS/System Product-JES2 Release 2 requires MVS Release 3.8 with MVS Processor Support 2 installed.

In order to support the following function and devices in MVS/SP-JES2 Release 2, the MVS Data Facility/Device Support program product (5740-AM7) is required:

- Checkpoint/Restart facilities
- 3375 Direct Access Storage
- 3380 Direct Access Storage

Details of the MVS Data Facility/Device Support program product may be found in the announcement letter.

RMF users must install RMF Version 2 Release 4.

MVS/System Product-JES2 Release 2 consists of enhancements to two MVS components: The MVS Base Control Program (BCP) and JES2. The BCP component of MVS/System Product-JES2 Release 2 replaces the BCP component of MVS/System Product-JES2 Release 1. The JES2 component of MVS/System Product-JES2 Release 2 replaces both JES2 Release 4.1 and the NJE for JES2 R3 program product (5740-XR8). In addition, the 3800 Enhancements provided for JES2 R4.1 and NJE for JES2 program product are incorporated into the JES2 component of MVS/SP-JES2 R2. Installation details for MVS/SP-JES2 R2 will be provided at availability.

**MVS/SYSTEM PRODUCT-JES2 RELEASE 2 COMPATIBILITY**

User-written programs that use standard external interfaces should continue to execute on MVS Release 3.8 with the MVS/System Product-JES2 Release 2 installed. Programs that interrogate MVS system control blocks may require modifications. Documentation on MVS/System Product-JES2 Release 2 control blocks will be available March, 1981.

When migrating from an MVS Release 3.8 or an MVS/System Extensions R1 environment, changes in an installation's accounting procedures may be required because of enhancements to SMF (see the *General Information Manual*, GC28-1025-0).

IBM devices currently supported by MVS Release 3.8 will continue to be supported by MVS with the MVS/System Product-JES2 Release 2 installed.

Any Installation Performance Specification (IPS) that is compatible with MVS Release 3.8, the MVS/System Extensions program product or MVS/System Product-JES2 Release 1 can be used unchanged with MVS/System Product-JES2 Release 2.

IBM program products currently supported on MVS Release 3.8, or MVS 3.8 with the MVS/System Extensions program product, or MVS 3.8 with MVS/System Product-JES2 Release 1 should continue to run

with MVS/System Product-JES2 Release 2 installed (although for RMF users, the appropriate RMF release, RMF V2 R4, must also be installed). APARs will be accepted for MVS/System Product-JES2 Release 2 when any such IBM program product does not run successfully after MVS/System Product-JES2 Release 2 is installed.

**DOCUMENTATION**  
(available from Mechanicsburg)

*MVS/System Product-JES2 General Information Manual* (GC28-1025-2).

**RPQs ACCEPTED:** No.

PROGRAM PRODUCTS

**5740-XYS - MVS/SYSTEM PRODUCT-JES2 R3**

**PURPOSE**

MVS/System Product-JES2 Release 3 provides all of the functions of MVS/System Product-JES2 Release 2 together with: The ability to achieve new levels of capacity and responsiveness on 3033 processors via performance improvements implemented in conjunction with the 3033 Extension feature; support for the Extended Addressing feature, permitting up to 32 megabytes of addressable storage on 3033, 3081, 3083 and 3084 processors, thereby providing potential for further capacity and responsiveness; significant improvements in System RAS; extensions to the reconfiguration and recovery aspects of Global Resource Serialization; and the potential further savings in the system virtual storage requirements. RMF support for MVS/System Product-JES2 Release 3 is provided by an enhancement for RMF Version 2 Release 4.

**BASE CONTROL PROGRAM HIGHLIGHTS**

**Performance:** The performance improvements are achieved through:

- Reduction in processor execution time for high frequency control program functions.  
Usage of the 3033 Extension Feature by many MVS components in combination with code optimization have resulted in shorter path lengths and reduced processor execution time for several highly used system functions. In particular, several system functions have been restructured to perform more effectively on IBM's large processors (3033 UP and above).
- Reduction in I/O wait time.  
Restructure of the MVS paging subsystem and use of new slot allocation algorithms results in reduced I/O wait time for paging and swapping.
- Reduction in I/O through use of extended real storage. MVS/SP R3 will utilize extended real storage to eliminate demand paging and swapping I/O operations, thereby freeing processor capacity for additional productive work and reducing I/O wait time.

These improvements yield increased system throughput and responsiveness:

- Measurement and projection of test environments indicate that the MVS/System Product Release 3, in conjunction with the associated enhancement of the Data Facility Device Support (DF DS) Release 1 program product, will provide the following performance benefits to 3033 users with the 3033 Extension Feature installed in comparison to MVS/System Extensions Release 2:
  - Throughput improvements generally of the order of 10% (UP) and 12% (AP/MP) for TSO/Batch environments.
  - Throughput improvements generally of the order of 6% for intensive Batch and online IMS/Batch environments, with 3033 AP/MP environments experiencing additional throughput. The IMS/VS projections utilized the then most current level of IMS/VS Version 1 Release 2 available in the fourth quarter of 1981.
  - Further throughput gains of up to 5% are expected for large multi-system establishments. Some of the performance improvements within MVS/SP R3 are sensitive to user I/O configuration and workload, the performance benefit increasing as the size of I/O configuration and I/O rates increase, with the largest benefit accruing to processors configured for multi-system environments.
  - New paging algorithms allow TSO environments to improve response time with increased capacity.

**Extended Addressing:** For customers who install the Extended Addressing Feature and additional storage, potential throughput improvements greater than those described above may be realized. MVS's efficient use of additional real storage to eliminate paging I/O operations allows interactive environments such as TSO and IMS/VS to experience improved response time.

The actual performance benefit that an installation will experience will vary depending upon such considerations as customer environment and customer usage of the product improvements. The working sets of new system address spaces created in MVS/SP R2 and R3 may result in an increased real storage requirement and increased paging rates for some installations. No assurance can be given that an individual user will achieve the projected results.

**New Levels of System RAS:** The RAS enhancements provided by MVS/System Product Release 3 are a result of detailed studies of large MVS installations in 1978. They seek to avoid unscheduled IPLs caused by problems in the areas of I/O equipment, the MVS control program and operations.

Estimates indicate that over 20% of the unscheduled IPLs resulting from problems in these areas in the 1978 study have already been addressed by the general solutions in currently available products such as MVS Processor Support 2. MVS/System Product Release 3 now

provides additional general solutions to detect and recover from such problems.

Projections for a 3033 environment indicate that MVS/System Product Release 3 addresses a further 19% of the unscheduled IPLs that resulted from problems in these areas in the 1978 study.

In addition, extensions have also been made to the recovery aspects of the Global Resource Serialization facility introduced in MVS/SP R2.

**Other Enhancements**

- The potential for additional savings in Common Service Area virtual storage.  
Utilization of Cross Memory Services by the Console Communications task provides the potential for further savings in Common Service Area virtual storage requirements.

**JES2 Considerations:** The JES2 component of MVS/SP-JES2 Release 3 provides a service update to the JES2 component of MVS/SP-JES2 Release 2.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

MVS/SP-JES2 Release 3 is designed to operate with the Extended Control Program Support Facility for MVS (ECP:SP) on 4341, 4361-5 and 4381 Processors and the appropriate S/370 Extended Feature on S/370 mds 158 (feature #7730 or #7731) and 168 (feature #7730). MVS/SP JES2 Release 3 is designed to operate on the following IBM processors:

Mdl 158-1	UP/MP/AP
Mdl 158-3	UP/MP/AP
Mdl 168-1 with RPO S20579	UP/MP
Mdl 168-1 with RPO S20580	AP
Mdl 168-3	UP/MP/AP
4341 Processor Model Group 1	UP
4341 Processor Model Group 2	UP
4361 Processor Model Group 5	UP
4381 Processor	UP
3031 Processor	UP/AP
3032 Processor	UP
3033 Processor	UP/MP/AP
3033 Processor Model Group S	UP
3033 Processor Model Group N	UP
3081 Processor Complex	Dyadic
3083 Processor Complex	UP
3084 Processor Complex	Dyadic

**SOFTWARE REQUIREMENTS**

MVS/SP-JES2 Release 3 is designed to operate with MVS 3.8 with the MVS Processor Support 2 installed. The functions provided by either Data Facility Device Support Release 1 (5740-AM7) program product or the MVS/370 Data Facility Product (5665-295) program product are required by the users of one or more of the following:

- IBM 3375 Direct Access Storage
- IBM 3380 Direct Access Storage
- Checkpoint/restart
- Extended Addressing feature and additional main storage beyond 16 megabytes

RMF users must install the RMF Version 2 Release 4 Enhancement that supports MVS/SP R3.

MVS/SP-JES2 Release 2 consists of enhancements to the MVS Base Control Program (BCP). The BCP component of MVS/SP-JES2 Release 3 replaces and enhances the BCP component of MVS/SP-JES2 Release 2. The JES2 component of MVS/SP-JES2 Release 3 is a service update to the JES2 component of MVS/SP-JES2 Release 2. Release 2 users who have the JES2 component of Release 2 installed will not be required to re-install this component when migrating to Release 3.

**DOCUMENTATION**  
(available from Mechanicsburg)

*MVS/System Product General Information Manual (GC28-1025-2)*

RPQs ACCEPTED: No

## PROGRAM PRODUCTS

**5740-XYS - MVS/SYSTEM PRODUCT-JES2 R3.2, 3.3****PURPOSE****RELEASE 3.2**

MVS/System Product-JES2 Release 3.2 provides support for the MVS/Operator Communication Control Facility (MVS/OCCF).

**BCP HIGHLIGHTS**

- Support for the MVS/Operator Communication Control Facility (MVS/OCCF) in a JES2 environment. MVS/OCCF is a Program Product that allows one or more remote MVS systems to be operated from a user-designated, controlling MVS system. MVS/SP Version 1 Release 3.2 provides the following function in support of MVS/OCCF.
  - MVS/OCCF can acquire or alter the use of a console. This support allows MVS/OCCF to obtain and release a console, change the routing codes of a console, or request that messages be broadcast to all subsystems.
- Multiple Console Support (MCS) console specifications can be initialized at IPL using the COMMAND member(s) of PARMLIB. After IPL, the master console operator or an operator at an MVS/OCCF console may direct commands to other consoles to correct system problems related to MCS consoles.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The hardware configurations specified for MVS/SP Release 3 are unchanged with the installation of MVS/SP Release 3.2.

**SOFTWARE REQUIREMENTS**

MVS/SP-JES2 Release 3.2 will support the JES2 component in MVS/SP-JES2 Release 3 as well as SU23 and SU25.

The functions provided by either Data Facility Device Support Release 1 (5740-AM7) program product or the MVS/370 Data Facility Product (5665-295) program product are required by the users of one or more of the following:

- IBM 3375 Direct Access Storage
- IBM 3380 Direct Access Storage
- IBM 3880 Storage Control mdl 11 or 13
- Checkpoint/restart
- Extended Addressing feature and additional main storage beyond 16 megabytes

The functions of MVS/370 Data Facility Product (5665-295) are required by the users of the following:

- Tape labels and tape file structure support for ISO 1001-1979, ANSI X3.27-1978 and FIPS-1979

**DOCUMENTATION**

(available from Mechanicsburg)

An update to the *OS/VS2 MVS/System Product General Information Manual* (GC28-1025) is available.

RPQs ACCEPTED: No

**RELEASE 3.3**

MVS/System Product - JES2 (MVS/SP-JES2) Release 3.3 provides ten new JES2 User Exits, improvements to the usability and operational characteristics of JES2 output processing and a new capability to dynamically add and delete spool data sets without warm starts.

**JES2 HIGHLIGHTS****TEN NEW USER EXITS**

- Job Queue Work Select Exit
- Output Data Set/Copy Select Exit
- Notify Exit
- BSC RJE Sign on/Sign off
- SNA RJE Logon/Logoff
- Initialization Statement Exit
- SMF Record Exit
- Cancel/Status Exit
- End of Job Input
- Post Initialization Exit

**User Control of Sysout Data Set Grouping**

- New Output JCL statements which allow the user to specify which data sets are to be contained in an output work unit. The user can also specify the setup characteristics and the priority for the output group.
- Operational enhancements provide improved procedures for limiting the formation of demand setup groups, limiting which

output device will process demand setup groups, limiting the use of user specified priorities for output and reducing operator intervention. Overall these enhancements will assure that the efficient processing of user's output will not be disrupted by the increase in the amount of demand setup work.

**Dynamic Add/Delete of Spool Data Sets**

- Capability for the operator to dynamically add or delete spool data sets eliminating the need to resort to a warm start which impacts the normal processing of work.
- A number of operator commands will be enhanced to display the jobs on a volume or the volumes used by a job.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The hardware configurations specified for MVS/SP Release 3 are unchanged with the installation of MVS/SP JES2 Release 3.3.

**SOFTWARE REQUIREMENTS**

MVS/SP-JES2 Release 3.3 requires the most current MVS/SP-JES2 Release 3 BCP component in March 1983 as a prerequisite. The JES2 component in MVS/SP-JES2 Release 3.3 contains all of the functional and device support enhancements as in the JES2 component of MVS/SP - Release 3 and is a complete replacement for the JES2 component in MVS/SP Release 3.

The functions provided by either Data Facility Device Support Release 1 (5740-AM7) program product or the MVS/370 Data Facility Product (5665-295) program product are required by the users of one or more of the following:

- IBM 3375 Direct Access Storage
- IBM 3380 Direct Access Storage
- IBM 3880 Storage Control mdl 11 or 13
- Checkpoint/restart
- Extended Addressing feature and additional main storage beyond 16 megabytes

The functions of MVS/370 Data Facility Product (5665-295) are required by the users of the following:

- Tape labels and tape file structure support for ISO 1001-1979, ANSI X3.27-1978 and FIPS-1979

**Planning Information:** MVS/SP-JES2 Release 3.3 requires a JES2 cold start.

RPQs ACCEPTED: No

**DOCUMENTATION**

(available from Mechanicsburg)

An update to the *OS/VS2 MVS/System Product General Information Manual* (GC28-1025) is available.

## TREND ANALYSIS (CICS/OS/VS) 5740-XYT

### PURPOSE

Trend Analysis is a business graphics and data base system which provides a computer-based linkage between an organization's operating and planning information files and the data presentation needs of decision makers. Trend Analysis integrates the color graphics capabilities of the 3279 Color Display Station and the 3287 Color Printer with the data management capabilities of IMS/VIS-DB and the modeling and projection capabilities of PLANCODE, IBM's primary business planning product. Trend Analysis functions are invoked from a display station through easy-to-use menus which can be customized to meet special organizational requirements. Reports can be displayed or printed in a variety of tabular data or graphic report formats.

### HIGHLIGHTS

- **Color Graphics:** Trend Analysis provides capabilities for creating color graphic displays and printouts of time series data. Color graphic displays can be produced in several different forms: Line graphs, surface and bar charts, histograms and pie charts. Combinations of up to 8 colors and 16 shading patterns can be used for the graphic charts.
- **PLANCODE-Trend Analysis Data Base Bridge:** Trend Analysis provides a bridge from PLANCODE to the Trend Analysis time series data base. Users can apply the data manipulation, projection and modeling capabilities of PLANCODE to the time series data which is subsequently used for data selection, formatting and presentation.
- **Terminal User Interaction:** Trend Analysis provides the display station user with the ability to view predefined reports or graphic charts, with preselected data elements, or to have the user interactively select, display and report on only items of of immediate interest.
- **Menu-oriented Selections:** Trend Analysis provides a series of menus from which the display station user may choose the options best suited to the information of interest. The easy-to-use menu selection approach permits users, with minimal training, to customize the information content and format of a desired report or graphic chart.
- **Data Organization:** Information stored for use by Trend Analysis is logically organized by selectable time periods (daily, weekly, monthly, quarterly, semi-annually and annually), organizations (such as companies, divisions, departments, subsidiaries), and by data elements (such as assets, expenses, sales, production, utilization).
- **Standard Report Types:** The Trend Analysis report writer formats data in one of three report types. These are the single period comparison (cross section) report, the historical comparison report and the historical analysis report. These three report types and their options are designed to correspond to the most common ways of examining time series information.
- **Calculator Facilities:** Trend Analysis permits the user to add, subtract, multiply and divide report data (for example, to create ratios). Some common statistical functions such as compound growth rate and standard deviation are also provided. The results of these calculations may be displayed and reported with other information from the data base.
- **Flexibility:** Trend Analysis is designed to provide generalized application customization capabilities. The supplied sample problem may be used as a basis for applications or the user can define specific screen layouts, processing sequences and data elements. Each Trend Analysis application may be tailored to meet specific organizational requirements.
- **User Exits:** To allow an organization to meet further processing requirements, user exits are provided for the addition of installation-written programming to supplement the data entry calculation and report writer facilities of Trend Analysis.
- **Data Maintainability:** Time series data may be maintained using either online or batch mode capabilities. Planning data in the Trend Analysis time series data base can be directly updated using the PLANCODE-Trend Analysis data base bridge or from an installation-written maintenance program using supplied time series data base interface modules.

### CUSTOMER RESPONSIBILITIES

The customer must provide the proper operating environment by installing the required operating system, CICS/OS/VIS and IMS/VIS-DB program products, PL/1 and Sort/Merge program products, and the Graphical Data Display Manager with the Presentation Graphics Feature. If PLANCODE is to be used with the PLANCODE/Trend Analysis data base bridge, then either PLANCODE/I or PLANCODE/S must be installed.

Customer technical personnel must be trained and knowledgeable on the above products, as well as on any other products to be used in conjunction with Trend Analysis. Appropriate customer personnel must

be trained and knowledgeable in Trend Analysis functions and in the design and preparation of Trend Analysis applications.

The customer is responsible for developing procedures to ensure data security, for developing operating and backup procedures, and determining the overall tasks to be accomplished to install and operate Trend Analysis for his organization.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

Trend Analysis (CICS/OS/VIS) will run on an IBM S/370 or 4300 processor supported by CICS/OS/VIS and IMS/VIS-DB, equipped with floating point feature, and with sufficient storage to meet the combined requirements of the following software components:

- Host operating system.
- Terminal management subsystem.
- Data base management subsystem.
- Graphical Data Display Manager.
- Trend Analysis.
- PLANCODE/I or PLANCODE/S (if used with Trend Analysis).

Trend Analysis online uses 300K unoverlaid, and can be real or virtual depending on the customer's installation requirements.

Trend Analysis will provide graphic and alphanumeric support, as indicated, for the following display terminals and printers:

- Multiple IBM 3270 Information Display System components of the following types:
  - 3279 mdl 2B or 3B (extended color) Color Display Station with Program Symbols (#5781 and 5782) attached to an appropriate control unit (alphanumeric/color graphics).
  - 3279 mdl 2A or 3A (base color) Color Display Station attached to an appropriate control unit (alphanumeric only).
  - 3278 mdl 2, 3 or 4 Display Station with Program Symbols (#5781 and 5782) attached to an appropriately configured control unit (alphanumeric/monochrome graphics).
  - 3278 mdl 2, 3, 4 or 5 Display Station attached to an appropriate control unit (alphanumeric only).
    - Note: If a 3278 mdl 5 is to be used, alphanumeric output should be directed to a terminal printer having at least a 132-character print line.
  - 3277 mdl 2 Display Station attached to an appropriate control unit (alphanumeric only).
  - 3276 mdl 2, 3, 4, 12, 13 or 14 Control Unit Display Station with appropriate control unit features (alphanumeric only).
  - 3275 mdl 2 or 12 standalone Display Station (alphanumeric only).
    - Note: 32XX display stations are only supported with EBCDIC keyboard configuration.
  - 3289 mdl 1 or 2 Line Printer attached to an appropriate control unit (alphanumeric only).
  - 3288 mdl 2 Line Printer attached to an appropriate control unit (alphanumeric only).
  - 3287 mdl 1 or 2 Printer, acting as a 3284/3286 mdl 2, with 3271/3272 Attachment (#8330) and 1920-Character print operation (#9522) (alphanumeric only).
  - 3262 mdl 3 or 13 Line Printer attached to an appropriate control unit (alphanumeric only).
  - 3268 mdl 2 Printer attached to an appropriate control unit (alphanumeric only).
  - 3287 mdl 1 or 2 Printer, with 3274/3276 Attachment (#8331) (alphanumeric only).
  - 3284 or 3286 mdl 2 Printer attached to an appropriate control unit with Data Analysis-APL Feature (#1066) installed if optional text feature character printing is desired (alphanumeric only).
  - 3284 mdl 3 Printer attached to the standalone 3275 Display Station (alphanumeric only).
  - 3287 mdl 1 or 2 Printer, with Program Symbols (#5781 and 5782) attached to an appropriate control unit (alphanumeric/monochrome graphics).
  - 3287 mdl 1C or 2C Printer (extended color), with Program Symbols-4A (#5783) attached to an appropriate control unit (alphanumeric and extended color graphics).
- The 8775 Display Terminal Component of the 8100 Information System, running in 3270 compatibility mode.

**Trend Analysis (cont'd)**

- 8775 mdl 1, 2, 11 or 12 large-screen sizes (1,920, 2,560 or 3,440 characters) Display with Program Symbols (#5781 and #5782) attached to an appropriate control unit on an IBM 8100 Information System running DPPX/DSC or DPPX/SP/DSC or DPCX/ DSC (alphameric/monochrome graphics).

**SOFTWARE REQUIREMENTS**

The Trend Analysis (CICS/OS/VS) program product is written in the IBM PL/I language and operates in the OS/VS1 or MVS environment under control of the Customer Information Control System (CICS/OS/VS), Release 1.5, or subsequent releases, unless otherwise stated.

The following program products are required for a Trend Analysis installation:

- Customer Information Control System (CICS/OS/VS) (Program No. 5740-XX1)
- Information Management System (IMS/VS) Data Base System (Program No. 5740-XX2)
- PL/I OS Resident Library (Program No. 5734-LM4)
- PL/I OS Transient Library (Program No. 5734-LM5)
- OS/VS Sort/Merge (Program No. 5740-SM1) or equivalent
- Graphical Data Display Manager (GDDM) (Program No. 5748-XXH) with Presentation Graphics Feature (PGF)

If user-exit code is to be written, the PL/I OS Optimizing Compiler (Program No. 5734-PL1) will be needed.

If the PLANCODE/Trend Analysis data base bridge is to be used, either PLANCODE/I (5740-XX8) or PLANCODE/S (5740-XX9) will be required.

**CONVERSION**

Trend Analysis (CICS/OS/VS) is based on Trend Analysis/370. The range of graphic options has been increased through the use of the Graphical Data Display Manager (GDDM) program product. Color graphic output is now displayed on the IBM 3279 Color Display Station or printed on the IBM 3287 Color Printer, which is supported through CICS/OS/VS. Support for the S/7 and OEM color displays will not be provided in Trend Analysis (CICS/OS/VS); existing customer graphic option menus will have to be updated to reflect the enhanced graphic capabilities now available with Trend Analysis (CICS/OS/VS). Minor changes to the time series data base structure have been made, and a reload of existing customer Trend Analysis/370 time series data bases will be required; a set of conversion utilities will be provided with Trend Analysis (CICS/OS/VS) to assist in this task.

**DATA SECURITY**

Several levels of security are provided to the users of Trend Analysis:

- Terminal- and transaction-level security provisions of CICS/OS/VS.
- Password protection for each user application within Trend Analysis.
- Separate retrieval and update protection provisions for every time series data base record in Trend Analysis (for both online and batch mode).

The Graphical Data Display Manager (GDDM), with its Presentation Graphics Feature (PGF), does not provide any additional security features; however, it does not impede or detract from the usability of the security functions provided by Trend Analysis or by CICS/OS/VS, IMS/VS-DB and the host environment.

Tables generated by Trend Analysis are normally placed in main storage, which is obtained from the system when required. These tables are, therefore, protected from accidental or deliberate interference by other users to the extent provided its host environment.

**DOCUMENTATION**

(available from Mechanicsburg)

*Trend Analysis (CICS/OS/VS): General Information Manual (GH20-2445) ... Graphical Data Display Manager (GDDM) and Presentation Graphics Feature (PGF): General Information Manual (GC33-0100) ... PLANCODE (OS/VS): General Information Manual (GH19-1103).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** Yes

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**TELECOMMUNICATIONS CONTROL SYSTEM  
ADVANCED COMMUNICATIONS FUNCTION  
TCS-ACF (5740-XY3)**

**PURPOSE**

The Telecommunications Control System - Advanced Communications Function (TCS-ACF) program product provides enhanced installability and operability for users with single-system ACF/TCAM or TCAM/NCP/VS-Direct networks or systems utilizing the ACF/TCAM Multisystem Networking Facility. These functional capabilities are available to the user through TCS-ACF and a separately orderable TCS-ACF Networking Feature.

**DESCRIPTION**

- The TCS-ACF basic program enhances the user's functional capabilities within a single system in an ACF/TCAM network (with or without the ACF/TCAM Multisystem Networking Facility) or with TCAM/NCP/VS-Direct.
- The optional TCS-ACF Networking Feature, operating with the TCS-ACF basic program and the ACF/TCAM Multisystem Networking Facility, provides extended multisystem networking capabilities in ACF/TCAM systems.

Many of the TCS-ACF facilities described below utilize functions provided by ACF/TCAM or TCAM/NCP/VS-Direct, the ACF Network Control Program/VS and/or the operating system. Facilities that depend heavily on ACF/TCAM or TCAM/NCP/VS-Direct are referred to below as TCS-ACF/TCAM, while those that are due to TCS-ACF itself are so described.

In single and multicomputer TCS-ACF/TCAM systems, there is terminal sharing (among TCAM applications) in either session or transaction modes of operation. Generally, a terminal or application program can communicate with any other terminal or application program in the network, subject (in most cases) only to non-mappable device-dependent characteristics or to user-imposed constraints. Terminals need not be dedicated to a particular application environment; various types of terminal devices can be shared among different application programs. There can also be application-to-application and terminal-to-terminal traffic. Communication line use is also shared among different application programs and terminals. The terminal operator is effectively isolated from the intricacies of the network architecture, and deals with other network resources (terminals and/or applications) as logical entities, without regard for their actual physical location or hardware identity.

TCS-ACF itself with the TCS-ACF Networking Feature features high function facilities for large network configurations that incorporate more than one central processor and elaborate application program subsystems. The TCS-ACF user may selectively augment the SDLC intercomputer links provided through the ACF/TCAM Multisystem Networking Facility with BSC intercomputer links that also permit host-to-host networking routing. It may be practical to share intercomputer links between interactive and bulk-type traffic because of TCS-ACF message-priority recognition and queuing capabilities. TCS-ACF/TCAM capabilities for management of intercomputer links also include automatic load-balancing across multiple links, alternate path and indirect routing and checkpoint/restart.

Message traffic may be stored on main storage and/or disk queues, the latter permitting checkpoint/restart reconstruction back to time-of-failure. The TCS-ACF retrieval program is included to permit retrieval of disk-queued messages by user-authorized terminals. System support programs are provided for online monitoring of application status throughout a complete multicomputer network and for synchronizing intercomputer transmissions to help provide message integrity. Facilities are supplied for manipulating the message queues for destinations, and for accumulating real-time traffic statistics.

A wide variety of application program environments can be supported by TCS-ACF/TCAM. Generally, application programs are run in another region or partition so that the TCS-ACF/TCAM control program and application program failures will not affect other programs or network operation. ACF/TCAM can provide data communication control for application subsystem environments that can utilize the TCAM application program interface (CICS/VS, for example), making these application environments accessible, not only throughout the shared terminal network of a single computer, but also to other shared terminals connected to other computers in a multiprocessor network. User application programs written in Assembler language, COBOL or PL/I can interface directly with TCS-ACF/TCAM. (For application programs written in COBOL or PL/I to interface to TCS-ACF/TCAM, either the OS/VS COBOL Compiler and Library (5740-CB1) or the OS PL/I Optimizing Compiler (5734-PL1) must be used.) The TCS-ACF/TCAM application program interface appears to the application program as a sequential access method (SAM) interface, so that many applications may be tested using sequential input/output devices, before they are run in the actual online system.

Message transmission between terminals and application programs may be handled either in a transaction mode (where each message is routed to its destination(s) based on data in the message) or in TCS-ACF session mode (where routing information is developed once and then maintained during an extended interchange of messages).

Application program checkpoints can be coordinated with the checkpoint facilities of the TCS-ACF/TCAM control program.

TCS-ACF incorporates reliability, availability and serviceability features, including an operator control facility especially tailored for ease in controlling large systems, with provisions for adding specialized function user-written operator control commands.

**FEATURES and CAPABILITIES:** The following is a summary of the principal TCS-ACF functional capabilities beyond those provided through TCAM/NCP/VS-Direct or through ACF/TCAM.

TCS-ACF basic program for single S/370s and for individual S/370 hosts within an ACF/TCAM multisystem network:

- Selective automatic detection of programmed operator handling of network problems.
- Automatic activation, monitoring and selective restart of the message control program and TCS-ACF system service tasks.
- Matrix driven generator for building variable-content start-up and restart messages.
- A versatile facility for retrieval of transmitted, disk-queued messages.
  - Retrieval may be requested via a TCS-ACF operator control command from authorized remote terminals.
  - Retrieval command allows choice of varied retrieval criteria.
- Extended message-priority recognition and handling.
- Operator control enhancements.
  - Commands for transferring, copying and purging unsent queued messages.
  - Facility for adding user-written commands.
  - Additional commands to facilitate large system management.
- Enhanced MCP message handler capabilities.
  - Capability for execution of user-written code during inmessage/outmessage subgroup processing.
  - Additional MH macro facilities for message switching, editing, validation and routing.
  - Device-independent aids for use with IBM 3270 Information Display System.
    - 3284/5/8 Printer scheduling.
    - Data conversion for 2260 application programs.
  - Model MCP for installation and maintenance ease.

TCS-ACF networking feature for S/370s operating with the ACF/TCAM multisystem networking facility and the TCS-ACF basic program:

- Prerequisite installation of the TCS-ACF basic program provides all capabilities described above.
- Selective automatic interchange of local network and application status changes among active network S/370 hosts.
- Alternate path facility over intercomputer links for host-to-host networking flow including:
  - Automatic detection of path failures.
  - Automatic programmed selection of alternative paths.
  - Automatic switch over to an alternate.
  - Automatic detection and handling of looping and echo error conditions.
- Support of both transaction and session modes of operation.
- Multicomputer networking message-switching capability.
- Automatic checkpoint/restart synchronization of disk-queued host-to-host traffic for message-loss protection.
- Selective automatic detection and programmed-operator handling of local network problems.
- Load-balancing across multiple host-to-host links.
- Message priority level recognition across intercomputer host-to-host paths.
- A flexible statistics collection facility for accounting and system tuning.
- Security and authorization facilities.
  - System-provided transmission/access-level control.

**TCS-ACF (cont'd)**

- Automatic generation of attempted-security-breach advisory messages.
- User-extendible and -modifiable.
- Operator control enhancements for multisystem networking.
- Capabilities aiding application program independence from device-characteristics considerations.
- Facilities to assist support of diverse network types and configurations, including:
  - Aids for developing user-written interfaces to non-TCS-ACF networks.
  - Capabilities applicable to loosely-coupled networks.
  - Capabilities applicable to inter-enterprise networks.
- Capabilities applicable to networks which are never totally deactivated (perpetual networks).
- A Model Message Control Program to facilitate installation and maintenance of users' systems.
  - Provided as operable, machine readable, Class A code.
  - A valid system base which users can modify for their own particular needs.

**TCS-ACF NETWORKING OVERVIEW**

In general, the capabilities of the TCS-ACF networking feature complement ACF/TCAM networking. The diagram (Figure A) below illustrates this concept.

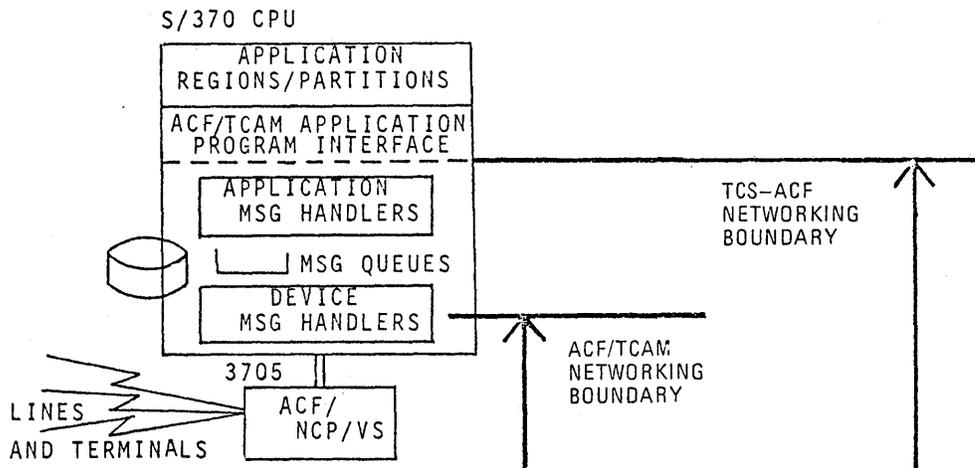


Figure A

This diagram shows one S/370 processor functioning as a host node of a multisystem network, and an attached 3705 Communications Controller with its ACF/NCP/VS controlling lines to other network nodes and terminals.

As shown in this diagram, ACF/TCAM networking involvement in an ACF/TCAM host extends as far as the device message handlers (user-specified code that deals with message transmission to and from the ACF/NCP/VS).

The diagram further depicts how the ACF-TCS networking structure extends into the host node to include additional message control program elements - the message queues and the application message

handlers (user-specified code that deals with message transfer to and from applications). Also within the TCS-ACF networking boundary are the TCS-ACF user-specified networking tables that TCS-ACF uses for message routing and network management.

The TCS-ACF ability to perform networking with extended host awareness of means of device and application message handler facilities and user-accessible to TCS-ACF networking tables, makes possible many of the TCS-ACF functional capabilities described in this document.

In the diagram (Figure B) below, a general overview of TCS-ACF networking structure is conceptually presented.

TCS-ACF (cont'd)

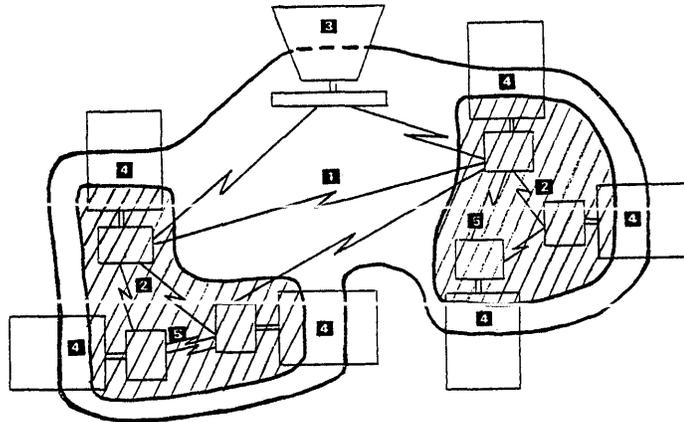


Figure B

A single TCS-ACF network as shown at key (1) in the diagram can encompass multiple ACF/TCAM networking systems, shown as hatched areas (2), and also can incorporate user interfaces to non-ACF/TCAM hosts (3). TCS-ACF's extension of the networking boundary further into the host processor (4), beyond the message queues and message handlers, coupled with the user-accessible TCS-ACF networking tables, permits enhanced capabilities, including:

- User involvement for specialized networking functions.
- Host-oriented functions, such as statistics gathering and access security authorization.
- Data staging on host queues for intercomputer traffic, for efficient line sharing and to smooth peak traffic loads.

In addition to those capabilities wholly provided through TCS-ACF, many TCS-ACF functions, key (5) in the diagram, make use of ACF/TCAM facilities implemented with the TCAM/ACF networking boundaries.

**RELATION to ACF/TCAM and SNA**

The SNA capabilities described in these pages are provided by ACF/TCAM, and do not represent TCS-ACF functional capabilities beyond those provided by the currently available TCS-ACF product (5740-XXD).

ACF/TCAM provides communication control capabilities, featuring queuing and message handlers, to enable message transmission and ancillary services in a Systems Network Architecture (SNA) environment. The optional ACF/TCAM Multisystem Networking Facility enables the linkage of ACF/TCAM systems (and, if desired, ACF/VTAM systems) into a multicomputer networking system, in which application programs and terminals may be accessed from applications or terminals attached to a different processor. ACF/TCAM supports many SNA, S/S and BSC terminal devices. When the ACF/TCAM Multisystem Networking Facility is utilized, the processors involved are linked via SDLC communication lines, under control of ACF/NCP/VS operating in IBM 3705 Communications Controllers. Intercomputer message traffic is managed in the context of SNA sessions. A SNA session between an application program and a terminal must be established by an initial *logon* transmission directed by way of the processor which maintains control of the terminal involved; subsequent transmissions (until the SNA session is terminated) may be routed by way of the intermediate ACF/NCP/VS and intercomputer links comprising the message path, without involving the terminal's host processor.

TCS-ACF augments the capabilities of ACF/TCAM as described in the "Features and Capabilities" section.

The additional facilities provided by the TCS-ACF basic program are intended to provide extended user flexibility, greater ease of system installation and operability aids especially appropriate for systems with large terminal networks. The TCS-ACF base product can alternatively

run with ACF/TCAM (with or without the Multisystem Networking Facility) or with TCAM/NCP/VS-Direct alone.

The TCS-ACF Networking Feature, running with the TCS-ACF base program and ACF/TCAM in conjunction with the ACF/TCAM Multisystem Networking Facility, provides networking that may selectively utilize host processor power for high-function capabilities. TCS-ACF Networking utilizes its own tables (built by user-coded TCS-ACF macro instructions) and can provide control beyond the boundary of SNA host processor awareness.

These characteristics of TCS-ACF's open architecture and extended control point capabilities, along with ACF/TCAM's structure of message handlers and queues, make TCS-ACF Networking particularly appropriate for:

- Controlled environments linking multiple SNA networking systems.
- Networking systems that interface with foreign (non-TCS-ACF) processors.
- Networking systems that include the TCS-ACF program product in some of the interconnected computers.
- Systems in which the user desires to incorporate his own code for specialized control involvement.
- Systems requiring the network elasticity that can be provided when data is staged (queued) across intermediate network host nodes.
- Incremental migration to full-function networking with the ACF/TCAM Multisystem Networking Facility.
- Large or complex systems requiring a high degree of programmed control for network management.

Using capabilities provided through the TCS-ACF Networking Feature, BSC intercomputer communication lines may link the system's processors through locally attached 370Xs to provide a host-to-host message flow; if any message path includes one or more processors acting as intermediate nodes, message traffic may be selectively relayed through each intermediate processor and queued at each processor, as well as at the originating and destination hosts. One or more BSC lines (in parallel), as required for the traffic load between any two host-node processors, may be used. If parallel lines are provided, TCS-ACF can optionally balance the traffic load, on a message-by-message basis, over the available lines. TCS-ACF provides an alternate BSC path capability for programmed error recovery, if an intercomputer link becomes unavailable. BSC intercomputer links are managed by TCS-ACF to provide intercomputer transmission according to message priority.

To take advantage of the SNA capabilities available through ACF/TCAM networking, the user may augment the TCS-ACF BSC intercomputer link capability described above with the SDLC intermodal links utilized by SNA session transmission. In this environment, BSC intercomputer links may be appropriate to permit an alternate path

**TCS-ACF (cont'd)**

capability, or to efficiently share the link between high-priority inquiry/response messages and low-priority traffic (bulk data transfer, for example), or to interface with non-TCS-ACF host processors. The user may design his system so that a portion of a particular routing path is via a TCS-ACF/TCAM-initiated SNA session over SDLC links (without intermediate host processor involvement) and a portion is handled using TCS-ACF networking control over either SDLC or BSC links.

**RELATION to TCS-AF**

Operation of TCS-ACF with the TCS-ACF Networking Feature in conjunction with ACF/TCAM provides TCS function equivalent to the currently available release levels of TCS-AF. For the user migrating from TCS-AF to TCS-ACF with the Networking Feature, functional TCS capabilities will remain the same, although additional function may be realized through operation with ACF/TCAM. TCS-AF (5740-XXD) is currently available to provide multisystem networking using TCAM Levels 5, 8 and 9. TCS-AF for TCAM/NCP/VS-Direct is available now. When each TCAM release level is no longer considered to be current, programming support for TCS-AF on that release level will be discontinued. Support for these levels will be withdrawn and central programming services will no longer be provided. TCS-AF will not support ACF/TCAM; TCS-ACF is available for that purpose. With the announcement of TCS-ACF, commitment by TCS-AF to support all subsequent TCAM releases and levels within 120 days of their availability is withdrawn.

Where related IBM programs (e.g., CICS/VS, TSO, SSS) operate with the current levels of TCS-AF, compatibility is retained for the levels of those programs that provide current support at the availability of TCS-ACF. Recompilation of the related programs is not required.

Compatibility is retained for existing user programs that utilize the current levels of TCS-AF. However, such programs may require changes to take advantage of the ACF multisystem networking capabilities offered through the ACF/TCAM Multisystem Networking Facility.

**CUSTOMER RESPONSIBILITIES**

To successfully install and use TCS-ACF, the customer must first order and install all required communications equipment ... generate an OS/VS1 or OS/VS2 system with ACF/TCAM or TCAM/NCP-Direct ... train all persons installing, operating or maintaining TCS-ACF in ACF/TCAM or TCAM/NCP-Direct, TCS-ACF and ACF/NCP/VS or NCP/VS ... code and test the MCP ... and develop conversion procedures and schedules.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

TCS-ACF requires the minimum IBM machine requirements of ACF/TCAM or TCAM/NCP-Direct and the appropriate operating system; OS/VS1 or OS/VS2 (SVS or MVS).

The *TCS-ACF Operations Guide* may be used to estimate the real main storage requirements of TCS-ACF for each specific customer system.

The data communication link connecting two processors in a TCS-ACF networking system utilizing ACF/TCAM with the ACF/TCAM Multisystem Networking Facility may be comprised of one SDLC link and/or one or more BSC lines.

**Terminal Support:** TCS-ACF provides terminal device support consistent with the level of TCAM or ACF/TCAM with which it is used. Consult the TCAM or ACF/TCAM pages for charts summarizing terminal support capabilities and device attachment dependencies.

**SOFTWARE REQUIREMENTS**

The TCS-ACF base program operates as a non-system task in conjunction with TCAM/NCP/VS-Direct or with ACF/TCAM, with or without the ACF/TCAM Multisystem Networking Facility, under OS/VS1 and OS/VS2 (SVS and MVS).

The TCS-ACF Networking Feature operates as a non-system task with the TCS-ACF base program and ACF/TCAM, in conjunction with the ACF/TCAM Multisystem Networking Facility, under OS/VS1 and OS/VS2 (SVS and MVS).

The chart below summarizes TCS-ACF and TCS-AF system programming dependencies:

	TCS-ACF Base Program	TCS-ACF Networking Feature*	TCS-ACF Program Product
TCAM Release Levels 5, 8 and 9		X	X
TCAM/NCP/VS-Direct ACF/TCAM	X	X	X
ACF/TCAM Multisystem Networking Facility (requires ACF/TCAM)		X	X

\* Requires TCS-ACF base program, ACF/TCAM and ACF/TCAM Multisystem Networking Facility.

TCS-ACF will operate with the latest current level of NCP/VS available or with ACF/NCP/VS.

**DATA SECURITY**

TCS-ACF provides authorization facilities oriented towards permitting only user-authorized station devices to access certain user-specified application programs or subsystems or to utilize system facilities like TCS-ACF operator control and retrieval. Further details on data security are included in the *TCS-ACF Concepts and Facilities* manual.

**DOCUMENTATION:** (available from Mechanicsburg)

*Telecommunications Control System - Advanced Communications Function Concepts and Facilities* is available from from Mechanicsburg. For information about SNA functions available through ACF/TCAM, refer to *Introduction to Advanced Communications Function* (GC30-3033) and to *Advanced Communications Function for TCAM General Information Manual* (GC30-2050).

## RESOURCE MEASUREMENT FACILITY RMF (5740-XY4)

### PURPOSE

Version 2 of the Resource Measurement Facility (RMF) is a significant functional extension of the system measurement capability provided in Version 1. RMF enables an installation to measure selected areas of system activity and obtain feedback that can be used to evaluate system performance.

RMF measures the utilization of individual processors, physical and logical channels, devices, real storage, external page storage, page and swap data sets, and address spaces. It also measures resource contention controlled by enqueueing, the interaction of real storage/processor/SRM, and the service being provided to different classes of users, as well as tracing the contents of fields from certain ASM/RSM/SRM control blocks.

RMF generates formatted printed reports, SMF records, and display reports describing the system activity measurements requested by an installation. The printed reports are routed to a SYSOUT data set that is made available for printing either immediately after the measurement interval or after RMF terminates. Hardcopy records of display reports can also be routed to a SYSOUT data set.

When SMF records are produced, their data can be formatted into the required reports at a later time by the post-processing facility. The post-processor can generate interval, duration, summary and plot reports.

### HIGHLIGHTS

The following classes of system activity can be measured and reported in the form of SMF records and/or formatted printed reports:

- Processor activity
- Physical and logical channel activity
- Detailed I/O device activity and contention for:
  - Unit record devices
  - Graphics devices
  - Direct access storage devices
  - Communication equipment
  - Magnetic tape devices
  - Character reader devices
- Detailed system paging activity
- Detailed system workload activity
- Page/swap data set activity
- Enqueue activity
- ASM/RSM/SRM trace activity.

The following classes of system activity can be measured and reported on at a display station for immediate inspection or in the form of SMF records and/or formatted printed reports:

- Address space activity
- System paging activity
- Real Storage/processor/SRM activity

RMF Version Release 3 adds the following classes of activity:

- Enqueue activity
- Reserve activity
- Transaction activity.

RMF Version 2 Release 4 adds the following classes of activity:

- Domain activity
- Device activity
- Page Space activity
- Physical and Logical Channel activity.

User exits enable an installation to gather and report information on other areas of system activity through the facilities of RMF. Enhanced post-processing facilities permit data summarization and plotting. Dynamic modification of RMF control options is also possible.

RMF Version 2 Release 3 offers new Post Processor options which provide user selection and grouping of one or more system threshold values into sets. The Post Processor recognizes each set as an exception condition that, when exceeded, will generate information in the new Exception Report and optionally generate specified sets of interval reports. This new function can save performance analysis personnel time by decreasing the bulk of data that must be reviewed.

RMF Version 2 Release 4 provides a new Timed Updating Function. This enhancement allows a user to have a Monitor II command automatically repeated a given number of times with a given interval between each repetition. This has the effect of automatically updating the display as specified by the user. This release also provides the user with the capability to produce the desired Monitor II report by selecting the appropriate 3270 Programmable Function Key. The new Global Resource Serialization facility available with MVS/System Product-JES2 Release 2 or MVS/System Product-JES3 Release 2 will also be supported by RMF Version 2 Release 4.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The approximate RMF auxiliary storage requirements for the system libraries are:

SYS1.LPALIB 22,000 bytes

Fixed storage requirements for RMF include temporarily fixed PLPA code space, temporarily fixed private area space and SOA global fixed space (SP245). The amount of storage used depends on the set of options that is requested for RMF processing.

There are no special hardware requirements in addition to the normal requirements of OS/VS2 MVS, with the following exceptions:

- Display reports can be run under TSO in a TSO display session or as a local 3270 display session started by an operator command. Display sessions require an IBM 3277 Display Station mdl 2, IBM 3278 Display Station mdl 2, or IBM 3276 Controller Display Station mdl 2. Monitor II display sessions now provide full screen support for the following terminals:

IBM 3276 mdls 2, 3 and 4 (Remote attachment only)

IBM 3278 mdls 2, 3 and 4 (attached to the IBM 3274 mdl 1D control unit)

IBM 3279 mdls 2A, 2B, 3A and 3B (attached to the IBM 3274 mdl 1D control unit)

- When the MVS/System Extensions program product or the MVS/System Product is installed, a 132-character printer is required to accommodate the extensions to the printed reports.

#### SOFTWARE REQUIREMENTS

RMF Version 2 can be used with OS/VS2 Release 3.7, which must have the following products installed:

- Supervisor Performance No. 1 (SU5).
- Supervisor Performance No. 2 (SU7).
- If MVS/System Extensions-Processor Support 2 feature is installed, the RMF (MVS/System Extensions Support) Processor Support 2 feature must also be installed.

RMF Version 2 can be used with OS/VS2 Release 3.8 (MVS) which must have the following products installed:

- If MVS Processor Support 2 is installed and the MVS System Extensions Program Product is not installed, the RMF Processor Support 2 feature must also be installed.
- If MVS/System Extensions Processor Support 2 feature is installed, the RMF (MVS/System Extensions Support) Processor Support 2 feature must also be installed.
- If MVS/System Extensions Release 2.0 is installed, the RMF (MVS/System Extensions Support) MVS/System Extensions Release 2 feature must also be installed.
- If MVS/System Extensions Release 2.0 is installed, RMF Version 2 Release 3 or the RMF (MVS/System Extensions support) MVS/System Extensions Release 2 feature, must also be installed.
- If MVS/System Product-JES2 Release 1 or MVS/System Product-JES3 Release 1 is installed, RMF Version 2 Release 3 must also be installed.
- If the Enhancement for MVS/System Product - JES2 Release 1 or MVS/System Product - JES3 Release 1 is installed, the Enhancement for RMF Version 2 Release 3 must also be installed.
- If MVS/System Product-JES2 Release 2 or MVS/System Product-JES3 Release 2 is installed, RMF Version 2 Release 4 must also be installed.
- If MVS/System Product - JES2 Release 3 or MVS/System Product - JES3 Release 3 is installed, the Enhancement for RMF Version 2 Release 4 must also be installed.

PROGRAM PRODUCTS

RMF (cont'd)

PRODUCT OVERVIEW: RMF VERSION 2 RELEASE 2

RMF Product	RMF V2R2	RMF V2R2 (MVS/Sys. Ext.Sup.)	RMF V2R2 Proc.Sup. 2 feature	RMF V2R2 (MVS/Sys. Ext.Sup.) Proc.Sup. 2 feature	RMF V2R2 (MVS/Sys. Ext. Sup.) MVS/Sys. Ext. Rel. 2 feature
Purpose	Function in a non-MVS/Sys. Ext. Env.	Function in an MVS Sys. Ext. Env.	COMPAT. with SU64	COMPAT. with MVS/Sys. Ext. Proc. Sup. 2 feature & SU64	COMPAT. with MVS/Sys. Ext. Rel. 2 Function
MVS Base	3.7/3.8	3.7/3.8 3.7/3.8	3.7/3.8	3.7/3.8	3.8
Pre-Reqs	SUs 5, 7, 61 or 3.8 Base	MVS/Sys. Ext. R1 & SUs 5, 7 & 53 or 3.8	RMF V2R2 & SU64	RMF V2R2 (MVS/Sys. Ext. Sup.) & MVS/Sys. Ext. Proc. Sup. 2 feature & SU64	RMF V2R2 (MVS/Sys. Ext. R2 & SU64
Available	3.7-11/77 3.8- 3/79	3.7-3/78 3.8-3/79	3.7-3/79 3.8-6/79	3.7-3/79 3.8-6/79	8/79
Last Date For Prog. Support	3.7-12/80 3.8-*	3.7-12/80 3.8-12/81	3.7-12/80 3.8-*	3.7-12/80 3.8-12/80	12/81

\* 6 Months Notice.

PRODUCT OVERVIEW: RMF VERSION 2 RELEASES 3 and 4

	Release 3	Release 3 Enhancement	Release 4	Release 4 Enhancement
RMF Product	RMF V2R3 (MVS/Sys. Ext. R1.2 & MVS/SP R1 Sup.)**	RMF V2R3 Enhancement (MVS/SP R1** Enhancement Supt.)	RMF V2R4 (MVS/SP R2 Supt.)**	RMF V2R4 Enhancement (MVS/SP R3 Supt.)**
Purpose	Function & Compat. with MVS/Sys. Ext. Rel. 2 & MVS/SP R1**	Function & Compat. with MVS/SP R1** Enhancement	Function & Compat. with MVS/SP R2**	Function & Compat. with MVS/SP R3**
MVS Base	3.8	3.8	3.8	3.8
Pre-Reqs	MVS/Sys. Ext. Rel. 2 or MVS/SP** R1 & SU64	RMF V2R3 MVS/SP** R1 Enhancement & SU64	MVS/SP R2** & SU64	RMF V2R4 MVS/SP R3** & SU64
Available	Now	Now	6/81	10/81
Last Date For Prog. Support	MVS/SE2* MVS/SP R1** -12/82	12/82	4/83	*

\* 6 Months Notice.

\*\* MVS/SP-JES2 or MVS/SP-JES3.

DOCUMENTATION (available from Mechanicsburg)

OS/VS2 MVS Resource Measurement Facility (RMF) General Information Manual (GC28-0921-1).

TERMS and CONDITIONS: See PP Index

## PROGRAMMED CRYPTOGRAPHIC FACILITY 5740-XY5

### PURPOSE

The Programmed Cryptographic Facility program product provides an installation with the ability to encipher and decipher data, and create and manage the keys associated with the data encryption. It employs a software implementation of the Federal Hardware Data Encryption Standard (DES) algorithm to encipher and decipher data using a 56-bit key. This facility may be used in conjunction with the ACF/VTAM Encrypt/Decrypt feature in a communications environment with the access method services REPRO function of either Access Method Services Cryptographic Option or MVS/XA Data Facility Product, or with installation encryption/decryption applications for data to be transmitted over communications lines, or stored on some physical device.

### HIGHLIGHTS

Enciphers and deciphers data using a software implementation of the Federal Data Encryption Standard algorithm.

Provides a macro for invocation by the ACF/VTAM Encrypt/Decrypt feature, ACF/VTAM Version 2 or installation applications, for use in enciphering data for transmission over unprotected communications lines.

Provides a Key Generation utility to generate and store (in enciphered form) keys used in data encryption and decryption.

Provides a Key Management function to assist in maintaining the security of the cryptographic keys, and to perform manipulation of these keys with minimum user involvement.

Provides an assembler macro interface to the encryption/decryption algorithm enabling an installation to implement protection for data sets via the access method services REPRO function of either Access Method Services Cryptographic Option or MVS/XA Data Facility Product, or user applications.

Routes security messages to the security console and SMF for detected attempted security violation occurrences, and execution of the Key Generator utility.

### DATA FILE ENCRYPTION/DECRYPTION CONSIDERATIONS

It is recommended that data encryption be used for entire data sets that need protection and are transcribed on transportable media or are to remain stored on some physical device. For online data protection, an authorization mechanism such as RACF should be considered. Access Method Services Cryptographic Option licensed program (5740-AM8) or MVS/370 Data Facility Product (5665-295) in the OS/VS2 MVS environment, or MVS/XA Data Facility Product Release 1 (5665-284) in the MVS/XA environment support the access method services REPRO function to give the user the ability to encipher and decipher data using the Programmed Cryptographic Facility. The user may also develop encryption/decryption routines using the services of the Programmed Cryptographic Facility licensed program.

### CUSTOMER RESPONSIBILITIES

Primary among the customer responsibilities for using the Programmed Cryptographic Facility are:

Generating cryptographic keys (by means of the Key Generator Utility).

Providing adequate physical security for the Key Generator Utility output, and data sets used during key generation.

Providing protection of the Cryptographic Key Data set (e.g., by using RACF (Program No 5740-XXH) (MVS only), or password protection).

Maintaining secure duplicate copies of the keys used. A lost key will preclude deciphering and result in loss of ability to use data. This is a concern primarily when storing enciphered data on physical devices.

For an installation to safeguard its data, it must not only consider the functions provided through the Programmed Cryptographic Facility and other data processing techniques, but it must also provide the necessary physical protective measures and implement effective information management practices. For an overview of physical security and data security, refer to the following IBM publications:

*The Considerations of Physical Security in a Computer Environment*, G520-2700 ... *The Considerations of Data Security in a Computer Environment*, G520-2169 ... *Data Security and Data Processing, Volumes 1 and 2*, G320-1370 and GC20-1371 ... *42 Suggestions for Improving Security*, G520-2797 ... *Data Security Controls and Procedures - A Philosophy for DP Installations*, G320-5649 ... *Management Memorandum: Security Features of IBM S/370*, G320-5650 ... *OS/VS2 MVS Resource Access Control Facility (RACF)*, *General Information Manual*, GC28-0722.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The virtual and direct access storage requirements for the Programmed Cryptographic Facility, beyond normal OS/VS1, OS/VS2 MVS or MVS/XA requirements are:

#### Virtual Storage Requirements:

OS/VS2 MVS MVS/XA	OS/VS1	Approximate Storage Required
Common Service Area (CSA)	Pageable System Queue Area (PSQA)	550 bytes plus space for ACBs and other VSAM control blocks, data buffers and index buffers.
Pageable Link Pack Area (PLPA)	Pageable Supervisor Area	23,000 bytes.
Private Area	Partition	2,500 bytes.

#### Direct Access Storage Requirements:

Library	Approximate DASD Space
SYS1.NUCLEUS(OS/VS1)	
SYS1.LPALIB(OS/VS2 MVS)	24,000 bytes
SYS1.LINKLIB	15,000 bytes
JOBLIB or STEPLIB data set *	38,000 bytes
SYS1.MACLIB or a private macro library	108,000 bytes
Cryptographic Key Data Set	50 bytes/entry
Master Key Variant Data Set	240 bytes

\* To control access to the key generator utility program, it is recommended that it be stored in a protected library that is accessed via a JOBLIB or STEPLIB DD statement.

No special hardware requirements exist for this program product, beyond either the IBM S/370 supported by OS/VS2 MVS or OS/VS1, or the IBM 3081 operating in Extended Architecture mode supported by MVS/XA.

The Programmed Cryptographic Facility will support an optional, dedicated security console (MCS, routing code = 9). The console may be any of the terminals supported by OS/VS1, OS/VS2 MVS or MVS/XA that have console capabilities.

### COMMUNICATIONS ENCRYPTION/DECRYPTION CONSIDERATIONS

For implementation in a communications environment, this program is designed to operate with the ACF/VTAM Encrypt/Decrypt feature or ACF/TCAM Version 2 and with the 4701 Finance Communication Controller and the following terminals when they are equipped with Encrypt/Decrypt feature #3680:

3274 mdls 1C, 21C, 31C and 51C  
3276 mdls 11, 12, 13 and 14  
3776 mdls 3 and 4  
3777 mdl 3

### SOFTWARE REQUIREMENTS

The Programmed Cryptographic Facility can be used with:

OS/VS2 MVS Release 3.8 with, optionally, MVS/370 Data Facility Product (5665-295)

OS/VS1 Release 7

MVS/XA (5665-284) Data Facility Product in an MVS/XA environment

and subsequent releases and modification levels unless otherwise specified.

### COMPATIBILITY

Existing 3600 host application programs may, with minor modifications, use the Programmed Cryptographic Facility program product macros.

### DOCUMENTATION

(available from Mechanicsburg)

*Programmed Cryptographic Facility General Information Manual* (GC28-0942).

RPQs ACCEPTED: No



PROGRAM PRODUCTS

**CRYPTOGRAPHIC UNIT SUPPORT (5740-XY6)**

**PURPOSE**

The Cryptographic Unit Support program product promotes security for sensitive data in communication and file applications through the use of cryptography. It provides an interface to the 3848 Cryptographic Unit, includes a process to generate cryptographic keys and a facility to manage those keys. The 3848 implements the Data Encryption Standard (DES) as published in Federal Information Processing Standard #46.

**HIGHLIGHTS**

Provides the capability to encipher and decipher data in hardware via an interface to the 3848 Cryptographic Unit.

Provides a key generation utility to generate and store (in enciphered form) keys used in data encryption and decryption.

Provides key management functions to enhance the security of the cryptographic keys and to perform manipulation of these keys with minimum user involvement.

Provides the capability to encrypt/decrypt data transmitted over communications lines by invocation of the appropriate macros by the:

ACF/VTAM Encrypt/Decrypt Feature or,  
ACF/TCAM Version 2 or,  
Installation Applications.

Supports file encryption through direct use of encryption macros in user-written applications or through either the Access Method Services Cryptographic Option licensed program (5740-AM8), MVS/370 Data Facility Product licensed program (5665-295), or the MVS/XA Data Facility Product licensed program (5665-284).

Routes security messages to the security console and writes records to the SMF data set for detection of attempted security violation occurrences and execution of the key generator utility as well as other significant events.

Provides error recovery and error recording for the 3848 cryptographic unit.

**CUSTOMER RESPONSIBILITIES**

Primary customer responsibilities for using the Cryptographic Unit Support are:

- Installing the host master key in the 3848 Cryptographic unit.
- Generating cryptographic keys (by means of the Key Generator Utility).
- Providing adequate physical security for the key generator utility output, and data sets used during key generation.
- Providing protection of the cryptographic key data set (for example, by using RACF (5740-XXH), MVS/XA or OS/VS2 MVS only), or password protection.

For an installation to safeguard its data, it must not only consider functions provided through the Cryptographic Unit Support program product and other data processing techniques, but it must also provide the necessary physical protective measure and implement effective information management practices. For general overview information on physical and data security, refer to the following IBM publications:

- *The Considerations of Physical Security in a Computer Environment* (G520-2700)
- *The Considerations of Data Security in a Computer Environment* (G520-2169)
- *Data Security and Data Processing, Volumes 1 and 2* (G320-1370 and G320-1371)
- *42 Suggestions for Improving Security* (G520-2797)
- *Data Security Controls and Procedures - A Philosophy for DP Installations* (G320-5649)
- *Management Memorandum: Security Features of IBM S/370* (G320-5650)
- *OS/VS2 MVS Resource Access Control Facility (RACF) General Information Manual* (GC28-0722).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Cryptographic Unit Support program product will run on the virtual storage IBM S/370 Mdl 145 through 168 and the IBM 3031, 3032, 3033 or 3081 Processors or 3081 Processor Complex operating in Extended Architecture mode to which an IBM 3848 is attached. The IBM Mdl 145-1 requires the no-charge special feature #1001, Advanced Program Support.

The program will support an optional dedicated console (MCS, routing code = 9). This console may be any of the terminals supported by MVS that has console capability.

**STORAGE ESTIMATES GUIDELINES**

The virtual and direct access storage requirements for the Cryptographic Unit Support Program Product, beyond normal MVS/XA or OS/VS2 MVS requirements, are:

**VIRTUAL STORAGE REQUIREMENTS**

	Approximate MVS Storage Required
Common Service Area (CSA)	554+A+(4076+(4096xB/5))
Pageable Link Pack Area (PLPA)	19,000 bytes
Private Area	2,000 bytes

A = storage for an ACB, for VSAM data buffers and index buffers, and for other VSAM control blocks. For information on the amount of space required for these control blocks, see *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide* or *OS/VS2 Access Method Services*.

B = number of Cryptographic Units defined at SYSGEN and B/5 not less than 1.

**DIRECT ACCESS STORAGE REQUIREMENTS**

Data Set or Library	Approximate DASD Space
SYS1.LPALIB	19,000 bytes
SYS1.LINKLIB	35,000 bytes
JOBLIB or STEPLIB data set*	48,000 bytes
SYS1.MACLIB of a private macro library	108,000 bytes
Cryptographic Key Data Set (CKDS)	58 bytes/entry
Master Key Variant Data Set (MKDS)	240 bytes

**Note:**

\* To control access to the key generator utility program, it is recommended that it be stored in a protected library that is accessed via a JOBLIB or STEPLIB DD statement.

**SOFTWARE REQUIREMENTS**

The Cryptographic Unit Support Program Product was designed to be used with OS/VS2 (MVS) Release 3.8 (and subsequent releases until otherwise indicated). When used with OS/VS2 (MVS) the following selectable unit is required:

MVS Processor Support 2 (SU64)

When used with an OS/VS2 MVS system that includes the MVS/System Extensions program product (5740-XE1), the selectable unit listed above is required as well as the Processor Support 2 Feature of MVS/System Extensions. The Cryptographic Unit Support program product may be used with MVS/370 Data Facility Product (5665-295) and its prerequisites. It may also be used in an MVS/XA environment with MVS/XA Data Facility Product licensed program and either MVS/System Product-JES2 Version 2 (5740-XC6) or MVS/System Product-JES3 Version 2 (5665-291) licensed programs

**COMMUNICATIONS ENCRYPTION/DECRYPTION CONSIDERATIONS**

For implementation in a communications environment, this program is designed to operate with the ACF/VTAM Encrypt/Decrypt feature or ACF/TCAM Version 2 and with the 4701 Finance Communication Controller and the following terminals when they are equipped with Encrypt/Decrypt feature #3680:

- 3274 mdls 1C, 21C, 31C and 51C
- 3276 mdls 11, 12, 13 and 14
- 3776 mdls 3 and 4
- 3777 mdl 3

**DATA FILE ENCRYPTION/DECRYPTION CONSIDERATIONS**

It is recommended that data encryption be used for entire data sets that need protection and are transcribed on transportable media. For online data protection, an authorization mechanism such as RACF should be considered. The Access Method Services Cryptographic Option Release 1 licensed program (5740-AM8), MVS/370 Data Facility Product licensed program (5665-295), and the MVS/XA Data Facility Product licensed program (5665-284) support the Access Method Services REPRO function to give the user the ability to encipher and decipher data using the Cryptographic Unit Support program product. The user may also develop his own encryption/decryption routines using the macro services of the Cryptographic Unit Support program product.

**COMPATIBILITY**

The Cryptographic Unit Support program product was designed to allow operation of programs written to use the Programmed Crypto-



PROGRAM PRODUCTS

**Cryptographic Unit Support (cont'd)**

graphic Facility program product. The actual encryption/decryption will be performed in the 3848 Cryptographic Unit. Data files that were encrypted by the Programmed Cryptographic Facility can be decrypted by the Cryptographic Unit Support program product and the 3848. Compatibility and conversion guidelines regarding cryptographic keys are discussed in the *OS/VS2 MVS Cryptographic Unit Support General Information Manual* (GC28-1015).

**DOCUMENTATION**  
(available from Mechanicsburg)

*IBM Cryptographic Subsystem Concepts and Facilities* (GC22-9063) ... *OS/VS2 MVS Cryptographic Unit Support General Information Manual* (GC28-1015) ... *IBM 3848 Cryptographic Unit Product Description and Operating Procedures* (GA22-7073).

**At Program Availability:** *OS/VS2 MVS Cryptographic Unit Support Licensed Program Specifications* (GC28-1014) ... *OS/VS2 MVS Cryptographic Unit Support Installation Reference Manual* (SC28-1016).

**RPOs ACCEPTED:** No

## PROGRAM PRODUCTS

**DATA BASE DESIGN AID (DBDA)  
5740-XY8 (OS/VIS)  
5746-XXQ (DOS/VIS)****PURPOSE**

The Data Base Design Aid (DBDA) is a collection of programs that assist the data base designer by performing a major portion of the data base logical design process.

Data base requirements which have been collected and recorded on DBDA Requirement Specification Forms are used to produce a logical design of the data base by mapping the data elements into segments and a hierarchical structure that shows the minimum set of relationships required by an integrated data base (one that services many application programs). The processing aids the data base designer by identifying inconsistencies or omissions in the input requirement, specifications, listing redundant data identified by the designer and producing a series of diagnostic and design reports. Using DBDA's suggested logical design to design a physical data base, the data base designer can expect to save from poor initial designs.

**HIGHLIGHTS**

**Reduced Data Base Design Time:** By automating analysis of the data requirements, DBDA can help reduce the design cycle time. This reduction can allow program development efforts to begin earlier in the implementation process.

**Increased Data Base Design Quality:** Because of its automated analysis of the data requirements, the use of DBDA helps create a more efficient and uniform initial design, as compared to manual methods.

**Automated Analysis of Data Requirements:** DBDA performs a comprehensive and thorough analysis of the data elements and their relationship to each other.

**Standardized Data Requirements Gathering:** DBDA provides a simple format for recording data base requirements. Requirements from various application areas within an organization can be recorded with an increased probability of completeness and consistency of content and meaning.

**Emphasized Designer Control:** DBDA analyzes design choices in structuring the data base and detects omissions, inconsistencies and redundancies in the data requirements. The results of this analysis are reported to the designer, who can then modify the data requirements and easily communicate the decisions to DBDA. The designer may also impose his own requirements and constraints on the design produced by DBDA. The analysis and restructuring can then continue or be repeated until the desired logical design is obtained.

**Creation of Comprehensive Reports:** DBDA produces design reports that define the structure of the data base and suggest a possible logical design. Diagnostic/edit reports are also produced that help the designer use DBDA in an iterative manner. They provide information on which to base design decisions and make corrections in the specifications of data requirements. In addition, both categories of reports are valuable as documentation of design decisions.

**DBDA -- DB/DC Data Dictionary Interfaces:** Two optional programs are supplied with DBDA to provide interfaces between DBDA and the DB/DC Data Dictionary. The DBDA Data Dictionary Command Generator enables both OS/VIS and DOS/VIS users to store the results of a DBDA design study into the DB/DC Data Dictionary: OS/VIS DB/DC Data Dictionary (5740-XXF), and DOS/VIS DB/DC Data Dictionary (5746-XXC). The DBDA Data Dictionary Information Extractor in OS/VIS DBDA enables OS/VIS users to extract from their dictionary a description of existing data structures. This facility can be employed by the user who wishes to support new application functions by expanding data structures, and makes it unnecessary to manually redescribe these structures for DBDA input.

**CUSTOMER RESPONSIBILITIES**

A customer installing DBDA must have at least the minimum machine configurations installed (described below under "System Requirements"). The customer's analysts must also collect and record data requirements.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

DBDA Version 2 requires an IBM S/370 (mdl 145 or larger for OS/VIS users, mdl 115 or larger for DOS/VIS users) with a direct access storage device supported by VSAM.

Minimum storage requirements above those of the host operating system are:

A virtual OS/VIS region or partition of 512K bytes.

A virtual DOS/VIS partition of 512K bytes when VSAM is resident in the SVA. If VSAM is not resident, the virtual partition required is 768K.

Input is via a card reader or by entry into an input data set from a terminal using TSO for OS/VIS users, CMS for VM/370 users, SPM II or ETSS for DOS/VIS users or any other terminal system that is capable

of generating a data set that can be read as SYSIN input. A printer is necessary for DBDA reports. One tape drive is required for DBDA installation on OS/VIS; two tape drives are required for installation on DOS/VIS. **SOFTWARE REQUIREMENTS**

DBDA Version 2 uses VSAM with multi-positioning and generic key searches. DBDA Version 2 executes in batch mode under all currently supported releases of OS/VIS1, OS/VIS2 and DOS/VIS and subsequent releases unless otherwise specified.

The host system must include a sort/merge routine designed for VSAM files and the standard OS/DOS interface with E15 and E35 exits. OS/VIS Sort/Merge (5740-SM1) and DOS/VIS Sort/Merge (5746-SM1) meet these requirements.

DBDA does not require the execution of IMS/VIS or DL/I DOS/VIS. However, the optional DB/DC Data Dictionary Information Extractor in OS/VIS DBDA requires any currently supported release of the DB/DC Data Dictionary OS/VIS (5740-XXF) and IMS/VIS Version 1 (5740-XX2) releases as required by the DB/DC Data Dictionary. Subsequent releases of IMS/VIS and the DB/DC Data Dictionary will be supported unless otherwise specified.

DBDA is distributed in Assembler language.

**COMPATIBILITY**

Version 2 is upward compatible with Version 1.

**CONVERSION**

No conversion aids are required to migrate from Version 1 to Version 2.

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual* (GH20-1626).



**DOS SORT/MERGE  
5743-SM1****PURPOSE**

The DOS Sort/Merge (5743-SM1) provides a number of functional improvements over the DOS Tape and Disk Sort/Merge 360N-SM-483, including support of the 3330/3333 Disk Storage Facility and the 3400-series Magnetic Tape Units. All the functions, facilities and options of the Type I program 360N-SM-483 as well as the earlier program product Tape and Disk Sort/Merge (5736-SM1) (now withdrawn) are included.

**FEATURES**

- Support for the 3330/3333 Disk Storage Facility and the 3410 and 3420 Magnetic Tape Units for input, output and work files.
- Reduction in minimum main storage requirements to 10K for all supported devices.
- Facility to specify any programmer logical unit number for input, output and work files.
- Work files on direct access devices can be specified as direct files as well as sequential disk files, making it easier to specify multi-extent disk work files.
- Disk input and/or output record lengths of the maximum track capacity are accepted.
- New and modified error messages.
- An option to get a storage dump at different levels of critical error messages.
- Message routing to console or printer.
- Work files on disk or 3400-series tape can optionally be erased.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum configuration supported by the Sort/Merge program is:

- Any IBM processor supported by DOS.
- A minimum partition of 10K for the Sort.
- One 2311, 2314 or 3330/3333 direct access device for system residence.
- Unit record equipment as required by the system.
- Three 2400-series or 3400-series tape units when tape work data sets are used.
- Sufficient direct access space when direct access input, output and/or work data sets are used.

5743-SM1 utilizes up to 512K of main storage. For work data sets, Sort/Merge (5743-SM1) utilizes up to eight extents on 2311, 2314, 2319 or 3330/3333 direct access devices or up to ten 2400/3400 series tape units.

**SOFTWARE REQUIREMENTS**

DOS Sort/Merge 5743-SM1 executes under Release 26 of the Disk Operating System and all subsequent releases. Sort/Merge support of the 3330 requires the 3330 device support provided in DOS Release 27.

**COMPATIBILITY**

A valid set of Sort control statements, and user-written exit routines prepared for the 360N-SM-483 program can be used without change for the 5743-SM1 program product. All data sets used and produced by 360N-SM-483 are supported by 5743-SM1.

5743-SM1 and 360N-SM-483 cannot exist in the same core-image library without renaming phases with identical names.

**PERFORMANCE**

When using the devices supported by 360N-SM-483, the DOS Sort/Merge 5743-SM1 has better or equal performance compared to the Type I Sort. The support of the 3330/3333 Disk Storage Facility utilizes the improved access time and larger track capacity of this device. For more information on the performance of 5743-SM1, see the "Timing Estimates" section of the *DOS Sort/Merge General Information Manual* (GC33-4020).

**DOCUMENTATION** (available from Mechanicsburg)

*IBM Specifications* (GC33-4019) ... *General Information Manual* (GC33-4020).



PROGRAM PRODUCTS

**INTERACTIVE PERSONNEL SYSTEM**  
**Release 1 Modification Level 2**  
**CICS/DOS/VS (5746-AM1)**

**PURPOSE**

The IBM Interactive Personnel System is designed to assist personnel functions in performing their required tasks efficiently and competently. Online-inquiry, online-update, as well as batch processing capabilities are offered. The data organization methods of the IBM Data Language/I Disk Operating System/Virtual Storage (DL/I DOS/VS) are used for data storage and retrieval. The online capability is made possible through the use of the data communication facilities of the IBM Customer Information Control System/Virtual Storage (CICS/DOS/VS).

**DESCRIPTION**

The Interactive Personnel System maintains three data bases:

- The personnel data base, which contains data related to employees.
- The positions data base, which holds data reflecting the organizational structure of a company, including reporting paths.
- The jobs data base, which contains data describing the jobs to be performed in a company and the skills required for these jobs.

These data bases are designed to meet a variety of administration and information requirements of the personnel functions of a company. If additional or different data is needed, the data bases can be customized. Facilities are available in the Interactive Personnel System to add, change or delete fields, segments or data bases. Also, new data base layouts can be defined.

A wide range of personnel administration and management is supported by the applications offered as part of the Interactive Personnel System. Some applications run in online mode and some in batch mode. The applications can be used without any modifications; however, they can be modified if necessary. Changes to the data bases or to the applications can be made easily using two system capabilities:

- Customizing of the data bases as mentioned above.
- Procedure definition language for the definition and modification of applications.

The procedure definition language is end-user-oriented and therefore easy to use. There are various procedure types, for example, a conversational inquiry or an online update, that define the skeleton of processing. A set of language keywords allows the specification of processing details such as input/output definitions, security specifications, editing options or user exit processing. This tool enables the user to define or modify applications with little effort. As part of the Interactive Personnel System, facilities for data security are offered in addition to the security facilities contained in the prerequisite data base/data communication systems. Security rules can be established for each user of the Interactive Personnel System. A hierarchy of security checks can be defined:

- Authorization to define or modify applications.
- Authorization to execute applications.
- Authorization to gain access to the application data bases.
- Authorization to use specific data within a record.
- Authorization to process the logging data base.

As part of the procedure definition language, editing features are included in the Interactive Personnel System to verify that the data entered into the data bases is correct. Editing can also be done on data that is to be displayed or printed. This includes, for example, code conversion.

Checking is done against user-defined tables that can be altered without program changes.

A set of government reporting and benefits tracking applications are offered as a separately-priced feature covering the following areas:

- Equal Employment Opportunity (EEO) Processing
- Occupational Safety and Health Act (OSHA) Processing
- Health Maintenance Organization (HMO) Tracking
- Benefits Tracking

These applications expand the personnel tracking capabilities of the Interactive Personnel System for private industry, providing the basis for the entry, update and processing of much of the information needed to comply with government reporting requirements.

The government reporting and benefits tracking applications use both online and batch mode processing. Sample data base segments are supplied for inclusion in the existing system data bases, and for the creation of an establishment data base to contain pertinent EEO data. Edit tables are also included for support of the establishment data bases.

These applications use the data base customization and procedure definition language capabilities of the Interactive Personnel System, and require no additional resources beyond the added data base segments, the establishment data base, and the table storage areas.

The system allows basic calculations. Complex calculations and complex data handling can be implemented in user exit routines that can be supplied as Assembler, PL/I or COBOL programs.

**HIGHLIGHTS**

- A set of three data bases for personnel, positions and job data.
- Personnel applications are offered to support many tasks in personnel administration and management. The applications are written using the procedure definition language.
- The system supports both online and batch processing.
- The Interactive Personnel System procedure definition language allows easy implementation of additional applications and modification of existing applications by the user.
- Customizing facilities are provided to adapt the system to the user's environment. Data bases, segments and fields can be added or changed.
- Data security and logging facilities are available.
- Data editing functions assist in data checking, data conversion and migration.
- Basic calculations are supported.
- User-exit modules within the applications can be written in PL/I, COBOL or Assembler language.
- Provisions are made for the translation of messages, commands and screen data into the customer's desired terminology.
- An optional feature is the logging of data base updated in a logging data base. The contents of the logging data base can be processed using Interactive Personnel System applications.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for the availability of the prerequisite machines and programming systems as listed in the "Specified Operating Environment".

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM machines: IBM S/370 mdls 138 to 158, IBM 303X and IBM 43XX. The following environment is required for the execution of the program:

- Processor: One IBM processor supported by DOS/VS or DOS/VSE and CICS/DOS/VS.
- Virtual address space (figures do not include the partition-related parts of DOS/VS or DOS/VSE, VSAM, DL/I DOS/VS or CICS/DOS/VS):
  - 300K for programs running in a batch environment
  - 240K for programs running under CICS/DOS/VS plus 35K for each active task.

The figures can increase if complex applications are executed, or if program functions such as security, edit or user exits are extensively used.

- Direct access storage devices: One IBM direct access storage device as supported by DL/I DOS/VS. In addition, optionally, one or more IBM 3330, IBM 3340, IBM 3350, IBM 3310 or IBM 3370 direct access storage devices for sequential input and output files.
- Unit-record devices: One card read/punch device and one print device as supported by DOS/VS or DOS/VSE.
- Sequential access storage devices: One 9-track tape device for installation and support; and one or more 9-track tape device(s) for optional input and/or output.
- Telecommunication facilities: One IBM 3275 Display Station mdl 2 (with or without RPQ X81191: Arabic Left to Right) or mdl 12, or one IBM 3277 Display Station mdl 2 (with or without RPQ X81191).

The Interactive Personnel System can also be used with the IBM 3274/3276 subsystem in compatibility mode, with or without RPQ 7H0306 (Arabic Display Control).

The system is designed to support additional disk storage, tape units, processor storage and terminals.

**SOFTWARE REQUIREMENTS**

The system is designed to operate under the Disk Operating System/Virtual Storage (see Note 1).



PROGRAM PRODUCTS

**Interactive Personnel System  
CICS/DOS/VS (cont'd)**

The system used the data base facilities of the IBM Data Language/I Disk Operating System/Virtual Storage (see Note 2) and the data communication facilities of the IBM Customer Information Control System/Virtual Storage (see Note 3).

**Notes:**

1. DOS/VS Release 34 or DOS/VSE Release 1, together with VSE Advanced Functions, Program Number 5746-XE8, Release 1 and VSE/VSAM, Program Number 5746-AM2, Release 1 or subsequent releases unless otherwise identified.
2. DL/I DOS/VS Version 1, Program Number 5746-XX1, Release 1.5 or subsequent releases unless otherwise identified.
3. CICS/VS Version 1, Program Number 5746-XX3, Release 4 or subsequent releases unless otherwise identified.

The IBM Interactive Personnel System is written in the IBM S/370 PL/I language and in the IBM S/370 Assembler language. Supplied user-exit routines are written in the IBM S/370 PL/I language, the IBM S/370 Assembler language or IBM S/370 COBOL.

Both source code and load modules are distributed. Normally, the user will run the load modules as distributed and, therefore, only require the PL/I Optimizing Compiler Transient Library, Program Number 5736-LM5, Release 5.0 or a subsequent release.

In addition, a DOS/VS Sort/Merge program product is required.

Modifications to the source code, including application of source fixes, require the use of either: PL/I Optimising Compiler and Libraries (5736-PL3) or, PL/I Optimising Compiler (5736-PL1) with PL/I Optimising Compiler Resident Library (5736-LM4).

**DOCUMENTATION:** (available from Mechanicsburg)

Title	Order Number
General Information Manual	GH12-5125
Licensed Program Specifications	GH12-5239
User's Guide	SH12-5321
Applications Guide	SH12-5326
System Programmer's Guide	SH12-5430
Logic Manual	LY12-5025

**RPOs ACCEPTED:** No

## VSE/VSAM RELEASE 1 5746-AM2

### PURPOSE

VSE/VSAM is an access method designed to operate with direct access devices and to support both direct and sequential processing by means of either an index key (keyed accessing) or by means of relative byte address (addressed accessing). (Relative byte address refers to the displacement of a stored record, or control interval, from the beginning of the storage space allocated to the file to which it belongs.)

Three types of data sets are provided: key-sequenced data sets, which are ordered by a key field in the data record, entry-sequenced data sets, which are ordered by the sequence in which the records were loaded, and relative record data sets which are ordered by record number. Keyed accessing is used to access key-sequenced or relative record data sets, and addressed accessing is used to access both key-sequenced and entry-sequenced data sets. Key-sequenced and entry-sequenced data sets may be either fixed or variable length records, relative record data sets are fixed length records only.

VSE/VSAM is composed of two major elements: A data organization which minimizes data movement and which is suitable for data base applications; and routines for creating files in the VSAM organization, adding and deleting records and performing other data management functions. (See also "Access Method Services" under System Utility Programs.) Because the data organization and the access method routines are supported for both OS/VS and DOS/VS, VSE/VSAM provides full file portability.

### HIGHLIGHTS

- Access to data via VSE/VSAM is controlled by macro instructions written under the conventions of the Assembler language. Access to files may be either direct or sequential, and may either be keyed (controlled by index key) or addressed (controlled by relative byte address).
- With VSE/VSAM, certain device-dependent calculations such as the optimum block size for a given device type will be carried out automatically. All data accessing is by relative byte within the storage space allocated to the file. These features minimize programmer effort when device types are to be changed.
- VSE/VSAM offers the DOS/VSE user the facility of a catalog (which will simplify JCL preparation), variable-length record support and password protection.
- Most existing COBOL, PL/I, RPG II, VS APL and Assembler language programs written for use with ISAM data sets may be used with VSAM data sets by means of the VSAM ISAM Interface Program. The ISAM Interface Program maps ISAM macro instructions into the corresponding VSAM requests. Refer to the "Program Product" pages for details regarding COBOL and PL/I support of VSE/VSAM.
- VSE/VSAM offers a multifunction service program to facilitate overall management of data. Such services as defining files initially, deleting VSAM files from the VSAM catalog, printing and copying data, listing the VSAM catalog and providing backup and portability features are controlled by this multifunction program. Converting files from the ISAM and SAM format to the VSAM format is another important function of this program.
- The VSE/VSAM user can expect to see performance improvements relative to DOS/VS ISAM. Performance gains with VSE/VSAM become increasingly significant as the number of insertions to the file rises. This is due to the elimination of the "chained record overflow" concept employed by ISAM. VSE/VSAM will effectively maintain its sequential, noninserted file performance as records are added to the file. While maintaining equivalent or better performance on direct retrieve and update, VSE/VSAM requires significantly less time to perform a record insert than does ISAM. These factors, coupled with the efficient index structure and with the VSE/VSAM performance options offer the potential of significant performance improvements relative to ISAM.

The functional enhancements inherent to VSE/VSAM (e.g., variable length records, device independence, etc.), and the relative performance improvements over ISAM may require additional pages of main storage.

Some VSE/VSAM performance improvements over DOS/VS ISAM are due to adaptations made to provide DOS/VS relocate support. These adaptations include dynamically allocating input/output areas and modules, having the index in main storage and reducing the usage of transient areas.

- A significant feature of VSE/VSAM is that of file and volume portability. Because the VSAM file organization and the access method routines are supported for both DOS/VS and OS/VS, VSE/VSAM provides full file portability.
- VSE/VSAM offers multiple levels of password protection to enhance file security.

Additional features are available to VSAM users. The primary objective of these features is to provide functions which will reduce the need to schedule redundant work, and improve compatibility with OS/VS by providing the following options:

**Alternate Indexes:** This feature permits application programs to access the records of a VSAM entry or key sequenced data set on the basis of keys other than the prime key. These alternate keys may be nonunique and must be contained in the base data record. Once an Alternate Index has been constructed by using Access Method Services, it may optionally be automatically updated whenever a data record is changed in the base data set to which it relates.

**Relative Record Data Set:** With this feature the data set is viewed as a numbered sequence of fixed length slots. Records may be inserted, updated, read or erased in these slots using VSAM keyed processing, with the slot (i.e., record) number as the key. No index is used since each record's physical location is calculated directly by VSAM from its record number and the characteristics of the data set.

**Get Previous:** This feature permits retrieval and update processing on the basis of descending key values, relative record numbers or relative byte addresses. Processing may begin either within or at the end of the data set.

**Reusable Data Set:** This capability allows a data set to be reused (i.e., reset to empty when opened and reloaded) many times without being deleted and redefined. A reusable data set may be any key sequenced, entry sequenced or relative record data set that does not have an alternate index associated with it and that does not reside on unique space. However, an alternate index may be a reusable data set.

**Spanned Record:** The Spanned Record feature allows a record to occupy multiple control intervals within a control area. If indexed, the keys must be in the first control interval.

**Recovery:** Extensions to the facilities within VSAM Catalog Management and Access Method Services permits limited access, via Access Method Services, to data that is not addressable by the catalog (due to the loss of, or damage to the catalog). Further, the user can restore addressability of the data and reconstruct the associated catalog entries.

**User Catalogs:** This facility is compatible with the one provided to OS/VS users. It can increase volume portability by allowing user catalogs to control VSAM data sets. A user catalog and its associated data can be moved from one system to another without reading or writing data sets.

**Automatic Close at End of Job:** This facility is similar to one provided to OS/VS users. It is designed to update the catalog entry and closes all open VSAM data sets within a partition. This helps to ensure that the data sets have been closed properly, whether the end of job was normal or abnormal.

### HIGHLIGHTS of VSE/VSAM RELEASE 1

The new fixed block mode 3310 and 3370 DASDs are supported. Externally, the changes are reflected in the use of blocks rather than cylinders and tracks for space allocation.

The new 8809 Magnetic Tape Unit is supported in Access Method Services. (No special actions are taken to exploit the streaming capability of this device.)

The user has the opportunity to choose wither fast catalog access or optimum disk space utilization with a new define catalog parameter. Note that catalog which have been created using disk space optimization cannot be processed by OS/VSAM.

The user may acquire additional information about a catalog's data or index records through an additional operand on the SHOWCAT macro.

VSE/VSAM users can assign any area of direct-access storage devices to special classes of space for subsequent file allocation. This support is particularly useful for controlling high performance areas such as fixed-head areas on the IBM 3340, 3344 and 3350 DASDs.

The automatic correction of a duplicate record situation if a control interval split on a key-sequenced file (including alternate indexes and catalogs) is interrupted by a system failure.

A reduction in the time required to create and reload backup and portable copies of VSE/VSAM files and volumes. This is accomplished through enhanced I/O buffering and, optionally, control-interval-mode data retrieval. Note that portable copies created in CI-mode cannot be processed by OS/VSAM.

A larger set of physical-record sizes, for better use of track capacity, is now available for VSE/VSAM to choose from (only applies to CKD devices). Physical-record sizes now range from 0.5K bytes to 8K bytes in multiples of 0.5K bytes. Note that files residing on volumes which are to be portable to OS/VSAM must use physical record sizes of 0.5K, 1.0K, 2.0K or 4.0K bytes.



PROGRAM PRODUCTS

VSE/VSAM R1 (cont'd)

**CUSTOMER RESPONSIBILITIES**

It is the responsibility of the customer to specify the VSE/VSAM specific considerations when coding DOS/VSE supervisor generation macros. The user must provide sufficient real and virtual storage to execute VSE/VSAM. These requirements are detailed in the *VSE/VSAM Programmer's Reference* (SC24-5145).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

VSE/VSAM will operate on any IBM system supported by DOS/VSE.

The IBM count-key-data direct access storage devices supported by VSE/VSAM are the 2314 Direct Access Storage Facility, the 2319 Disk Storage, the 3330 Disk Storage mdls 1 and 2, the 3330 Disk Storage mdl 11, the 3340 Disk Storage, the 3344 Direct Access Storage and the 3350 Direct Access Storage.

In addition, VSE/VSAM supports the fixed blocked mode IBM 3310 and 3370 Direct Access Storage Devices and the IBM 8809 Magnetic Tape Unit.

**SOFTWARE REQUIREMENTS**

VSE/VSAM Release 1 is designed to operate with VSE/Advanced Functions Release 1.

In addition VSE/VSAM Release 1 will run with CMS/DOS BSEP Release 2 in support of VM/IFS and DL/I DOS/VS. For the CMS/DOS user the VSE/Advanced Functions Release 1 is not required.

**Service Requirements:** Under certain error conditions VSE/VSAM customers will need additional tools (DITTO or equivalent products) to provide printouts from DASD areas for problem determination.

**COMPATIBILITY**

VSE/VSAM Release 1 provides current users of VSAM several new enhancements that may or may not affect portability to OS/VSAM and DOS/VSAM. Users of VSE/VSAM can achieve file and volume portability to other environments by using only those functions, types of files, and devices that are supported by all affected environments. Additionally, the VSE/VSAM user must in certain cases specify new parameters in order to produce compatible output for all environments. Additional information on items which affect portability can be found in the Sales Pages and the *General Information Manual*.

**PERFORMANCE CONSIDERATIONS**

VSE/VSAM provides various options to optimize performance and storage requirements. These options are specified through Access Method Services Commands. Some of the options that affect performance are the Control Interval size, I/O Buffer Space, Distributed Free Space, Preformatting Control Areas, various Index Options and Key Ranges.

VSE/VSAM keeps statistical information about a file in its catalog record which can help in deciding when to take action to improve performance.

The overall performance of VSE/VSAM will not change measurably except in those areas where special actions have been taken to improve the performance over that of the previous DOS/VS SCP versions of VSAM and Access Method Services. For details refer to the *General Information Manual of VSE/VSAM*.

**DOCUMENTATION:** (available from Mechanicsburg)

VSE/VSAM Licensed Program	
Design Objectives	GC24-5141
VSE/VSAM Licensed Program Specifications	GC24-5142
VSE/VSAM General Information	GC24-5143

**TERMS AND CONDITIONS:** See PP Index

**VSE/VSAM RELEASE 2 WITH  
VSE/VSAM SPACE MANAGEMENT  
FOR SAM FEATURE  
5746-AM2**

VSE/VSAM is an access method designed to operate with direct access devices and to support both direct and sequential processing by means of either an index key (keyed accessing) or by means of relative byte address (addressed accessing). (Relative byte address refers to the displacement of a stored record, or control interval, from the beginning of the storage space allocated to the file to which it belongs.)

Three types of data sets are provided: Key-sequenced data sets, which are ordered by a key field in the data record, entry-sequenced data sets, which are ordered by the sequence in which the records were loaded, and relative record data sets which are ordered by record number. Keyed accessing is used to access key-sequenced or relative record data sets, and addressed accessing is used to access both key-sequenced and entry-sequenced data sets. Key-sequenced and entry-sequenced data sets may be either fixed or variable length records, relative record data sets are fixed length records only.

VSE/VSAM is composed of two major elements: A data organization which minimizes data movement and which is suitable for data base applications; and routines for creating files in the VSAM organization, adding and deleting records and performing other data management functions. (See also "Access Method Services" under System Utility Programs.) Because the VSAM data organization and the access method routines are supported for both OS/VS and DOS/VS, VSE/VSAM provides full file portability.

#### Highlights

- Access to data via VSE/VSAM is controlled by macro instructions written under the conventions of the Assembler language. Access to files may be either direct or sequential, and may either be keyed (controlled by index key) or addressed (controlled by relative byte address).
- With VSE/VSAM, certain device-dependent calculations such as the optimum block size for a given device type will be carried out automatically. All data accessing is by relative byte within the storage space allocated to the file. These features minimize programmer effort when changing device types.
- VSE/VSAM offers the DOS/VSE user the facility of a catalog (which will simplify JCL preparation), variable-length record support and password protection.
- Most existing COBOL, PL/I, RPG II, VS APL and Assembler language programs written for use with ISAM data sets may be used with VSAM data sets by means of the VSAM ISAM Interface Program. The ISAM Interface Program maps ISAM macro instructions into the corresponding VSAM requests. Refer to the "Program Product" pages for details regarding COBOL and PL/I support of VSE/VSAM.
- VSE/VSAM offers a multifunction service program to facilitate overall management of data. Such services as defining files initially, deleting VSAM files from the VSAM catalog, printing and copying data, listing the VSAM catalog and providing backup and portability features are controlled by this multifunction program. Converting files from the ISAM and SAM format to the VSAM format is another important function of this program.
- The VSE/VSAM user can expect to see performance improvements relative to DOS/VS ISAM. Performance gains with VSAM become increasingly significant as the number of insertions to the file rises. This is due to the elimination of the "chained record overflow" concept employed by ISAM. VSE/VSAM will effectively maintain its sequential, noninserted file performance as records are added to the file. While maintaining equivalent or better performance on direct retrieve and update, VSE/VSAM requires significantly less time to perform a record insert than does ISAM. These factors, coupled with the efficient index structure and with the VSE/VSAM performance options offer the potential of significant performance improvements relative to ISAM.

The functional enhancements inherent to VSE/VSAM (variable length records, device independence, etc.), and the relative performance improvements over ISAM may require additional pages of main storage.

Some VSE/VSAM performance improvements over DOS/VS ISAM are due to adaptations made to provide DOS/VS relocate support. These adaptations include dynamically allocating input/output areas and modules, having the index in main storage and reducing the usage of transient areas.

- A significant feature of VSE/VSAM is that of file and volume portability. Because the VSAM file organization and the access method routines are supported for both DOS/VS and OS/VS, VSE/VSAM provides full file portability.
- VSE/VSAM offers multiple levels of password protection.

Additional features are available to VSE/VSAM users. The primary objective of these features is to provide functions which will reduce the

need to schedule redundant work, and improve compatibility with OS/VS by providing the following options:

**Alternate Indexes:** This feature permits application programs to access the records of a VSAM entry or key sequenced data set on the basis of keys other than the prime key. These alternate keys may be nonunique and must be contained in the base data record. Once an Alternate Index has been constructed by using Access Method Services, it may optionally be automatically updated whenever a data record is changed in the base data set to which it relates.

**Relative Record Data Set:** With this feature the data set is viewed as a numbered sequence of fixed length slots. Records may be inserted, updated, read or erased in these slots using VSAM keyed processing, with the slot (i.e., record) number as the key. No index is used since each record's physical location is calculated directly by VSAM from its record number and the characteristics of the data set.

**Get Previous:** This feature permits retrieval and update processing on the basis of descending key values, relative record numbers or relative byte addresses. Processing may begin either within or at the end of the data set.

**Reusable Data Set:** This capability allows a data set to be reused (i.e., reset to empty when opened and reloaded) many times without being deleted and redefined. A reusable data set may be any key sequenced, entry sequenced or relative record data set that does not have an alternate index associated with it and that does not reside on unique space. However, an alternate index may be a reusable data set.

**Spanned Record:** The Spanned Record feature allows a record to occupy multiple control intervals within a control area. If indexed, the keys must be in the first control interval.

**Recovery:** Extensions to the facilities within VSAM Catalog Management and Access Method Services permits limited access, via Access Method Services, to data that is not addressable by the catalog (due to the loss of, or damage to the catalog). Further, the user can restore addressability of the data and reconstruct the associated catalog entries.

**User Catalogs:** This facility is compatible with the one provided to OS/VS users. It can increase volume portability by allowing user catalogs to control VSAM data sets. A user catalog and its associated data can be moved from one system to another without reading or writing data sets.

**Automatic Close at End of Job:** This facility is similar to one provided to OS/VS users. It is designed to update the catalog entry and closes all open VSAM data sets within a partition. This helps to ensure that the data sets have been closed properly, whether the end of job was normal or abnormal.

#### Highlights of VSE/VSAM Release 2

- Support is provided to allow VSE/VSAM catalogs and files to be maintained on DASD volumes which are shared between DOS/VSE systems with VSE/Advanced Functions Release 2 installed.
- Performance of requests to Catalog Management has been improved by altering the scanning algorithm and reducing the number of dictionary scans.
- SHAREOPTION 4 (full cross-partition sharing) has been improved by reducing overhead in the main-line paths.
- Automatic correction will be provided if duplicate record condition is caused by a system failure during a control area split.
- A new Access Method Services CANCEL command will be provided to give the user the ability to either cancel a job or the current job step.
- VSE/VSAM Space Management enhancements are provided to significantly improve DASD space management and usability. Support provided:
  - The ability to easily specify that the entire space or remaining space of a volume is to be owned by VSAM.
  - The ability to define a file in the VSAM catalog without allocating any space to it.
  - The elimination of the necessity to provide EXTENT JCL statements in most cases and the DLBL statement for some Access Method Services commands.
  - The ability to specify default parameters for Access Method Services DEFINE CLUSTER/AIX commands via default modelling.
  - The ability to specify a file-ID that generates partition or processor unique file-IDs for workfiles so that JCL may run in any partition or any processor.

## VSE/VSAM R2 (cont'd)

### HIGHLIGHTS of VSE/VSAM SPACE MANAGEMENT for SAM

Provided is the capability for the sequential access method (SAM) user to define and process a SAM file within VSAM data space giving automatic space management of the file. This support includes VSAM data spaces and all direct access devices that are supported by VSE/VSAM. It supports users of DTFSD (data and workfiles), DTFPCP with DISK=YES, and DTFPH for DASD with MOUNTED = SINGLE. In addition, the user has the ability to access these files via VSAM access.

Through the use of VSE/VSAM Space Management, the SAM user can now place many details of space management responsibility on the system. By introducing space (ideally entire volumes) to VSE/VSAM, the user may leave the space management of that space (volume) to VSE/VSAM. If necessary the user may still subdivide the managed space through the use of VSE/VSAM space classes.

Note that SAM files in VSAM space are not supported by OS/VSAM.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

VSE/VSAM will operate on any IBM system supported by DOS/VSE.

The count-key-data direct access storage devices supported by VSE/VSAM are the IBM 2314 Direct Access Storage Facility, 2319 Disk Storage, 3330 Disk Storage mdls 1, 2, 3330 Disk Storage mdl 11, 3340 Disk Storage, 3344 Direct Access Storage, 3375 Direct Access Storage mdls A1, B1 and 3350 Direct Access Storage.

In addition, VSE/VSAM supports the fixed blocked mode IBM 3310 and 3370 Direct Access Storage Devices and the IBM 8809 Magnetic Tape Unit.

#### SOFTWARE REQUIREMENTS

The VSE/VSAM Release 2 is designed to operate with VSE/Advanced Functions Release 2.

For the VM/CMS user of VSE/VSAM Rel. 2, the VSE/Advanced Functions Rel.2 is required.

**Service Requirements:** Under certain error conditions VSE/VSAM customers will need additional tools (DITTO or equivalent products) to provide print-outs from DASD areas for problem determination.

#### COMPATIBILITY

VSE/VSAM Release 2 provides several new enhancements that may or may not affect portability to OS/VSAM and DOS/VSAM. Users of VSE/VSAM Release 2 can achieve file and volume portability to the other environments by using only those functions, types of files and devices that are supported by all affected environments. Additionally, the VSE/VSAM user must in certain cases, specify new VSE/VSAM parameters in order to produce compatible output for all environments. Additional information on items which affect portability can be found in the Sales pages and the *General Information Manual*.

#### PERFORMANCE CONSIDERATIONS

VSE/VSAM provides various options to optimize performance and storage requirements. These options are specified through Access Method Services Commands. Some of the options that affect performance are the Control Interval size, I/O Buffer Space, Distributed Free Space, Formatting Control Areas, various Index Options and Key Ranges.

VSE/VSAM keeps statistical information about a file in its catalog record which can help in deciding when to take action to improve performance.

The overall performance of VSE/VSAM Release 2 will not change measurably except in those areas where special actions have been taken to improve the performance over that of VSE/VSAM Release 1. Additional information is provided in the *General Information Manual of VSE/VSAM Release 2*.

#### VSE/VSAM BACKUP/RESTORE FEATURE

The VSE/VSAM BACKUP/RESTORE Feature of VSE/VSAM Release 2 provides backup onto tape and restore from tape with high performance and low processor utilization. The VSE/VSAM BACKUP/RESTORE Feature is especially geared to the streaming mode of the 8809 tape drive.

#### Highlights

- Backup onto tape and restore from tape for the following VSAM objects:
  - Key-sequenced data sets (KSDS).
  - Entry-sequenced data sets (ESDS).
  - Relative-record data sets (RRDS).
  - Alternate Indexes (AIX).
  - SAM files in VSAM space in CI format (SAM ESDS).
- BACKUP will allow multiple VSAM objects to be backed up with a single command.

- For backup, the user can specify a generic name that identifies a group of related VSAM objects rather than the individual entry names for each of those objects.
- BACKUP provides the facility to backup all VSAM objects owned by a catalog with one single command.
- VSAM objects can be excluded from a generic backup.
- RESTORE allows multiple VSAM objects to be restored with a single command.
- For RESTORE, the user can specify a generic name that identifies a group of related VSAM objects, which he wants to be restored from a given backup file.
- VSAM objects can be excluded from a generic RESTORE.
- Interspersed, unwanted VSAM objects of a backup file can be skipped.
- VSAM objects can be restored to volumes different from the ones they have been backed up from as long as the device type remains the same.
- VSAM objects can be restored to different locations than they originally occupied on a volume.
- Volumes of the backup file can be selectively and randomly mounted during restoration in order to avoid unnecessary mounting of unused volumes.
- The size and the number of buffers for reading and writing determine the performance of the BACKUP/RESTORE function. The user can specify the size of the buffers in the BACKUP command and the number of buffers in both the BACKUP and the RESTORE command. In addition, he can request via Job Control whether or not the buffers should be fixed.
- The number of parameters to be specified on the BACKUP and RESTORE commands have been considerably reduced compared to the EXPORT/IMPORT commands. All but one of the remaining parameters (entry-name/\*) are optional.

#### CUSTOMER RESPONSIBILITIES

It is the responsibility of the customer to provide sufficient real and virtual storage to execute VSE/VSAM and the VSE/VSAM BACKUP/RESTORE Feature. Storage requirements are detailed in the *VSE/VSAM Programmer's Reference (SC24-5145)*.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

VSE/VSAM BACKUP/RESTORE will run on any IBM hardware configuration supported by VSE/VSAM Release 2 with the exception of tape-less systems. In particular, the IBM 8809 tape drive will be supported in both start-stop mode and streaming mode.

#### SOFTWARE REQUIREMENTS

VSE/VSAM BACKUP/RESTORE is a feature of VSE/VSAM Release 2 and operates with VSE/Advanced Functions Release 2 and DOS/VSE.

#### COMPATIBILITY

The tape format produced by BACKUP and required by RESTORE is different from the format of the portable files produced by the Access Method Services EXPORT/EXPORTA commands of VSE/VSAM as well as OS/VSAM. As a consequence, portable files created by an EXPORT command cannot be processed by RESTORE nor can backup files created by BACKUP be processed by IMPORT. In other words, the RESTORE command is the only correct counterpart to the BACKUP command.

VSAM files created by VSE/VSAM can be backed up and restored without restrictions. VSAM files created by OS/VS or by DOS/VS VSAM releases prior to VSE/VSAM Release 1 cannot always be backed up and restored because of the new physical record size support available with VSE/VSAM Release 1.

#### PERFORMANCE

The VSE/VSAM BACKUP/RESTORE feature of VSE/VSAM Release 2 is designed to support the streaming mode of the 8809 tape drive. Streaming of the 8809 will occur within each data set extent (i.e., within each primary or secondary allocation) under the following conditions:

- 4331 processor
- 3310 DASD
- 8809 long gap, high speed
- Single batch
- 2 buffers (3 buffers for KSDS (NOIMBED))
- Buffer size 8K

The processor utilization for BACKUP/RESTORE in the case described above will not exceed 30%.



PROGRAM PRODUCTS

**VSE/VSAM R2 (cont'd)**

**DOCUMENTATION:** (available from Mechanicsburg)

VSE/VSAM Licensed Program	
Design Objectives	GC24-5141
VSE/VSAM Licensed Program Specifications	GC24-5142
VSE/VSAM General Information	GC24-5143

**TERMS AND CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**VSE/VSAM RELEASE 2 BACKUP/RESTORE FEATURE  
5746-AM2**

**PURPOSE**

VSE/VSAM Backup/Restore Feature Release 2 offers enhancements to the support provided in the initial release. Files and their related catalog information, including empty objects, may be restored to a different device type. Additionally, the 3375 Direct Access Storage is supported for all operations.

**HIGHLIGHTS**

- Backup with DASD device-independent information.
- RESTORE to a device type different from that used for BACKUP.
- Modification at restoration.
- VSE/VSAM empty object support.
- Support for the 3375 Direct Access Storage.

**CUSTOMER RESPONSIBILITIES**

It is the responsibility of the customer to provide sufficient real and virtual storage to execute VSE/VSAM and the VSE/VSAM Backup/Restore feature. Storage requirements are detailed in *Using the VSE/VSAM Backup/Restore Feature*, SC24-5216.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

VSE/VSAM Backup/Restore will run on any hardware configuration specified by IBM as supported by VSE/VSAM Release 2 with the exception of tapeless systems.

**SOFTWARE REQUIREMENTS**

VSE/VSAM Backup/Restore is a feature of VSE/VSAM Release 2 and operates with DOS/VSE and VSE/Advanced Functions Release 2 or 3. Prerequisites for the 3375 support in VSE/VSAM Backup/Restore Feature Release 2 is the 3375 support in VSE/VSAM and VSE/Advanced Functions.

**COMPATIBILITY**

BACKUP produces the tape format required by RESTORE. This tape format is not compatible with the format produced by the Access Method Services EXPORT/EXPORTA commands of VSE/VSAM and OS/VSAM.

Files backed up under VSE/VSAM Backup/Restore Feature Release 1 can be restored by VSE/VSAM Backup/Restore Feature Release 2. Backup files created under Backup/Restore Release 2 can, as long as they do not contain empty objects, be restored by Backup/Restore Release 1. For details on compatibility with the previous release and compatibility with OS/VSAM, refer to *Using the VSE/VSAM Backup/Restore Feature*, SC24-5216.

**PERFORMANCE CONSIDERATIONS**

The enhancements to Backup/Restore will not adversely affect performance of current functions on a file basis.

A backup or restore may take longer if the catalog is used to manage a significant number of empty objects.

Restoration to a different device type will require additional processing, so that the program's ability to maintain streaming on the 8809 Tape Unit is affected. Using this function of Backup/Restore Release 2, a performance degradation can be expected compared to Backup/Restore Release 1. The actual degradation will depend on device geometry, control area size, and the number of CI splits and record deletions that have occurred in the file.

**DOCUMENTATION:** (available from Mechanicsburg)

*Licensed Program Specifications* (GC24-5190).

**RPQs ACCEPTED:** No

**TERMS AND CONDITIONS:** See PP Index

## PROGRAM PRODUCTS

**VSE/VSAM RELEASE 3  
5746-AM2****PURPOSE**

VSE/VSAM Release 3 provides significant enhancements designed to improve catalog reliability and integrity while providing additional serviceability and usability.

**HIGHLIGHTS**

- Restructuring of catalog define processing to define exposure if an interruption occurs

VSE/VSAM also reinitializes a broken free chain (list of available catalog records) and processes it. Formerly a broken free chain could cause a damaged catalog, requiring problem diagnosis and catalog repair.

- Enhanced VERIFY processing and support of Share Option 4

Enhancements have been made to VERIFY processing to reset all catalog fields that may have changed, including support for Share Option 4 files.

- Automatic invocation of VERIFY by OPEN

When a file is opened, OPEN determines whether the file was previously opened for output and not closed. If this is the case, OPEN calls VERIFY to check catalog records and update them when necessary. Formerly it was your responsibility to diagnose the error, issue the VERIFY command, and rerun the job. *Note:* Automatic verification does not occur for ESDSs being opened for CI access, for non CI-format SAM ESDSs, or for files that were interrupted during initial loading in SPEED mode.

- Catalog integrity checks added to VERIFY

You are now assured that correct catalog information exists for any file you open that was not closed on a previous open for output.

- DELETE enhancements allow removal of an incompletely defined file from the catalog

The new IGNOREERROR parameter for the DELETE command permits the deletion of incomplete catalog information, which could have resulted from a system catalog failure during DEFINE or DELETE processing. Previously, it was not permitted to define or delete a file if partial catalog information existed for it.

- A new Catalog Check Service Aid is available to validity check the catalog

This new service aid is invoked:

- By VSAM OPEN (after the automatic VERIFY described above) to validity check individual files.
- By DELETE IGNOREERROR processing which validity checks the entire catalog.

You can also invoke this service directly to verify the entire catalog structure.

By early identification of possible catalog errors, this service aid helps to prevent the propagation of such errors into other catalog records. Error messages identify a variety of catalog errors and assist in recovery.

If you invoke this service aid directly, the new PARM support lets you specify on the EXEC statement that the name and password of the catalog to be checked. Catalog job control statements and an operator response are not required.

- Multiple catalogs can own space on the same non-recoverable DASD volume

Multiple catalogs can now own space on the same DASD volume, as long as only one recoverable catalog owns space on that volume and only one catalog resides on that volume.

- VSE/VSAM components will invoke the system IDUMP facility when specific logical errors are encountered

VSE/VSAM will invoke the system IDUMP when specific internal logic errors are encountered and pass back information for diagnostic use.

- Access Method Services PARM command function is supported through the PARM parameter on the EXEC job control statement
- Ability to syntax check Access Method Services commands without executing the commands or modifying data

The SYNCHK keyword used in the PARM parameter of the EXEC job control statement permits you to verify the syntax of Access Method Services commands without actually executing them or modifying any data. Syntax checking permits faster identification of syntax errors and protects data from being modified by commands that execute improperly. You can check command syntax without having any VSE/VSAM catalogs or files mounted.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for specifying the VSE/Advanced Functions supervisor generation macros parameters that are appropriate for VSE/VSAM. The user must provide sufficient real and virtual storage to execute VSE/VSAM. These requirements are detailed in the *VSE/VSAM Programmer's Reference* (SC24-5145).

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VSE/VSAM Release 3 is designed to operate on any IBM system supported by DOS/VSE and VSE/Advanced Functions Release 3.

The count-key-data direct access storage devices supported by VSE/VSAM are the IBM 2314 Direct Access Storage Facility, 2319 Disk Storage, 3330 Disk Storage mdls 1, 2 and 11, 3340 Disk Storage, 3344 Direct Access Storage, 3350 Direct Access Storage and the 3375 Direct Access Storage mdls A1 and B1.

In addition, VSE/VSAM supports the fixed blocked mode IBM 3310 and 3370 Direct Access Storage Devices.

The IBM 8809 tape drive is supported in addition to the IBM 2400 and 3400 series tape drives.

**SOFTWARE REQUIREMENTS**

VSE/VSAM Release 3 is designed to operate with DOS/VSE and VSE/Advanced Functions Release 3. For 3375 support, VSE/VSAM requires the VSE/Advanced Functions Release 3 functional PTF for 3375 or equivalent.

**COMPATIBILITY**

Files, catalogs, Access Method Services jobstreams and VSE/VSAM user programs created under prior releases of VSE/VSAM can be used under VSE/VSAM Release 3. Files, catalogs, Access Method Services jobstreams, and VSE/VSAM user programs created under VSE/VSAM Release 3 and not containing or utilizing new external functions can be processed on previous releases of VSE/VSAM. Access Method Services commands written for VSE should be compatible with OS/VSAM as long as no VSE-specific functions are used. Additional information on compatibility items is contained in the *VSE/VSAM General Information Manual* (GC24-5143).

The VSE/VSAM Space Management for SAM feature and the VSE/VSAM Backup/Restore Feature Release 2 are supported for use with VSE/VSAM Release 3.

**PERFORMANCE CONSIDERATIONS**

VSE/VSAM provides various options to optimize performance and storage requirements. These options are specified through Access Method Services commands. Some of the options that affect performance are the control interval size, I/O buffer space, distributed free space, preformatting control areas, various index options, and key ranges.

VSE/VSAM keeps statistical information about a file in its catalog record which can help in deciding when to take action to improve performance.

The overall performance of Release 3 compared to VSE/VSAM Release 2 will not change significantly except in areas where implicit validity checks are taken to ensure catalog integrity.

**DOCUMENTATION**

(available from Mechanicsburg)

*VSE/VSAM Licensed Program Specifications* (GC24-5190) ...  
*VSE/VSAM General Information* (GC24-5143).

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**VSE/IBM SYSTEM/3-3340 DATA IMPORT  
RELEASE 1 (5746-AM3)**

**PURPOSE**

The VSE/IBM S/3 - 3340 Data Import to DOS/VSE is a utility program that assists the user in converting S/3 3348 files into DOS/VSE SAM or VSE/VSAM files. The VSE/IBM S/3 - 3340 Data Import Release 1 runs as a problem program under control of DOS/VSE with VSE/Advanced Functions and requires a minimum of 256K bytes of storage in a virtual partition. This program requires the 3340/3344 Direct Attachment feature #7851 on an IBM 4331 Processor. The VSE/IBM S/3 - 3340 Data Import Release 1 Program executes on any 4331 Processor supported by DOS/VSE with VSE/Advanced Functions.

**HIGHLIGHTS**

VSE/IBM S/3 - 3340 Data Import Release 1 is designed to convert S/3 files located on the main data area of a 3348 data module into DOS/VSE SAM or VSE/VSAM files.

Multi-Volume and Multi-Version (Generation Data Set) files can be converted. DOS/VSE naming conventions must be applied to Multi-Version files.

One or more files can be converted by one single run of this program.

The following figure illustrates the conversions supported by this program:

S/3 File Type	DOS/VSE File Type
Sequential Direct (Note 2)	SAM, VSE/VSAM ESDS or RRDS (Note 1)
Indexed Ordered or Unordered	VSE/VSAM KSDS (Note 1)
Indexed Unordered	VSE/VSAM ESDS (Note 3)

**Note 1:** Other VSE/VSAM file types possible, if advisable by record format and applications.

**Note 2:** Handled as sequential file.

**Note 3:** To get indexed capability, a secondary index must be built using the BLDINDEX function of VSE/VSAM.

Operating messages are provided for volume mounting. Program messages are supplied to provide a log about the conversions executed as well as error information.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This program requires the IBM 3330/3340 Direct Attachment Feature #7851 on an IBM 4331 Processor. The storage requirement is 256K bytes in a virtual partition size of DOS/VSE.

Output device can be one of the following disks attached to a 4331 Processor:

- 3310, in native mode or emulating a 2314
- 3340

One printer and the operator console are required in addition.

**SOFTWARE REQUIREMENTS**

VSE/IBM S/3 - 3340 Data Import is designed to operate with VSE/Advanced Functions. VSE/VSAM is needed as well, since the output is performed via the VSE/VSAM REPRO function. The user of the VSE/IBM S/3 - 3340 Data Import utility is not concerned with loading and calling of VSE/VSAM. The REPRO function of VSE/VSAM is called automatically by the VSE/IBM System/3 - 3340 Data Import utility via the interface described in *VSE/VSAM: Using VSE/VSAM Commands and Macros (SC24-5144)*.

The input device must be known to DOS/VSE as a 3340 and assigned to SYS004.

**COMPATIBILITY**

Data sets produced by this program are fully compatible with DOS/VSE Sequential Access Method (SAM) and VSE/VSAM data sets. Input files must have been created by IBM S/3 Data Management.

**DOCUMENTATION:** (available from Mechanicsburg)

Licensed Program Design Objectives	GC33-6075
Licensed Program Specifications	GC33-6062



**VSE/FAST COPY DATA SET PROGRAM  
RELEASE 1 (5746-AM4)****PURPOSE**

VSE/Fast Copy Data Set Program Release 1 is an enhanced version of the Fast Copy Disk Utility contained in DOS/VSE providing additional functions and improved performance.

VSE/Fast Copy Data Set Program Release 1 executes in the minimum virtual partition of VSE/Advanced Functions Release 2. The VSE/Fast Copy Data Set Program Release 1 is designed to operate with VSE/Advanced Functions Release 2 and executes on any configuration supported by this operating system.

**HIGHLIGHTS**

- Full Track Read for CKD Devices.

The Fast Copy Disk Utility has been upgraded to use the 'Read Multiple CKD' command for all devices/control units that accept this command. This may increase the performance of the utility significantly when backing up volumes.

- Copy/Restore Files with Relocation.

This function enables the user to copy or restore individual SAM files from disk to disk or restore from tape to disk to the same or different physical location.

- Partial Volume Dump/Copy.

This function enables the user to dump/copy groups of files.

Example: Copy all files of a volume with the exception of file A and file B.

The objective of this feature is a performance improvement of the volume function by avoiding the processing of unimportant files.

- NOREWIND-Option for Dump to Tape.

This function gives the ability to write 'Dump Files' consecutively on a tape. This is a prerequisite for an efficient dumping of several files onto a single tape.

- Multivolume File Copy/Dump/Restore.

With this function a single file (specified via DLBL/EXTENT) which spans several volumes (Multivolume File) may be dumped to one 'File Dump' or may be copied to one or several volumes of the same device type. Accordingly this 'File Dump' may be restored to one or several volumes.

- Selective Restore of Files from a Volume Dump.

The selective restore function allows the user to restore an individual file from a volume dump on tape (or disk).

The following example will clarify the capability of this function.

Assumption:     -   A complete 3350 disk pack containing 50 files has been dumped to tape.  
                  -   During processing file 36 has been destroyed.

Action:           -   When restoring, this function will automatically search for file 36 on tape and restore only this file, thus maintaining the integrity of the other files.

This function is important for a nonremovable DASD-environment.

**Access Methods Support**

- Volume and partial volume support is access method independent.
- Single or multi volume files without relocation support SAM, DAM and ISAM.
- Single file with relocation supports SAM only.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

There are no additional hardware requirements other than those which exist for the host operating system. All DASD and tape devices supported by DOS/VSE are supported by the VSE/Fast Copy Data Set Program.

**SOFTWARE REQUIREMENTS**

The VSE/Fast Copy Data Set Program Release 1 executes in the minimum virtual partition of VSE/Advanced Functions Release 2. Executing the program in REAL-mode will improve the performance. The VSE/Fast Copy Data Set Program Release 1 is designed to operate with VSE/Advanced Functions Release 2.

**COMPATIBILITY**

The VSE/Fast Copy Data Set Program Release 1 can process dump files that were created by the corresponding DOS/VSE utility programs. The user can selectively restore from a volume dump file produced by the Fast Copy Disk Utility contained in DOS/VSE, and relocate SAM files contained in DOS/VSE dump datasets.

The program can process a tape that was produced by the Fast Copy Disk Volume utility from DOS/VS Release 34 or earlier. Such a tape can, however, only be used for the restore volume function.

The standalone support is identical with the DOS/VSE standalone Fast Copy Disk utility; in addition, the standalone Fast Copy Disk can restore a Partial Volume Dump.

**PERFORMANCE CONSIDERATIONS**

The new functions allow a reduction of the backup and restore times. The actual throughput improvement depends on how much from a volume was selected for the backup and how the block size varies. A throughput improvement of up to a factor of 2 can be expected if the blocksize or the number of blocks per track varies from track to track.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual (GC33-6081).*



## PROGRAM PRODUCTS

**VSE/FAST COPY DATA SET PROGRAM  
RELEASE 2 Modification Level 0  
5746-AM4****PURPOSE**

VSE/Fast Copy Version 1, Release 2, Modification Level 0 (V1.2.0) is an enhanced version of the VSE/Fast Copy Data Set Program Version 1.1 providing improved performance.

The enhancement is a new multi-buffering concept developed in order to provide streaming for the 8809 Tape Unit in most instances where alternate blocks are assigned or temporary read errors occur.

VSE/Fast Copy V1.2.0 is designed to operate with:

VSE/Advanced Functions Version 1, Release 3, Modification Level 5, and VSE/SP Version 1, Release 1, Modification Level 0

and executes on any configuration which they support. VSE/Fast Copy V1.2.0 requires a minimum virtual partition size of 148K bytes for FBA disks. The minimum virtual partition size required for CKD devices depends on the CKD device type.

**HIGHLIGHTS**

The new VSE Fast Copy V1.2.0 I/O Buffering Technique is designed to improve the performance of Fast Copy when dumping/restoring FBA disks to/from the 8809, compared to the current VSE Fast Copy Data Set Program Version 1 Release 1 when copying FBA disks with alternate block assignments or with temporary read errors.

VSE/Fast Copy V1.2.0 implements a multi-buffering concept for DUMP and RESTORE functions (no reorganization) to smooth the I/O-caused delays. A variable number of buffers (2 up to 24 - 16K bytes each) will be used depending on the free space available in the partition. A message informs the user of the actual number of buffers used for running the Fast Copy job.

VSE/Fast Copy V1.2.0 will also process tapes written with Release 1 in the double-buffering mode. Tapes for DUMP ALL/VOLUME and RESTORE ALL/VOLUME functions are compatible with the stand-alone version of Fast Copy included in VSE/Advanced Functions 1.3.5.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VSE/Fast Copy Version 1, Release 2, Modification Level 0 will run on any IBM S/370, 303X and 4300 System supported by VSE/Advanced Functions Version 1, Release 3, Modification Level 5, and VSE/SP Version 1, Release 1, Modification Level 0. All DASD and tape devices supported in the DOS/VSE environments are supported by VSE/Fast Copy V1.2.0. There are no additional hardware requirements other than those specified for the above mentioned operating systems.

**SOFTWARE REQUIREMENTS**

VSE/Fast Copy V1.2.0 is designed to operate with either:

VSE/Advanced Functions Version 1, Release 3, Modification Level 5, or VSE/SP Version 1, Release 1, Modification Level 0.

When CKD disks are used, VSE/Fast Copy V1.2.0 operates in the minimum virtual partition of its operating system with two exceptions: The IBM 3350 requires 138K bytes and the IBM 3375 requires 184K bytes.

Working with FBA disks, the program requires for DUMP/RESTORE at least a virtual partition size of 148K bytes (including the minimum number of 2 buffers and GETVIS space). The multi-buffering mode is prompted by granting additional 16K bytes for each additional buffer up to a highest number of 24 buffers (reached at 500K bytes). The number of buffers used in the multi-buffering mode for FBA DUMP/RESTORE is controlled by selection of the partition size. Working with an intermediate data set on disk and executing the copy function will only require 2 buffers.

**COMPATIBILITY**

VSE/Fast Copy V1.2.0 can process tapes which have been created by Release 1 Fast Copy, with the stand-alone version of Fast Copy included in VSE/Advanced Functions Releases 1 to 3, and with the Fast Copy Disk Volume Utility from DOS/VS Release 34 or earlier.

These tapes are only processed in double-buffering mode. Tapes which have been created by Release 2 are also accepted by Release 1. Tapes written with VSE/Fast Copy V1.2.0 using the DUMP ALL or DUMP VOLUME function, can be restored with the VSE/Advanced Functions 1.3.5 Fast Copy Stand-Alone Utility in multi-buffering mode and vice versa.

**PERFORMANCE CONSIDERATIONS**

The VSE Fast Copy Data Set Program Version 1 Release 1 copying FBA disks (with alternate block assignments or with temporary read errors) to or from tape might show reduced performance compared to situations where it works with FBA disks without alternate block assignments or without temporary read errors. The performance degradation becomes apparent in particular if 8809 Tape Units are used. Because I/O time needed for the disk is then extended, the 8809

tape might lose its streaming capability if only two alternate buffers handle the data.

The new VSE Fast Copy V1.2.0 I/O Buffering Technique is designed to improve the performance of Fast Copy when dumping/restoring FBA disks to/from 8809. The performance improvements are quantified below.

- a. VSE Fast Copy V1.2.0 executing on a dedicated 4321 or faster CPU using at least four 16K byte I/O buffers will dump and restore (note 1) FBA disk packs to or from an 8809 at the 8809 streaming data rate (143K bytes-per-second with no media change).

This statement applies to a normal FBA disk drive. In case of high numbers of alternate block assignments or with temporary read errors, 8809 'backhitching' might still occur. Using as many 16K-byte I/O buffers as available might prevent 'backhitching' even in this case.

- b. These statements assume that the I/O buffers are not subject to paging.

**Note 1:** 'Restore' without 'Write Verification' (NOVERIFY).

**DOCUMENTATION**

(available from Mechanicsburg)

*Licensed Program Specifications (GC33-6080) ... Program Summary (GC33-6158).*

**RPQs ACCEPTED: No**

## PROGRAM PRODUCTS

**VSE/3270 BISYNC PASS-THROUGH  
5746-AM5****PURPOSE**

VSE/3270 Bisync Pass-Through allows a 4300, S/370 or 3031 Processor running under DOS/VSE to appear as a remotely-attached BSC 3271 control unit to an S/370, a 303X Processor or another 4300 Processor. 3270-type displays attached to the remote processor may alternately access local CICS/VS applications within it or new or currently existing applications on the remote host processor over a binary synchronous communications link.

**HIGHLIGHTS**

- Interactive host-connect capability to remote host applications or subsystems using ACF/VTAM, ACF/VTAME, ACF/TCAM, VTAM, TCAM, BTAM-ES or BTAM that support a remote BSC 3270-type display in today's environment.
- Terminal sharing between CICS/VS local and remote host applications. No modifications are required to application programs running on the host.
- Supports up to 32 IBM 3270-type displays and/or printers assigned to a simulated control unit of the Bisync Pass-Through Program. Terminals are controlled by CICS/VS and may be directly attached to the IBM 4331 Processor via the Display/Printer Adapter or locally or remotely attached to any supported processor via a local control unit or via BSC or SDIC lines.
- Customer paced migration. IBM 4300 Processors may be installed in a distributed environment with ACF/VTAME or ACF/VTAM Release 2 and host-connect to current host applications that may be under VTAM, TCAM, BTAM or ACF Products without MSNF. For full networking, host applications may then be migrated to ACF products with the Multisystems Networking Feature.

**CUSTOMER RESPONSIBILITIES**

The installation of Bisync Pass-Through will require initial planning by the customer to understand the environment in which Bisync Pass-Through will be installed plus the host access methods and subsystems that require host-connection. The next consideration is the number and type of terminals to use Bisync Pass-Through and whether hardwired addresses are required. At this time the customer may have to order local control units for the remote IBM 4300 Processor.

The customer is also responsible for installing an interface to the supplied user exit in order to audit user access to the Bisync Pass Through Program if required.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Bisync Pass-Through product will run on IBM 4300 Processors, S/370 or IBM 3031 supported by DOS/VSE and which have a minimum of 384K of memory. The Communications Adapter on the IBM 4331 Processor requires one BSC port using the Station Select feature.

IBM 4300 Processors, S/370 and IBM 3031 Processors with an IBM 3705 Communications Controller will also be supported. One port must be able to support a BSC link to the host in EP mode.

**SOFTWARE REQUIREMENTS**

VSE/3270 Bisync Pass-Through operates with:

**Program Name**

DOS/VSE  
VSE/ADVANCED FUNCTION  
CICS/DOS/VS 1.4

**DEVICE SUPPORT**

**Directly Attached Terminals (via IBM 4331 Processor Display/Printer Adapter)**

3278-2  
3262-1, -11  
3287-1, -2  
3289-4

**Locally Attached Control Units**

3272-1, -2  
3274-1A  
3274-1B, 1D

**Remotely Attached BSC Control Units**

3271-1, -2  
3274-1C  
3275-2  
3276-1, -2, -3, -4

**Remotely Attached SDLC Control Units**

(requires ACF/VTAME or ACF/VTAM Release 2)

3274-1C (Nonswitched connection only)  
3276-11, -12, -13, -14

**COMPATIBILITY**

No modifications are required to DOS/VSE, CICS/DOS/VS or any access method either in the host processor or remote 4300 Processor.

**CONVERSION**

The capability will exist to "hardwire" Bisync Pass-Through for 3270 addresses of all connected displays and printers.

If 3277 displays and 32XX printers are being removed from an IBM remote 3271 control unit and attached locally to an IBM 4300 Processor, a local 3272 control unit is required. A single 3271, however, may be directly attached to the 4331 Processor Communications Adapter through the Local Attachment Interface.

When migrating to full networking, a BSC host link using the Bisync Pass Through program may co-exist with an SDLC link using ACF/VTAME or ACF/VTAM Release 2 with MSNF. In order to make this transition easier it is recommended that Bisync Pass-Through be installed initially using ACF/VTAME with the 4331 or 4361 Processor Communications Adapter on ACF/VTAM Release 2 on the 4300 Processors with an 3705 Communications Controller.

**DATA SECURITY**

Bisync Pass-Through provides a path to applications and data. Access to Bisync Pass-Through on the remote system can be controlled by the security features of CICS/VS. Access to host system services will be controlled by the host. This product is supported by DOS/VSE, CICS/DOS/VS and the security, auditability and control procedures that it provides. No logging or journalling of user access is provided by the Pass-Through Program, however an exit will be provided to the customer, and may be used as required as an additional layer of auditability of user access to the Pass-Through Program. User management is responsible for the selection, application, adequacy, and implementation of these features and for appropriate application and administrative controls.

**DOCUMENTATION:**

(available from Mechanicsburg)

*VSE/3270 Bisync Pass-Through General Information Manual ...  
VSE/3270 Bisync Pass-Through Licensed Program Design Objectives.*



PROGRAM PRODUCTS

**DOS/VS COBOL COMPILER AND LIBRARY (5746-CB1)  
DOS/VS COBOL OBJECT LIBRARY (5746-LM4)**

**PURPOSE**

The DOS/VS COBOL Compiler and Library provide a number of improvements in function and performance over previous DOS IBM Full American National Standard COBOL Compilers. The Library is required for execution of compiled programs. The compiler and library operate under control of DOS/VSE, and support American National Standard COBOL, X3.23-1968. †

Release 3 supports American National Standard COBOL, X3.23-1974.

These program products are designed for use in a virtual storage environment under the DOS/VSE Operating System.

**RELEASE 1 HIGHLIGHTS**

- VSAM support - the new high performance access method
- FIPS FLAGGER - an installation management tool which helps enforce conformance to the Federal Information Processing Standard for COBOL as defined by FIPS Pub 21, March 15, 1972.
- MERGE FACILITY - allows the user to combine two or more identically sequenced files according to the ascending/descending order of imbedded key(s) in each record. Use of the Merge facility requires the DOS/VSE Sort/Merge Program Product (5746-SM1). \*
- Support of 5425 Multi-Function Card Unit
- Support of 3886 Optical Character Reader \*\*
- Support of 3340 Disk Storage
- Support of 5203 and 3203 Line Printers
- Support of 3540 Diskette Input/Output Unit
- Syntax-checking feature - a fast source program scan for syntax errors. No object code is generated when unconditional syntax checking is specified.
- Language supported by the previous versions of DOS Full ANSI COBOL is also supported in DOS/VS COBOL.

The following features are also available:

- Support of American National Standard Code for Information Interchange, X3.4-1968, which provides the user with the capability of accepting, creating and sorting American National Standard magnetic tapes \* (the appropriate Sort/Merge program product is required when the Sort/Merge feature is used). †††
- Support of the American National Standard for Magnetic Tape Labels for Information Interchange, X3.27-1969. ††
- A formatted trace of the last user-specified number of procedures executed before an abnormal termination.
- The ability to print the number of the COBOL statement being executed when an abnormal termination occurs.
- Expansion of the condensed listing produced by the CLIST compiler option, and the Data Division map produced by the SYM compiler option, to include global tables, literal pools and register assignments.
- Optional alphabetically-ordered cross-reference listings, with significant performance improvement over the Version 2 (CB482) source-ordered cross-reference. The current cross-reference option which preserves source statement order is still supported, with similar performance improvement.
- A symbolic debug feature, which permits the programmer to debug in a high-level language, without resorting to the bits and control blocks of a DOS dump. Information given includes symbolically formatted dumps of named data areas taken dynamically at desired points in the Procedure Division, and a symbolically formatted dump at abnormal termination of execution. No new COBOL language is required to exercise this feature.
- An optional optimizer can be used to generate more concise object code, thereby decreasing object-time space requirements. (This optimizer cannot be used if any of the debugging options are in effect.)
- Support of the 3211 Printer with a 150-character line.
- Utilization of S/370 hardware.
- Double-buffering of ISAM data sets. \*

**RELEASE 2 HIGHLIGHTS**

- LISTER - a facility for reformatted source listings with expanded, embedded cross-referencing information. Features of this new source listing include: Standard indentation for all DATA division level-numbers to show group structure, and for all IFs, etc., in the PROCEDURE division to facilitate tracing program logic. Alignment of PICTURE and VALUE clauses to highlight OCCURs and REDEFINES. Two-way, embedded cross-references to eliminate indirect

"lookups" (via a separate SXREF listing in a conventional COBOL compiler), "Reference-letters" to show type of reference, indicate overall usage of a program item, and reduce the need to look up each reference. Footnotes on PROCEDURE pages to show the definition of referenced data items, eliminating more "lookups". Two-column PROCEDURE division pages to compact the listing and further reduce FDs and PROCEDURE division SECTIONs reference to each other. Optional reformatted and renumbered source decks for manual use or for updating the BASIS library.

- VERB PROFILES - a facility which eases identification of verbs used in the source program, and of finding where the verbs are located. This facility is composed of two options: A verb summary feature and a verb cross-reference feature. Both the verb cross-reference and summary features use the format of the XREF and SXREF listings.
- EXECUTION STATISTICS - a facility which is both a debugging and an optimization aid. It consists of a summary of how often each COBOL source program verb is executed; all statistics are for an individual program execution and are printed at program termination. This is useful for knowing which sections of a program are heavily used and should be evaluated for efficient coding; it is of further use in monitoring whether all portions of a program have been executed during a debugging run.
- SORT-OPTION clause - gives the programmer greater control over the operation of the Sort/Merge program. In the Sort-file description entry, the SORT-OPTION clause specifies a working storage area which at object time will contain an OPTION control statement for the Sort/Merge program (5746-SM2).
- IBM FIXED BLOCK DISK DEVICES - The fixed block disk devices are supported at compile and execute time for all functions where DASD devices are supported by SAM and VSAM.
- Support of 3330-11 ††††
- Support of 3350 ††††

**RELEASE 3 HIGHLIGHTS**

- VSAM support through Standard COBOL I/O language for:
  - Alternate Indexes
  - Relative Record Data Sets
 in addition to previously supported Sequential and Indexed VSAM files.
- New enhanced file processing capabilities (through SAM and VSAM).
  - Relative and Alternate Keys, with passwords
  - FILE STATUS for Sequential files
- 1974 Standard COBOL language support, in addition to retaining previously supported 1968 Standard language.
- LANTLR compiler option to allow language interpretation based on either the 1968 or 1974 Standard, for those language elements whose syntax is identical but whose semantics have been changed.

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\* Not available under CMS at object time.  
 \*\* Not available under VM/SP at object time.  
 † Formerly known as USA Standard COBOL, compatible with, and identical to, the international standard of the language: ISO 1989-1972 Programming Language COBOL.  
 †† ANSI X3.27-1969 is technically identical to ISO 1001, Magnetic Tape Labeling and File Structure for Information Interchange, which is also supported.  
 ††† ASCII is the US Version of the International Organization for Standardization (ISO) 646, 6- and 7-Bit Coded Character Set for Information Interchange. ISO 646 allocates several codes to National Use to provide room in derived National Standard for those alphabetic characters in excess of 26 which are used in some countries. Since the translation performed by DOS between EBCDIC and ASCII character accommodates the US choices for the nationally used positions, the translation is not entirely matched to National Code Standard in countries other than the US. Country Standards Authorities should be consulted about necessary translation adjustments which may be required before DOS support of National Code Standard is offered in those countries.  
 †††† DOS/VS Release 34 or above is required.  
 Not available for ISAM files.  
 If the compiler is used under DOS/VSE with VSE/Advanced Function or subsequent releases of these products, then support is available for fixed block disk devices using SAM or VSE/VSAM.

**DOS/VS COBOL Compiler/Library (cont'd)**

- Support for Federal Information Processing Standard (FIPS) PUB 21-1 at the Low-Intermediate level.
- Enhancement to the Federal Information Processing Standard (FIPS) flagger to allow statement flagging based on either the 1975 FIPS PUB 21-1 (1974 ANS Standard) or the 1972 FIPS PUB 21 (1968 ANS Standard) specifications, according to the language option selected.
- New object program debugging capabilities (USE FOR DEBUGGING).
- Alternate collating sequence support.
- Expanded COPY library facilities.
- Extended data manipulation and arithmetic capabilities.
- Compilation return code passed from the compiler on exit.
- Support for 3375 disk devices is provided by the DOS/VSE operating system; the COBOL user may specify 3330, etc., in the COBOL ASSIGN statement and use 3375 at execution.
- Provision for accessing the DOS/VSE SORT/MERGE program (5746-SM2) directly from object code under both DOS/VSE and the VM/SP release of CMS/DOS.

**INDUSTRY STANDARDS**

The DOS/VS COBOL Release 3 Compiler and Library is designed according to the specifications of the following industry standards, as understood and interpreted by IBM as of May, 1980:

- American National Standard (ANS) COBOL, X3.23-1974. ANS COBOL is identical to ISO 1989-1978, approved in February 1978 by the International Organization for Standardization. The following ANS functional modules are included in DOS/VS COBOL:
  - 2 NUC 1,2 (Nucleus)
  - 2 TBL 1,2 (Table Handling)
  - 2 SEQ 1,2 (Sequential I-O except that the OPTIONAL phrase of the SELECT clause is treated as documentation, the REVERSED phrase of the OPEN verb does not cause file positioning, and the EXTEND phrase of the OPEN verb is not supported).
  - 2 REL 0,2 (Relative I-O)
  - 2 INX 0,2 (Indexed I-O) except that if records are READ using an alternate key, then updated using REWRITE, a subsequent READ or START using the alternate key may not reflect the update unless the file is closed and reopened prior to the READ or START.
  - 2 SRT 0,2 (Sort/Merge)
  - 2 SEG 0,2 (Segmentation)
  - 2 LIB 0,2 (Library) except for the multiple library facility.
  - 1 DEB 0,2 (Debug)
  - 1 IPC 0,2 (Inter-Program Communication)
  - 0 RPW 0,2 (Report Writer)
  - 0 COM 0,2 (Communication)
- The 1975 Federal Information Processing Standard (FIPS) PUB 21-1, Low-Intermediate level.
- American National Standard (ANS) COBOL X3.23-1968, which is identical to ISO 1989-1972. All processing modules are supported.
- The 1972 Federal Information Processing Standard (FIPS) PUB 21, High level.
- American National Standard Code for Information Interchange (ASCII) X3.4-1977, which is identical to ISO 646.
- American National Standard for Magnetic Tape Labels for Information Interchange, X3.27-1978, which is technically identical to ISO 1001.2.

**CUSTOMER RESPONSIBILITIES**

To install DOS/VS COBOL, the user:

- Chooses the default system parameters COBOL will use.
- Chooses the default compiler options for use during problem program compilation.
- Defines DOS/VS COBOL libraries to the DOS/VSE system.
- Sets up and executes MSHP (for DOS/VSE) for compiler and library.
- Uses the sample program provided to test for successful installation.

**SPECIFIED OPERATING ENVIRONMENT**

DOS/VS COBOL Release 2 is supported under DOS/VS (Release 29 and later) and under the CMS/DOS component of VM/370. It uses DOS VSAM as primary access method. Release 3 is supported under DOS/VSE Advanced Functions Release 3, and under the CMS/DOS component of VM/SP. It uses VSE/VSAM as primary access method. After September 30, 1982 (one year after the availability of Release 3), DOS/VS COBOL Release 2 will no longer be supported.

**HARDWARE REQUIREMENTS**

DOS/VS COBOL Release 3 is designed to operate on all IBM processors supported by DOS/VSE Advanced Functions Release 3.

**Requirements:** The DOS/VS COBOL Compiler Release 3.0 requires at least 128K bytes of virtual storage exclusive of the storage required by the operating system control program. It is possible that some programs will compile with less virtual storage than the 128K design point of the Compiler but performance will be degraded.

Additional virtual storage can be used to reduce compilation time by reducing the use of auxiliary storage normally used by the compiler.

The IBM machine must include the decimal instruction set. If floating point data is used, the machine must also include the floating point instruction set. The timer feature is required if the time taken for compilation or the time of compilation are to be recorded. Direct access storage space is required for Compiler residence; approximately 700 blocks of 1,024 bytes, regardless of the device type.

Four data sets, SYS001 through SYS004, are required for compilation. An additional data set, SYSLNK, is required for the CATAL or LINK options. SYS005 is required if the Symbolic Debugging feature is used. SYS006 is required if the FIPS flagger is used.

**Execution:** The storage requirements of the object program are a function of the COBOL language facilities used in the source program. The decimal instruction set is required, and if floating point data is to be used, the floating point instruction set is required. The timer feature is required if use is made of the TIME built-in function.

The object program can utilize the following IBM input/output devices if they are supported by the release of the DOS/VSE system used. Note that this list is complete for Advanced Functions Release 3. For later Advanced Functions releases, see the appropriate Advanced Functions documentation.

**Using SAM Support**

- Magnetic Tape Units: 2400, 3410, 3411, 3420, 8809
- Card Units: 1442, 2501, 2540, 2560, 3504, 3505, 3525, 5424, 5425
- Optical Mark Reader: 3881
- Optical Character Reader: 3886
- Diskette Unit: 3540
- Printers: 1403, 1443, 3203, 3211, 3262, 4245, 5203
- Direct Access Storage: Fixed block devices, 3375

**Using SAM and DAM**

- Direct Access Storage: 2311, 2314, 2319, 3330-1, 3333-11, 3340, 3344, 3350

**Using ISAM Support**

- Direct Access Storage: 2311, 2314, 3330-1, 3340, 3344, 3350 in compatibility mode

**Using VSAM Support**

- Direct Access Storage: 2314, 3330-1, 3330-11, 3340, 3344, 3350, fixed block devices, 3375

**SOFTWARE REQUIREMENTS**

The Compiler is designed to operate under DOS/VSE Advanced Functions Release 3, and subsequent releases unless otherwise stated in a revision of the specifications. DOS/VSE can operate as an independent system, or under control of VM/SP. DOS/VS COBOL Release 3 also operates under the CMS/DOS component of VM/SP. VSE/VSAM is the primary access method.

**Requirements:** SAM is used directly by the Compiler. The DOS/VSE system that supports a specific device is required for the Compiler to use that device. The timer system generation option is required if the time taken for compilation or the time of compilation are to be recorded.

**Execution:** For further processing, object modules produced by the DOS/VS COBOL Compiler require the DOS/VS COBOL Subroutine Library. If dynamically fetched subroutines are required during problem program execution, the Subroutine Library must be installed on the object machine. It may be necessary, therefore, to order 5746-LM4 separately. Otherwise, the object time subroutines can be link-edited on the source machine.

Object programs must be executed under DOS/VSE Advanced Functions Release 3 or the CMS/DOS component of VM/SP. All

## PROGRAM PRODUCTS

**DOS/VS COBOL Compiler/Library (cont'd)**

object programs require SAM modules in the generated operating system.

If VSAM files are used, the Program Product VSE/VSAM Release 2, 5746-AM2, is required.

If the SORT or MERGE verbs are used, the Program Product DOS/VSE Sort/Merge Version 2, 5746-SM2, is required.

Object programs may also be executed as application programs in the CICS environment using CICS DOS/VS, 5746-XX3. Programs compiled with DOS/VS COBOL Release 3 will execute on any releases of CICS/VS on which programs compiled with Release 2.6 will execute.

Object programs may be executed under CMS/DOS, with the restrictions noted below.

**Compilation and Execution under CMS/DOS:** A minimum of 128K virtual storage is required in order to operate the Compiler under CMS/DOS, in addition to the storage needed by VM, CMS and CMS/DOS.

When executing a COBOL program under CMS/DOS, the same processor features are required as are necessary when executing under DOS/VSE. Under CMS/DOS, the DOS/VS COBOL Compiler Release 3.0 supports those I/O devices which are supported under DOS/VSE provided they are supported by VM/SP.

**CMS Restrictions:** Under CMS/DOS, the Compiler can accept and compile any COBOL source program that it can accept and compile under the control of DOS/VSE. The object code generated by the DOS/VS COBOL Compiler under CMS/DOS can be executed without restriction under the control of DOS/VSE. The object code generated under CMS/DOS can also be executed under CMS/DOS, with object time restrictions in the following areas:

- ISAM
- User label handling
- ASCII encoded tapes
- Spanned record processing
- Checkpoint/Restart
- Segmentation with LANGLVL(1)
- Positioning options of OPEN (EXTEND) and CLOSE
- Multi-volume data sets
- Use of SYSPARM for setting execution-time options AIXBLD and NODEBUG
- Use of VSAM alternate indexes (COBOL Alternate Record Key clause)

For more detailed information about the above restrictions under CMS/DOS, refer to *IBM CMS User's Guide for COBOL* (SC28-6469).

**COMPATIBILITY**

Programs coded for the IBM DOS Full American National Standard COBOL and DOS Subset American National Standard COBOL Compiler will compile on DOS/VS COBOL without modification.

Source programs written for the COBOL D Compiler must be converted before compiling them on the DOS/VS COBOL Compiler. The Language Conversion Program described in the publication *Conversion Aids: COBOL-to-American National Standard COBOL Language Conversion Program* (GC28-6400), facilitates such conversion.

Data set compatibility exists between DOS/VS COBOL and the other IBM DOS COBOL Compilers: Previous versions of the Full American National Standard COBOL Compiler, the Subset American National Standard COBOL Compiler, and the COBOL D Compiler. That is, data sets created by a program compiled on one of these compilers can be processed by a program compiled on DOS/VS COBOL.

The DOS/VS COBOL Library (5746-LM4) will operate with DOS Full American National Standard COBOL, Version 3 (5736-CB2), DOS Full American National Standard COBOL, Version 2 (360N-CB-482), and DOS Subset American National Standard COBOL (5736-CB1) compiled programs. Thus, a user having these programs need not recompile when going to the DOS/VS COBOL program product.

Object modules from the above mentioned compilers may be linked together in a program when operating under the DOS/VS Operating System.

**BASIC MATERIAL**

DOS/VS COBOL (5746-CB1) compiled and link-edited programs all require the presence of the DOS/VS COBOL Library at execution time. Note that a separate library may not be needed. The library packaged with the compiler can be used if the programs are executing on the same processor as the one on which they are compiled; otherwise, there must be a separate library (5746-LM4) for each processor on which the programs are executing.

The DOS/VS COBOL Library (5746-LM4) will operate with DOS Full American National Standard COBOL Version 3 (5736-CB2), DOS Full American National Standard COBOL Version 2 (360N-CB-482) and DOS Subset American National Standard COBOL (5736-CB1) compiled

programs. Thus, a user having these programs need not recompile when going to the DOS/VS COBOL program product.

However, if the following unique subset library routines are needed, either those modules must be brought over from a subset library, or the source programs must be recompiled:

ILBDFMBO to compare 2 operands - one or both of which is variable in length or is more than 256 bytes long.

ILBDFMCO to move when one or both operands is variable in length or is more than 256 bytes long.

ILBDIRMO to DISPLAY on SYSPUNCH.

ILBDNEFO to convert an abnormally signed item to a normally signed item.

ILBDRASO to DISPLAY multi-lines on SYSLST or CONSOLE, and to EXHIBIT, TRACE, DISPLAY.

ILBDROZO to DISPLAY on SYSLST or CONSOLE and to handle displays for READY TRACE.

ILBDSEGO to use the segmentation feature.

Object modules from the above mentioned compilers may be linked together in a program when operating under the DOS/VSE Operating System.

**DOCUMENTATION**  
(available from Mechanicsburg)

*DOS/VS COBOL Program Product Specifications* (GC28-6476) ... *VS COBOL for DOS/VSE* (GC26-3998).

## PROGRAM PRODUCTS

**VSE/3890 DOCUMENT PROCESSOR SUPPORT  
5746-DC1****PURPOSE**

The 3890 VSE Support (5746-DC1) is used to read and stacker-select banking documents using the 3890 Document Processor. This support operates under VSE/Advanced Functions Release 2, SSX/VSE Release 3 and later releases. Device-dependent macros called stacker control instructions (SCIs) are provided with the support. These instructions are used to code an SCI program that controls stacker selection when loaded into the 3890.

This Support enables the user to:

- Define a 128-byte initialization record for the 3890 which includes:
  - Fields to be processed and their attributes.
  - Kill or rehandle pockets.
  - Count limit for which the merge function is used.
  - 3890 features to be active during a run.
- Load the 3890 control unit with initialization data and/or modify its contents.
- Start and stop document feeding during a run.
- Retrieve document data from the 3890.
- Image process documents: Reduces the number of rejects encountered during subsequent passes of the same document.
- Parallel Processing for multiple 3890s.

**HIGHLIGHTS**

The VSE/3890 Program Product supports:

- Stacker control program generation.
- Open and close processing.
- Reading documents.
- Image processing.
- Device control.
- Error handling.

**CUSTOMER RESPONSIBILITIES**

The VSE/3890 Support provides an interface between application code, VSE/Advanced Function Release 2 (which contains function necessary to operate this program product) and the IBM 3890.

The user must:

- Describe the 3890 data set(s) and any other data sets used for the run.
- Define the initialization record and assemble the SCI program.
- Open the data set(s).
- Load the 3890 Control Unit User Storage.
- Read a record from the 3890 and then process the record.
- Stop and start the 3890 as required.
- Close the data set(s) after all records of the data set have been processed.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The following IBM models and features are supported:

Models -	A1 through A6 B1 through B6
Features -	Item Number Endorse Microfilm

The IBM 3890 Document Processor is supported on the following Processors:

- IBM S/370 mdl 115 (with RPQ SU0057)
- IBM S/370 mdl 125 (with RPQ SU0057)
- IBM S/370 mdl 135
- IBM S/370 mdl 135-3
- IBM S/370 mdl 138
- IBM S/370 mdl 145
- IBM S/370 mdl 145-3
- IBM S/370 mdl 148
- IBM S/370 mdl 155-11

- IBM S/370 mdl 158
- IBM 3031 Processor
- IBM 4331 Processor
- IBM 4341 Processor

Attachment is via the byte-or-block-multiplexer channel.

A tape drive (1600/6250 bpi) is required to install this program product.

**SOFTWARE REQUIREMENTS**

This program product operates in conjunction with VSE/Advanced Functions Release 2, SSX/VSE Release 3 and subsequent releases.

The source code is distributed in assembler language as part of the basic material.

**COMPATIBILITY**

This program product will allow the 3890 VSE user to utilize the enhanced 4300 system as well as provide the following advantages over the current support which is the DOS/VS Application Installation Support FDP (#5798-BDC).

- Additional SCI Macros.
- Multiple Sorter Support Enhancements.
- Additional IREC Parameters.
- Additional SETDEV Function.

Users of the FDP can utilize these advantages by installing this program product. The changes and improvements that have been made will require the user to make minor modifications to his application program as well as the stacker select program. The extent of the changes required will depend on the user's specific implementation.

**DOCUMENTATION**

(available from Mechanicsburg)

*VSE/3890 Document Processor Support General Information Manual (GC31-0001 ... VSE/3890 Document Processor Support Licensed Program Specifications (GC31-0003) ... VSE/3890 Document Processor Support Users Reference Manual (SC31-0002).*

PROGRAM PRODUCTS

**ELECTRONIC PAYMENT SYSTEMS SUPPORT/  
CHECK PROCESSING DOS/VS(DOSCHECK)  
(5746-F12)**

**DESCRIPTION**

The Electronic Payment Systems Support/Check Processing DOS/VS (DOSCHECK) program product provides the DOS/VS user with a comprehensive check-processing system designed to exploit the advanced functional capabilities of the IBM 3890 Document Processor.

DOSCHECK is a performance-oriented system that operates in a wide range of IBM S/370 configurations (mdl 115 and above) in either dedicated or multiprogramming environments. Because DOSCHECK is designed explicitly for operation in a virtual storage environment and requires no prerequisite programming, the minimum-size processor required depends on user volumes rather than on program requirements.

DOSCHECK is designed to operate in two types of environments; in standalone bank installations and in remote check processing installations, such as commercial bank regional proof centers or Federal Reserve regional check processing centers. Both types of environments may operate as multibank facilities.

DOSCHECK operates as an independent system, controlling check sorting and associated listings without requiring any link to another computer. Captured check data is stored on disk for subsequent use as input to customer-written DDA and other applications. In a dedicated environment, these subsequent applications may be run in the same processor. In a remote environment, the check data may be written on tape or may be transmitted, using a customer-written program, to a central processor using the DOS/VS Remote Job Entry Workstation Program (5799-WHX).

The system may often be run without on-site systems programming personnel and often without a full-time console operator. The system may be run largely by the sorter operators, with a minimum of operating system interactions. In the case of remote installations, most program maintenance should be performed at the central site. A bank with several remote sites would want to keep the programs at each site identical to minimize maintenance, even though the remote sites may differ greatly in size.

**HIGHLIGHTS**

**System Operation:** The system is run largely by the reader/sorter operators using IBM 3277 Display Stations to control run setup. The operators use the terminal to specify the sort type and bank code prior to starting the sorter. While a sort is in progress, the terminal can also be used for jam or restart displays.

Initiation of a sorter run triggers automatic production of balancing reports and kill listings for the run. Printing of the listings can be overlapped with completion of the sorting run. An entry master list is produced as a byproduct of prime-pass runs. This list is a three-up detailed list of the input showing the deposit, batch, and block-balancing status of the run. The subsequent-pass master list, produced after all subsequent-pass runs, shows subsequent-pass items with the item numbers that were assigned on prime pass. Pass-to-pass differences and missing or free items are also highlighted. Each sorter run also causes automatic production of kill listings. The kill lists are seven-up and contain detail item amounts and incoming sequence numbers. Printing of all listings is on a deferred basis, taking place whenever a printer is available. The order of listings is determined by the order in which sorting is performed. Listing speed is not limited by sorter speed.

**Document Preparation and Control:** Data Preparation for DOSCHECK involves insertion of only those MICR inscribed control documents used to reconcile prime pass input dollar controls. Deposit slips and other credits may either precede or follow the items they control. Batches are the next highest level of control for proof-of-deposit work and the basic control level for inclearing work. MICR-inscribed batch tickets precede the batch items and contain the batch control total. Groups of batches from a common source form a block, which is preceded by a block slip. Block slips are the highest level of input dollar control. No further document preparation is necessary because the DOSCHECK cut-slip design avoids the need for divider slips, tracer slips or batch separators in the document input stream. Cut slips are automatically inserted from the 3890 merge feed whenever they are required to close out a kill or a rehandle pocket. This provides for rehandle control groups of more uniform size.

**Data Sets:** The all-items file contains images of all documents as they were read through the reader/sorters. This disk file is created by the MICR task using a chained sequential technique. Record allocation is in a sequential wrap-around fashion allowing retention of as many images as can be stored on the file. All detail lists are printed from this file. Subsequent-pass records are updated by the subsequent-pass master list program to include the incoming item sequence number. A tape copy of the all-items file is used for reconstruction of the file in case of disk hardware failure.

The cut-slip file is used both to index the all-items file and to store control totals. It is a direct-access file, based upon the unique serial numbers inscribed on the cut slips. The cut-slip file is updated to

indicate the time the bundle is rehandled as well as the time it is listed. Bundle-total information is included on the file for use in both pass-to-pass balancing and end-of-cycle accounting.

The endpoint master file contains information about the endpoints to which checks are sent. The records include indicative information for kill lists and information about options that pertain to the endpoint. The endpoint master file is not altered after it is loaded.

The print-queue file is used to store start requests for printing. The records are used by the writer subtasks to determine the order of listings to be produced.

**CUSTOMER RESPONSIBILITIES**

Users of the DOSCHECK program are responsible for performing tasks necessary to tailor it to the desired operational environment. Some of these tasks are:

- Tailor the parameters specified in the system-generation-options copybook to the actual configurations to be used.
- Generate the DOS/VS operating system as specified in the *DOS/VS System Generation Manual* and the *DOSCHECK Program Reference and Operations Manual*.
- Prepare specifications used as input to the sort-table generator.
- Write 3890 stacker control instruction SCI programming as desired to perform special editing for on-us documents.
- Prepare data cards to be used as input for the batch program supplied to build the endpoint master name-and-address file.
- Allocate and initialize the all-items and print-request-queue, and sort pattern files using the IBM utility CLRDK or equivalent.
- Allocate the cut-slip and writer work files.
- Interface the output files to the existing DDA posting and/or general ledger programs.
- Write programs to transmit DOSCHECK output data to a central location by using the DOS/VS Remote Job Entry Workstation Program (5794-WHX).
- Prepare or order uniquely numbered cut slip documents.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum system configuration for this program is an IBM S/370 mdl 115 that can support a virtual partition of 200K and a real partition of 64K.

In addition to those devices used by DOS/VS, DOSCHECK requires the following:

Adequate DASD storage is required to contain the data files, work files and libraries used to install, maintain and operate the DOSCHECK system.

Two magnetic tape units are required for program installation and maintenance. A single tape unit is required for program execution.

A card reader is required for program installation and maintenance and, optionally, for program startup.

A 132 print position line printer is required for installation and execution of this program. The program supports from one to three dedicated printers, or, if operating under POWER/VS, it can share printers with jobs in other partitions.

The DOSCHECK program requires one local 3277 Display Station mdl 2 per 3890 Document Processor and can support up to six additional 3277 displays mdl 2 for reject reentry.

The DOSCHECK program requires a 3890 Document Processor (EC Level 143263 or later).

The DOSCHECK program uses the operator console for displaying messages and for entering print requests.

**Note:** Give consideration to the data rates of the devices used as they can have an impact on system throughput. In addition, if the computer is used for batch processing concurrently with check processing, examine the data rates of shared devices, such as channels and printers, to avoid system slowdowns. The "Factors Affecting Throughput" section of the *General Information Manual* should be consulted for additional considerations.

**SOFTWARE REQUIREMENTS**

DOSCHECK is written to operate under DOS/VS Release 33 and subsequent releases. The program is written in Assembler language and is distributed in source form. The following is a list of the programs used by DOSCHECK:



PROGRAM PRODUCTS

**DOSCHECK (cont'd)**

Disk Operating System/Virtual Storage (DOS/VS)

Sequential Access Method (SAM)

Direct Access Method (DAM)

Basic Teleprocessing Access Method (BTAM)

DOS/VS Assembler

DOS/VS Linkage Editor

DOS/VS System Utilities

DOSCHECK operates in a virtual storage partition of DOS/VS. The programs operate in a subtasking environment and make use of DOS/VS facilities across a wide range of configurations. Rather than employing a rigid planned overlay structure, the DOSCHECK package is link-edited as a single phase. Portions of the program are paged into real storage by DOS/VS as they are needed. The total amount of real storage allocated to the DOSCHECK partition can be used as a performance tuning factor. For certain portions of the system with critical performance requirements (such as sorter attachment), the programs perform explicit page fixing and Channel Command Word (CCW) translation to avoid performance degradation.

The MICR subtask controls up to four 3890s and their associated 3277s. Internal dispatcher logic is used to allow asynchronous operation of the sorters. The MICR task controls the initial writing of check data on the all-items file and on the cut-slip file. After a sufficient volume of checks has been sorted, the MICR task also puts a print request in the print queue file to start the appropriate listing (prime or subsequent-pass entry lists).

A separate subtask is attached for each printer. This writer subtask is reenterable and contains program code common to all listing programs. The common code includes special chained CCW routines used to optimize printer performance by printing an entire page at a time.

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual (GH20-1939) ... Program Reference and Operations Manual*

**TERMS and CONDITIONS:** See PP Index

**5746-F52 - INTERACTIVE FINANCIAL SYSTEM 1 - DOS/VS  
POSTINGS AND GENERAL LEDGER  
IFS 1 RELEASE 1 Modification Level 4****PURPOSE**

The Interactive Financial System 1 is part of the Interactive Financial System (IFS). The Interactive Financial System is a set of application programs designed to perform accounting and related functions. The set consists of IFS 1, IFS 2, IFS 3 and IFS 4. IFS 1 allows posting either in interactive mode using 3277, 3278 or 3279 Display Stations or in batch mode. Any account and any voucher can be displayed and, if necessary, processed randomly at the terminal.

**DESCRIPTION**

This release introduces the following:

- The object code is provided in addition to the source code. Four options have been preselected in the object code:
  - The decimal character for monetary values is a period, and the character separating thousand values is a comma.
  - Printed text, text that appears on the screen, and messages are in English.
  - The data base management system is DL/I DOS/VS.
  - The daily work file is VSAM-organized.
- IFS programs can be customized to run with various I/O devices without the need to recompile programs.
- The format used to specify mailing addresses has been changed to allow extended addresses to be specified.
- Both IBM data base systems DL/I DOS/VS and DL/I-Entry DOS/VS are supported.
- Fixed Blocked Method (FBM) devices are now supported.

**SPECIAL SALES INFORMATION****Primary Potential Industries:**

- Manufacturing
- Process
- Distribution
- Health

**Other Potential Industries:**

- Transportation
- Insurance
- Media
- Finance

IFS may be run in parallel with other applications. In addition, IFS is well suited as a stand-alone application on a 4331.

**HIGHLIGHTS**

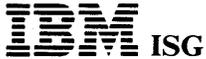
- IFS 1 provides the accounting data base organization and management functions for the four program products IFS 1 through IFS 4. Accounting data necessary for IFS 1-4 is stored in the following DL/I data bases:
  - The parameter data base contains general information on the installed IFS, for example, the accountant identifications, authorizations of accountants and terminals, table of clients, posting keys and payment conditions.
  - The accounts data base includes the impersonal and personal accounts per client and the related posting entries of the actual posting periods. Included are segments for historical and budget data and user-defined structuring of accounts for the balance sheet, profit and loss reports, or financial status reports (for use by IFS 2).
  - The match code data base is a secondary index data base for retrieval of accounts using match codes as search arguments.
  - The document data base is a secondary index data base allowing for retrieval of posting entries using voucher numbers as search arguments.
  - The combined data base includes key reference information useful for the secondary account coding function and for recording additional data about postings.
- A temporary non-DL/I file is used as intermediate storage for the posting material (Daily Work File).
- System restart facilities and data base recovery functions are available for IFS 1 through IFS 4.
- Accounting functions for up to 99 separately maintained clients (separately balanced subsidiaries or branches of a company) are possible.
- The main accounting functions that the user may request are:
  - Posting in interactive or batch mode.

– Display, creation and changing of account master data.

- Entering, verifying and posting in one operation, either directly at a display terminal, thereby saving the time consuming and costly manual transfer to intermediate recording media, or in machine-readable form. After entry in batch mode, this posting material is available for display and modification in interactive mode at a display terminal.
  - Posting Interactively: Postings are entered and processed in groups (a sequence of related postings for which control totaling has to be performed). IFS 1 provides posting masks on the screen (corresponding to the conventional processing cycle) to handle these groups.
  - Posting in Foreign Currencies: Postings in foreign currencies are done by entering the values in foreign-currency and/or in local-currency notation in specified foreign-currency accounts. These values are always stored in both local and foreign currency. If an amount is entered only in foreign-currency notation, a stored or entered currency exchange rate is used to calculate the corresponding local-currency amount.
  - Posting of Unverified Invoice Receipts: Received purchase invoices can be recorded before verification to achieve, for example, tracking of unverified invoices, payment with optimum conditions, or early deduction of pretax. Unverified invoices are processed by common IFS posting facilities, using specific accounts (suspense accounts). These postings are displayed and reported separately.
  - Standard Journal Entries/Forward Postings: Postings with explicit posting dates can be entered beforehand. Once entered, such postings are repeatedly posted at the specified dates (standard journal entries) or only once (forward postings).
  - Match Code Function: The accountant can search for the account number of a debtor or creditor by means of match codes he defines himself.
  - Posting Group and Account Display: Before a short-period summary is produced, the user can display on the screen a list of posting groups as entered, or all posting groups of an account for a certain period.
  - Accounting Summaries: During short period summary (normally performed daily), IFS 1 provides various reports, such as a list of all postings entered (Journal) and a posting group list.

During a monthly summary, IFS 1 prepares a trial balance and a final account report.

In the annual summary, all the accounts of a client, as well as the supplementary postings of the preceding accounting year are printed.
  - Data Integrity Precautions: These precautions help prevent unauthorized access to stored information. Before using the online facilities, each accountant must enter his name, authorization code and client number so that the system can determine what processing he is allowed to do for the given client, and which operation he is permitted to perform, for instance, display, maintain or post certain accounts or open new accounts.
  - Creation of the general journal and the general ledger for each client.
  - Provisions are made for the adaptation of messages, commands, and screen text according to national requirements.
  - Testing and training can be carried out in parallel to normal operations by simply reserving one client for these purposes.
- CUSTOMER RESPONSIBILITIES**
- The program products IFS 1-4 constitute an application package affecting several departments within a company.
- The organizational prerequisites should be planned and considered early. The departments affected should be made familiar with the arrangements necessary in the financial accounting area.
- Before IFS 1 can be installed and executed, the user must provide for:
- The definition of the company's account structure.
  - The identification of all necessary accounting data by keys, codes or abbreviations.
  - The definition of match codes to facilitate postings of debtors and creditors even if the account numbers are unknown (optional).
  - The specification of control information about the different accounting procedures, for example, arrears procedure, sales tax procedure and discount posting procedure.
  - The provision of account data in the required format.
  - The initial loading of the collected account data into the data bases.



## PROGRAM PRODUCTS

## IFS 1 R1.4 (cont'd)

- The adaptation of messages, commands, screen text, report headings and currency amounts to national requirements, if required.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM machines: IBM S/370 mdl 115 to 158, IBM 3031, IBM 4331 and IBM 4341. It uses, in online processing, 30K bytes of real storage in addition to the storage required for the operating system, CICS/DOS/VSE, DL/I-Entry DOS/VSE or DL/I DOS/VSE. For batch processing, approximately 130K bytes of real storage are required.

The minimum machine requirements for IFS 1 are:

- One IBM direct access storage device such as an IBM 2314, 3330, 3350, 3310 or 3370, or equivalent. To install IFS 1 and to execute the provided samples, approximately 90,000 adjacent FBM blocks, or the equivalent of 160 cylinders of an IBM 3330 disk pack are required.
- One IBM 2540 card reader, or any other device supported by the operating system to process SYSIN data.
- One IBM 4245 printer mdl 1, or an equivalent device supported by the operating system, with at least 132 print positions.
- One IBM tape unit, such as IBM 2400 or 3400 or equivalent.
- One IBM 3277 display station mdl 2 or equivalent with data entry keyboard.

**SOFTWARE REQUIREMENTS**

IFS 1 is written in PL/I and Assembler language and is supplied in the form of relocatable modules and source code. It operates under DOS/VSE Release 34, and under DOS/VSE, program number 5745-020 Release 1.0 or subsequent releases (with VSE/Advanced Functions, program number 5746-XE8 Release 1.0 or subsequent releases) and VSE/VSAM, program number 5746-AM2 Release 1.0 or subsequent releases, unless otherwise specified.

To recompile IFS 1, the DOS PL/I Optimizing Compiler, program number 5736-PL1 and the DOS/VSE Assembler are required.

To link-edit and execute IFS 1, the DOS PL/I Resident Library, program number 5736-LM4, the DOS PL/I Transient Library, program number 5736-LM5, and the DOS/VSE Sort/Merge Version 2, program number 5746-SM2, are required. IFS 1 uses the data management and access methods VSAM and SAM, with the exception of the Daily Work File which uses DAM or VSAM. The VSAM organization of this file supports FBM devices.

The online communication facility CICS/DOS/VSE Version 1, program number 5746-XX3, Release 4 or a subsequent release (unless otherwise indicated) is required.

For data base management, DL/I Entry DOS/VSE Version 2.0, program number 5746-XX7 or DL/I DOS/VSE Version 1, program number 5746-XX1, Release 4 or a subsequent release is required unless otherwise stated.

**PERFORMANCE CONSIDERATIONS**

The performance of the system may be influenced, in online and in batch mode, by VSAM specifications such as the buffer space, the control interval size and the record size. When the data base is distributed over more than one disk drive or when the index data base resides on a separate disk drive or when additional disk storage is allocated, this may result in an increase of performance.

Processing of open items in accounts that have a large number of open items may increase the online response time.

**DOCUMENTATION**

(available from Mechanicsburg)

*IFS 1-4 General Information Manual (GH12-5120) ... IFS 1-4 Program Messages (SH12-5525) ... IFS 1-4 Application User's Guide (SH12-5327) ... IFS 1 Licensed Program Specifications (GH12-5229) ... IFS 1 Program Reference Manual (SH12-5425) ... IFS 1 Operations Guide (SH12-5519).*

RQs ACCEPTED: No

**5746-F53 - INTERACTIVE FINANCIAL SYSTEM 2  
PROFIT & LOSS, BALANCE SHEET,  
FINANCIAL STATUS REPORTS  
IFS 2 RELEASE 1.3****PURPOSE**

The Interactive Financial System 2 is part of the Interactive Financial System (IFS). The Interactive Financial System is a set of application programs designed to perform accounting and related functions. The set consists of IFS 1, IFS 2, IFS 3 and IFS 4. IFS 1 Release 1 Modification Level 4 is a prerequisite to IFS 2. With IFS 2, the user can define the profit and loss statement, balance sheet and financial status report to his individual requirements.

**DESCRIPTION**

This release introduces the following:

- The object code is provided in addition to the source code. Four options have been preselected in the object code:
  - The decimal character for monetary values is a period, and the character separating thousand values is a comma.
  - Printed text and messages are in English.
  - The data base management system is DL/I DOS/VS.
  - The daily work file is VSAM-organized.
- IFS programs can be customized to run with various I/O devices without the need to recompile programs.
- The format used to specify mailing addresses has been changed to allow extended addresses to be specified.
- Both IBM data base systems DL/I DOS/VS and DL/I-Entry DOS/VS are supported.
- Fixed Blocked Method (FBM) devices are now supported.

**SPECIAL SALES INFORMATION****Primary Potential Industries:**

- Manufacturing
- Process
- Distribution
- Health

**Other Potential Industries:**

- Transportation
- Insurance
- Media
- Finance

IFS may be run in parallel with other applications. In addition IFS is well suited as a stand-alone application on a 4331.

**HIGHLIGHTS**

IFS 2 is designed to:

- Prepare and print profit and loss statements.
- Prepare and print balance sheets for different posting periods, according to a format specified by the user.
- Prepare and print financial status reports in various formats.
- Print a summary of the status of user-selected accounts and account groups, differentiating between the various posting periods.
- Report the balance brought forward, the debit and credit turnover of the corresponding report period, the accumulated annual sales (debit and credit), and the current balance.
- Provisions are made for the adaptation of messages, report headings, and currency amounts according to national requirements.

**CUSTOMER RESPONSIBILITIES**

Before installing and executing IFS 2, the program product IFS 1, program number 5746-F52, which includes the IFS data base management must be installed.

In connection with the installation of IFS 1, the appropriate organizational prerequisites are to be resolved by the user.

The adaptation of messages, report headings and currency amounts to national requirements must be performed if applicable.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM processors: IBM S/370 mdl 115 to 158, IBM 3031, IBM 4331 and IBM 4341. It uses approximately 130K bytes of real storage.

The minimum machine requirements for IFS 2 are:

- One IBM direct access storage device such as an IBM 2314, 3330, 3350, 3310 or 3370, or equivalent. To install IFS 2 and to execute

the provided samples, approximately 90,000 adjacent FBM blocks, or the equivalent of 160 cylinders of an IBM 3330 disk pack are required.

- One IBM 2540 card reader, or any other device supported by the operating system to process SYSIN data.
- One IBM 4245 printer mdl 1, or an equivalent device supported by the operating system, with at least 132 print positions.
- One IBM tape unit, such as IBM 2400 or 3400 or equivalent.

**SOFTWARE REQUIREMENTS**

IFS 2 is written in PL/I and is supplied in the form of relocatable modules and source code. It operates under DOS/VS Release 34 and under DOS/VSE, program number 5745-020 Release 1.0 or subsequent releases (with VSE/Advanced Functions, program number 5746-XE8 Release 1.0 or subsequent releases) and VSE/VSAM, program number 5746-AM2 Release 1.0 or subsequent releases, unless otherwise specified.

To recompile IFS 2, the DOS PL/I Optimizing Compiler is required.

To link-edit and execute IFS 2, the DOS PL/I Resident Library, program number 5736-LM4, the DOS PL/I Transient Library, program number 5736-LM5, and the DOS/VS Sort/Merge Version 2, program number 5746-SM2, are required. IFS 2 uses the data management and access methods VSAM and SAM with the exception of the Daily Work File which uses DAM or VSAM. The VSAM organization of this file supports fixed block architecture (FBM) devices.

For data base management, DL/I Entry DOS/VS Version 2.0, program number 5746-XX7, or DL/I DOS/VS Version 1, program number 5746-XX1, Release 4 or a subsequent release is required unless otherwise stated.

**PERFORMANCE CONSIDERATIONS**

The performance of the system may be influenced by VSAM specifications such as the buffer space, the control interval size, and the record size. When the data base is distributed over more than one disk drive or when the index data base resides on a separate disk drive or when additional disk storage is allocated, this may result in an increase of performance.

**DOCUMENTATION**

(available from Mechanicsburg)

*IFS 1-4 General Information Manual (GH12-5120) ... IFS 1-4 Program Messages (SH12-5525) ... IFS 1-4 Application User's Guide (SH12-5327) ... IFS 2 Licensed Program Specifications (GH12-5230) ... IFS 2 Program Reference and Operations Manual (SH12-5323)*

RPOs ACCEPTED: No



**5746-F54 - INTERACTIVE FINANCIAL SYSTEM 3  
OPEN ITEM ACCOUNTING  
IFS 3 RELEASE 1 Modification Level 3**

**DESCRIPTION**

The Interactive Financial System 3 is part of the Interactive Financial System (IFS). The Interactive Financial System is a set of application programs designed to perform accounting and related functions. The set consists of IFS 1, IFS 2, IFS 3 and IFS 4. IFS 1 Release 2 Modification Level 0 is a prerequisite to IFS 3. IFS 3 extends the account management functions provided by IFS 1 by the open item accounting procedure for debtor, creditor and impersonal accounts.

**DESCRIPTION**

This release introduces the following:

- The object code is provided in addition to the source code. Four options have been preselected in the object code:
  - The decimal character for monetary values is a period, and the character separating thousand values is a comma.
  - Printed text, text that appears on the screen, and messages are in English.
  - The data base management system is DL/I DOS/V.S.
  - The daily work file is VSAM-organized.
- IFS programs can be customized to run with various I/O devices without the need to recompile programs.
- The format used to specify mailing addresses has been changed to allow extended addresses to be specified.
- Both IBM data base systems DL/I DOS/V.S. and DL/I-Entry DOS/V.S. are supported.
- Fixed Blocked Method (FBM) devices are now supported.

**SPECIAL SALES INFORMATION**

Primary Potential Industries:

- Manufacturing
- Process
- Distribution
- Health

Other Potential Industries:

- Transportation
- Insurance
- Media
- Finance

IFS may be run in parallel with other applications. In addition, IFS is well suited as a stand-alone application on a 4331.

**HIGHLIGHTS of IFS 3**

- The user may select a display either of all open items, the overdue items, the matched items (that is, items with identical item match numbers), the settled items, or of all stored items of an account. This includes the request for account statements of open item accounts.
- Some information may be changed in an open-item account, such as:
  - Payment conditions
  - Item match numbers
  - Arrears letter level, arrears letter exclusion
  - Affirmation or negation of automatic matching
  - Textual Information
  - Verification department for purchase invoices

With the exception of the update of payment conditions and textual information, this information may be changed in one operation for the entire account.

- Payments may be matched to open items. Various calculation methods are available for posting payments and maintaining accounts.
- Open items are allocated to payments and the allocated items are marked as 'settled'. At the same time, the related postings (as a result of the allocation) are established. The sales tax is automatically corrected for the postings involving revenue reductions, and optionally, the cash discount posting is performed.
- Payments in foreign currency can be matched manually against open items in foreign currency. A possible currency exchange difference caused by different exchange rates, is automatically calculated and posted to specific accounts (Foreign-currency-exchange profit-and-loss accounts).
- At certain dates determined by the user, all the debtors' accounts, or a specified number of them, are scanned for overdue items to print arrears letters. The accounts excluded from arrears proce-

dures or debtor accounts not treated as open-item accounts are ignored.

- An account statement is printed for the due debits and can also be furnished for open items that are not yet due.
- The number of arrears letters written for each customer is recorded in the account data base as a basis for judgment on a customer's payment behavior.
- At the end of an arrears letter procedure, an address list of all debtors who have reached the highest arrears level is printed for the legal department.
- A list of matched open items can be written for all open-item accounts.
- A list of unverified invoices, sorted by verification department and client number, can be printed on request.
- Provisions are made for the adaptation of messages, commands, screen texts, report headings and currency amounts, according to national requirements.

**CUSTOMER RESPONSIBILITIES**

Before installing and executing IFS 3, the program product IFS 1, program number 5746-F52, which includes the IFS data management, must be installed.

In connection with the installation of IFS 1, the appropriate organizational prerequisites must be resolved by the user.

The adaptation of messages, commands, screen texts and report headings to comply with national requirements must be performed, if required.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM processors: IBM S/370 mdl 115 to 158, IBM 3031, IBM 4331 and IBM 4341. It uses, in online processing, 30K bytes of real storage in addition to the storage required for the operating system, CICS/DOS/V.S., DL/I Entry DOS/V.S. or DL/I DOS/V.S. For batch processing, approximately 130K bytes of real storage are required.

The minimum machine requirements for IFS 3 are:

- One IBM direct access storage device such as an IBM 2314, 3330, 3350, 3310 or 3370, or equivalent. To install IFS 3 and to execute the provided samples, approximately 90,000 adjacent FBM blocks, or the equivalent of 160 cylinders of an IBM 3330 disk pack are required.
- One IBM 2540 Card Reader, or any other device supported by the operating system to process SYSIN data.
- One IBM 4245 Printer mdl 1, or an equivalent device supported by the operating system, with at least 132 print positions.
- One IBM Tape Unit, such as IBM 2400 or 3400 or equivalent.
- One IBM 3277 Display Station mdl 2 or equivalent with data entry keyboard.

**SOFTWARE REQUIREMENTS**

IFS 3 is written in PL/I and Assembler language and is supplied in the form of relocatable modules and source code. It operates under DOS/V.S. Release 34 and under DOS/V.S.E, program number 5745-020 Release 1.0 or subsequent releases (with V.S.E/Advanced Functions, program number 5746-XE8 Release 1.0 or subsequent releases) and V.S.E/VSAM, program number 5746-AM2 Release 1.0 or subsequent releases, unless otherwise specified.

To recompile IFS 3, the DOS PL/I Optimizing Compiler, program number 5736-PL1, and the DOS/V.S. Assembler are required.

To link-edit and execute IFS 3, the DOS PL/I Resident Library, program number 5736-LM4, the DOS PL/I Transient Library, program number 5736-LM5 and the DOS/V.S. Sort/Merge Version 2, program number 5746-SM2, are required. IFS 3 uses the data management and access methods VSAM and SAM with the exception of the Daily Work File which uses DAM or VSAM. The VSAM organization of this file supports FBM devices.

The online communication facility CICS/DOS/V.S. Version 1, program number 5746-XX3, Release 4 or a subsequent release (unless otherwise indicated) is required.

For data base management, DL/I Entry DOS/V.S., program number 5746-XX7, Version 2 or DL/I DOS/V.S. Version 1, program number 5746-XX1, Release 4 or a subsequent release is required unless otherwise stated.



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PP 5746-F54.2

Dec 83

Major Revision

PROGRAM PRODUCTS

### IFS 3 R1.3 - DOS/VS (cont'd)

#### PERFORMANCE CONSIDERATIONS

The performance of the system may be influenced by VSAM specifications such as the buffer space, the control interval size and the record size. When the data base is distributed over more than one disk drive or when the index data base resides on a separate disk drive or when additional real storage is allocated, this may result in an increase in performance.

#### DOCUMENTATION

(available from Mechanicsburg)

*IFS 1-4 General Information Manual (GH12-5120) ... IFS 1-4 Program Messages (SH12-5525) ... IFS 1-4 Application User's Guide (SH12-5327) ... IFS 3 Licensed Program Specifications (GH12-5231) ... IFS 3 Program Reference Manual (SH12-5324).*

RPQs ACCEPTED: No

## PROGRAM PRODUCTS

**5746-F55 - INTERACTIVE FINANCIAL SYSTEM 4  
PAYMENT PROCESSING RELEASE 1.3****PURPOSE**

The Interactive Financial System 4 is part of the Interactive Financial System (IFS). The Interactive Financial System is a set of application programs designed to perform accounting and related functions. The set consists of IFS 1, IFS 2, IFS 3 and IFS 4. IFS 1 Release 2 Modification Level 0 and IFS 3 Release 2 Modification Level 0 are prerequisites to IFS 4. IFS 4 is designed to determine the maturity of open items by user-specified criteria, such as settlement periods and payment strategy, and to prepare and print a payment proposal list of the selected items.

**DESCRIPTION**

The user can change and release the payment proposal at the display terminal. When the user has released the payment proposal, IFS 4 can automatically post the related outpayments and print the payment orders.

This release introduces the following:

- The object code is provided in addition to the source code. Four options have been preselected in the object code:
  - The decimal character for monetary values is a period, and the character separating thousand values is a comma.
  - Printed text, text that appears on the screen, and messages are in English.
  - The data base management system is DL/I DOS/VS.
  - The daily work file is VSAM-organized.
- IFS programs can be customized to run with various I/O devices without the need to recompile programs.
- The format used to specify mailing addresses has been changed to allow extended addresses to be specified.
- Both IBM data base systems DL/I DOS/VS and DL/I-Entry DOS/VS are now supported.
- Fixed Block Method (FBM) devices are now supported.

**SPECIAL SALES INFORMATION**

Primary Potential Industries:

- Manufacturing
- Process
- Distribution
- Health

Other Potential Industries:

- Transportation
- Insurance
- Media
- Finance

**HIGHLIGHTS**

- An automatic account payment procedure can be performed for user-defined accounting periods.
- A payment proposal list is prepared that shows the individual due invoices, the total amount of all due invoices per payment method, and the amounts for credit notes, prepayments, and cash discounts, separated according to the specified terms of payment.
- For due invoices in foreign currencies, the amounts are printed in both local and foreign currency and proposed for manual payment during payment processing. The foreign-currency amounts are summed up and printed as totals per currency.
- Unverified invoices are processed in the payment procedure in accordance with the payment option as specified for the creditor.
- The following alterations are possible using a display terminal before a payment proposal is released for payment processing:
  - A client's payment proposal can be withdrawn
  - Individual open items per creditor can be withdrawn
  - Other terms of payment can be specified
  - Manually-processed items can be inserted
  - Payment information, such as payment-due date or payment methods can be changed
  - Individual items can be removed for manual processing

Using the accepted payment proposal and the specified bank and method of payment, IFS 4 is designed to perform the postings automatically, that is, to creditors and cash accounts, and open items are matched and marked as settled.

- Payment orders, collective lists, and accompanying letters for the banks are printed in a format as required in Germany, but a payment file, containing payment order information, is prepared so that individual payment order forms can be created by user-written print programs.

- Provisions are made for the adaptation of messages, commands, screen texts, report headings, and currency amounts according to national requirements.

**CUSTOMER RESPONSIBILITIES**

Before installing and executing IFS 4, the program product IFS 1, program number 5746-F52, which includes the IFS data base management, must be installed. In addition, IFS 3, program number 5746-F54, must also be installed.

In connection with the installation of IFS 1 and IFS 3, the appropriate organizational prerequisites must be resolved by the user.

The adaptation of messages, commands, screen texts and report headings to comply with national requirements must be performed, if required.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

This licensed program is designed to operate on the following IBM processors: IBM S/370 mdl 115 to 165, IBM 3031, IBM 4331 and IBM 4341. It uses, in online processing, 30K bytes of real storage in addition to the storage required for the operating system, CICS/DOS/VS, DL/I Entry DOS/VS or DL/I DOS/VS. For batch processing, approximately 130K bytes of real storage are required.

The minimum machine requirements for IFS 4 are:

- One IBM direct access storage device such as an IBM 2314, 3330, 3310 or 3370, or equivalent. To install IFS 4 and to execute the provided samples, approximately 90,000 adjacent FBM blocks, or the equivalent of 160 cylinders of an IBM 3330 disk pack are required.
- One IBM 2540 card reader, or any other device supported by the operating system to process SYSIN data.
- One IBM 4245 printer mdl 1, or an equivalent device supported by the operating system, with at least 132 print positions.
- One IBM tape unit, such as IBM 2400 or 3400 or equivalent.
- One IBM 3277 display station mdl 2 or equivalent with data entry keyboard.

**SOFTWARE REQUIREMENTS**

IFS 4 is written in PL/I and Assembler language and is supplied in the form of relocatable modules and source code. It operates under DOS/VS Release 34 and under DOS/VSE, program number 5745-020 Release 1.0 or subsequent releases (with VSE/Advanced Functions, program number 5746-XE8 Release 1.0 or subsequent releases) and VSE/VSAM, program number 5746-AM2, Release 1.0 or subsequent releases, unless otherwise specified.

To recompile IFS 4, the DOS PL/I Optimizing Compiler, program number 5736-PL1 and the DOS/VS Assembler are required.

To link-edit and execute IFS 4, the DOS PL/I Resident Library, program number 5736-LM4, the DOS PL/I Transient Library, program number 5736-LM5, and the DOS/VS Sort/Merge Version 2, program number 5746-SM2, are required. IFS 4 uses the data management and access methods VSAM and SAM, with the exception of the Daily Work File which uses DAM or VSAM. The VSAM organization of this file supports FBM devices.

The online communication facility CICS/DOS/VS Version 1, program number 5746-XX3, Release 4 or a subsequent release (unless otherwise indicated) is required.

For data base management, DL/I Entry DOS/VS, program number 5746-XX7, Version 2.0 or DL/I DOS/VS Version 1, program number 5746-XX1, Release 4 or a subsequent release is required unless otherwise stated.

**PERFORMANCE CONSIDERATIONS**

The performance of the system may be influenced by VSAM specifications such as the buffer space, the control interval size and the record size. When the data base is distributed over more than one disk drive or when the index data base resides on a separate disk drive or when additional real storage is allocated, this may result in an increase in performance.

**DOCUMENTATION**

(available from Mechanicsburg)

*IFS 1-4 General Information Manual (GH12-5120) ... IFS 1-4 Program Messages (SH12-5525) ... IFS 1-4 Application User's Guide (SH12-5327) ... IFS 4 Licensed Program Specifications (GH12-5232) ... IFS 4 Program Reference Manual (SH12-5325).*

RPOs ACCEPTED: No

## PROGRAM PRODUCTS

**COMMERCIAL BANK APPLICATION SYSTEM (CBAS)**

CBAS Base Product ... 5746-F60  
 Demand Deposit Accounting ... 5746-F61  
 Savings Accounting ... 5746-F62  
 Time Certificates of Deposit Accounting ... 5746-F63  
 General Ledger Accounting ... 5746-F64  
 Revolving Credit Accounting ... 5746-F65

**PURPOSE**

Commercial Bank Application System, a set of applications software for commercial banks, complements Customer Information Facility/VSE and uses the DOS/VSE environment to provide financial account processing. CBAS consists of the following program products: Commercial Bank Application System Base Product Support (CBAS Base) (The base programs provide common support for any one or more of the five application products in CBAS, 5746-F60 ... Commercial Bank Application System Demand Deposit Accounting (CBAS DDA), 5746-F61 ... Commercial Bank Application System Savings Accounting (CBAS SAV), 5746-F62 ... Commercial Bank Application System Time Certificates of Deposit (CBAS TCD), 5746-F63 ... Commercial Bank Application System General Ledger Accounting (CBAS GNL), 5746-F64 ... Commercial Bank Application System Revolving Credit Accounting (CBAS RVC), 5746-F65. The Commercial Bank Application System provides a commercial bank with batch application software to support key application areas. Using IBM's Data System products, CICS/DOS/VS, DL/I DOS/VS and CIF/VS, the product will support Demand Deposit Accounting, Savings Accounting, Time Certificates of Deposit Accounting, Revolving Credit Accounting and General Ledger Accounting.

**HIGHLIGHTS**

- Functionally integrated with CIF/VS to provide consistent customer and application data management.
- Standardized forms, codes and data.
- Comprehensive audit trail.
- Automatic transfers.
- Application generated inputs to the General Ledger application.
- Comprehensive reporting.

**HIGHLIGHTS of CBAS BASE:**

- CBAS Base is designed to contain the common code necessary to perform functions for any one or more CBAS application products.

**HIGHLIGHTS of CBAS DDA: (Demand Deposit Accounting)**

CBAS DDA is designed to provide:

- Collected balance analysis.
- Controlled overdraft limit.
- Multiple service charges.
- Multiple statement cycles.
- Optional Stop Payment reporting.
- Free form statement messages.
- Individual account analysis.
- Formatted direct deposit (Social Security Checks) processing.
- Interest bearing DDA (NOW accounts).

**HIGHLIGHTS of CBAS SAV: (Savings Accounting)**

CBAS SAV is designed to provide:

- Support of nine savings plans.
- Daily accrual accounting.
- Multiple interest payment methods.
- Free form statement messages.
- Multiple interest calculations.
- Multiple statement periods.

**HIGHLIGHTS of CBAS TCD: (Time Certificates of Deposit Accounting)**

CBAS TCD is designed to provide:

- Multiple payment methods.
- Multiple payment frequencies.
- Multiple maturities.
- Optional 1099 penalty reporting.

**HIGHLIGHTS of CBAS RVC: (Revolving Credit Accounting)**

CBAS RVC is designed to provide:

- Overdraft banking.
- Automatic loan checks.

- Cycled statements.
- Multiple interest rates.
- Overline reporting.

**HIGHLIGHTS of CBAS GNL: (General Ledger Accounting)**

CBAS GNL is designed to provide:

- Nine levels of reporting.
- Descriptive entries.
- Internal and external interfaces.
- Optional detailed statement reporting.
- Budget analysis.
- Seven year actual budget history.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

These licensed programs are designed to operate on:

Processors: IBM S/370, 3031, and 4300 Processors supported by DOS/VSE that meet the minimum processor storage requirements described below.

For batch or online processing, CBAS requires 100K bytes of real storage and 500K bytes of virtual storage, in addition to the storage required for the VSE operating system, CICS/DOS/VS and DL/I DOS/VS.

The minimum machine requirements for CBAS are:

- One IBM 4331 Mdl J01 Processor (1M).
- Two IBM 3370 mdl A01 or five IBM 3310 (3 mdl A02 and 2 mdl B01) direct access storage devices. To install CBAS and execute the provided samples, approximately 400,000 FBA blocks on the above devices or equivalent storage on IBM 3330, IBM 3340, or IBM 3350 direct access devices are required.
- One IBM 3262 printer or an equivalent device supported by the operating system, with at least 132 print positions.
- Three IBM 8809 tape drives or equivalent supported by the operating system.
- Two IBM 3277, 3278 or 3279 Display Stations mdl 2 or equivalent.

**SOFTWARE REQUIREMENTS**

CBAS is written in COBOL and Assembler language and is supplied in the form of core image phases and source statement books. It operates under the DOS/VSE operating system using an IPO/E environment, with VSE/Advanced Functions Release 2 (5746-XE8) or subsequent releases, and VSE/VSAM Release 2 (5746-AM2) with the VSE/VSAM Space Management for SAM and Backup/Restore features, or subsequent releases, unless otherwise specified.

To compile CBAS, the functions of the COBOL Compiler (5746-CB1) and DOS/VS Assembler are required.

To link-edit and execute CBAS, the COBOL Libraries (5746-LM4), the DOS/VS Sort/Merge Program Version 2 (5746-SM2) or equivalent, the online communication facility CICS/DOS/VS Version 1 Release 5 (5746-XX3), the data base management facility DL/I DOS/VS Version 1 Release 5 (5746-XX1) with the HLP1 Release 2 ICR, the Interactive Computing and Control Facility VSE/ICCF (5746-TS1), the Interactive Productivity Facility (5748-MS1), VSE/IPC Interactive Problem Control System (5746-SA1), VSE/POWER (5746-XE3), and the Customer Information Facility/VS (CIF/VS) Version 1 for DOS/VS (5746-XXS) with support for CBAS (to be available concurrently with CBAS availability), or subsequent releases, are required unless otherwise specified.

**SECURITY, AUDIT and CONTROL**

Extensive control and audit features are included in CBAS applications. Transaction journals and master file change lists are regularly produced. In addition, master file changes are controllable. Special programs are available to supply auditor and regulatory agency required data.

CBAS uses security features provided by the operating system (DOS/VSE), the data communications manager (CICS/DOS/VS), and the data base manager (DL/I DOS/VS). Security features of those products are also available to the user. Required additional security measures may be placed in the application programs. Since the appropriateness of controls may depend upon the environment, user management is responsible for their selection, implementation and adequacy.

**DOCUMENTATION**

(available from Mechanicsburg)

*Commercial Bank Application System General Information Manual*

PROGRAM PRODUCTS

**HEALTH CARE SUPPORT ACCOUNTING SYSTEM  
5746-H14**

**PURPOSE**

The Health Care Support/Accounting System consists of the Health Care Support/Accounting Base Program and the Health Care Support/Accounting Application Program. The Accounting System provides hospital accounting for the single or multiple hospital environment. The Accounting Application Program includes patient billing, accounts receivable, general ledger and inquiry.

**DESCRIPTION**

The Health Care Support/Accounting System is written in ANS COBOL and Assembler. Inquiry is provided through DOS CICS/STANDARD.

The Health Care Support/Accounting Base Program provides the basic facilities of the input edit tables, error reporting routines, utility subprograms, hospital profile and report format control adaptability features to the Health Care Support/Accounting Application Program and to a related medical system in the Health Care Support family, the Laboratory Information System (Program Product 5746-H12).

The design of the Health Care Support/Accounting System allows the individual user, in either a shared or non-shared environment, to tailor processing procedures and report formats to meet his particular requirements. Data security is maintained through input and data set identification. Each hospital is able to inquire into or modify only its own data.

The programs can be used, as released, for data entry and report output at the central computer location, or with the Health Care Support/Data Communications Program (Program Product 5746-H13) for remote batch data entry and output.

The Health Care Support/Accounting Application Program supports the application areas of patient billing, accounts receivable, general ledger and billing and provides inquiry under the Customer Information Control System (CICS). Accounting services are provided for both inpatients and outpatients, and include Medicare and other insurance proration and preparation of billing forms. In addition, in-patient census, cost allocation, revenue and statistics are provided.

This feature coupled with the Accounting Base Program is an enhancement of the Shared Hospital Accounting System (SHAS) Type II (360A-UH-11X). Following are the major enhancements to the SHAS program.

- Programs run under the Disk Operating System/Virtual Storage (DOS/VS).
- Device support has been extended to include System/370 devices.
- Programs have been converted to ANS COBOL from COBOL D.
- The inquiry programs now operate under CICS, thus allowing the foreground partition to process additional programs concurrently.
- To support outpatient functions, the following enhancements have been included: combining the inpatient and outpatient records into a single disk resident file, an alphabetic outpatient directory report and inquiry into outpatient accounts. Also provided is the facility to change an account from preadmit status to inpatient or outpatient, from inpatient to outpatient or from outpatient to inpatient
- In the General Ledger Application, the cost allocation program now accepts statistics and dollar amounts to calculate cost allocation ratios rather than requiring manual calculation of these ratios.

**Features**

**The Accounting Base Program**

- The use of the DOS/VS catalogued procedure library allows execution of job streams from catalogued job control statements.
- The Hospital Profile, a disk file containing each user's individual specifications of processing options.
- The Edit Specifications Table, for standardized editing of patient data.
- Error Reporting routines, to provide consolidated reporting of certain operational errors.
- The utility subprograms, used by application programs for common routines.
- Report Format Control, which allows the tailoring of many report formats to user specifications.

**The Accounting Application Program**

**Patient Billing**

- Creation of patient records for inpatients, outpatients and preadmitted patients.
- Charge posting with central pricing.

- Inpatient census reports prepared in four sequences: Alphabetic, nursing station (with or without patient's daily balance forward), doctor and religion.
- Automatic proration of charges between the patient and up to four insurance plans, including Medicare
- Inquiry under CICS into Inpatient and Outpatient Billing Indexes.
- Preparation of patient and insurance bills.
- Transfer to accounts receivable after final bill.
- Accumulation of revenue and usage data.
- Doctor statistics.

**Accounts Receivable**

- Preparation of statements.
- Recording of cash payments and adjustments.
- Accounts stored either on tape (off-line) or disk (on-line).
- Full status on-line inquiry under CICS if accounts are stored on disk.
- Aged trial balance.
- Selection of accounts by financial class.
- Listing of accounts requiring a final diagnosis.
- Listing of accounts with insurance receivables.
- Listing of accounts which have failed to meet installment payments.
- Bad debt reports.

**General Ledger**

- Ledger Posting.
- Trial Balance.
- Comparative Income and Expense Report.
- Balance Sheet.
- Operating Statement.
- Cost allocation methods suitable for Medicare -- stepdown and double apportionment with automatic calculation of cost allocation ratios.

**USE**

The Accounting System processes input data against patient and account master files. These files are established through procedures supported by the Accounting System programs. Patient admissions and dismissals, charges, payments and accounting transactions are processed for multiple or single hospitals. File update and report jobs are controlled by the central operator through DOS/VS catalogued procedures.

Balance and edit, maintenance and error reporting routines process data for all applications. Update routines in each application maintain and back up tape and disk master files. Report routines can select data for individual hospitals from billing and receivables tape and disk files.

**CUSTOMER RESPONSIBILITIES**

A thorough understanding of DOS/VS and of CICS by customers using inquiry ... knowledge of ANS COBOL and Assembler ... preparing master file data ... center operator training ... establishing proper transition and backup procedures ... selection of options through the Hospital Profile.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum S/370 IBM machine configuration required to compile, execute, and maintain the Health Care Support/Accounting Base Program with the Health Care Support/Accounting Application Program or the Health Care Support/Laboratory Information System without teleprocessing terminals is: IBM 3125 Processing Unit mdl FE (98,304 bytes) with IBM 3333 Disk Storage and Control mdl 1 (2 drives), 1403 Printer/5425 Card Unit Power Prerequisite (4505), Integrated 1403 Attachment (#4662), 3411 Magnetic Tape Adapter (#4675), Integrated 3504 Card Reader Attachment (#4680), Integrated 3525 Card Punch Attachment (#4685) ... 1403 Printer mdl 2 ... IBM 3504 Card Reader mdl A1 ... IBM 3525 Card Punch mdl P1 ... One IBM 3411 Magnetic Tape Unit and Control Unit mdl 1 with an IBM S/370 mdl 125 Attachment (#7361) ... One IBM 3410 Magnetic Tape Unit mdl 1.

For a system with teleprocessing (inquiry only), the minimum S/370 configuration is: An IBM 3125 Processing Unit mdl G (131,072 bytes) with an Integrated Communications Adapter (#4640) with the necessary line groups and adapters for the terminals to be installed. The remainder of the configuration is the same as that for the non-teleprocessing system.



PROGRAM PRODUCTS

**Health Care Support/Accounting (cont'd)**

Supported processors are the IBM 3125, 3135, 3145, 3158 and 3031. For systems with inquiry, mdl G or larger is required.

Supported DASD devices are IBM 2314, 2319, 3333 and 3330. Supported printers are IBM 1403, 3211, and 4245. Supported card readers are IBM 2540, 3504, and 3505. Supported card punches are IBM 2540 and 3525. Supported tape drives are IBM 2400-series, 3410 and 3420.

Models and features are supported that are supported by the Disk Operating System/Virtual Storage (DOS/VS), ANS COBOL and CICS versions being used.

For further information, contact your medical industry marketing representative.

**SOFTWARE REQUIREMENTS**

The Health Care Support/Accounting System operates in virtual mode under the Disk Operating System/Virtual Storage (DOS/VS). Inquiry requires the Customer Information Control System/DOS-Standard (5736-XX7) and has all prerequisites of a CICS application program. Written in Assembler and ANS COBOL, the Accounting System also has the following requirements:

- System Control and Basic IOCS
- Direct Access Method
- Basic Telecommunications Access Method (Inquiry only)
- Assembler
- System Utilities
- Consecutive Tape IOCS
- Consecutive Disk IOCS
- Indexed Sequential File Management System
- Full ANS COBOL V3 Compiler and Library
- Tape and Disk Sort/Merge
- Virtual System Access Method

To support some devices, later versions of some of these programs may be required.

**DOCUMENTATION**  
(available from Mechanicsburg)

Title	Order Number
General Information Manual	GH20-1179
Design Objectives	GH20-4234
Promotional Flyer	G520-2646
Sales Brochure	G520-2648

## PROGRAM PRODUCTS

**DOS FORTRAN IV LIBRARY OPTION 1 (5746-LM3)****PURPOSE**

The DOS FORTRAN IV Library Option 1 is an optional feature of the DOS FORTRAN IV Library that provides the ability to use new S/370 I/O devices with larger block sizes and to create and process magnetic tape files that conform to the American National Standard Code for Information Interchange. Library Option 1 is required for 3330, 3340, 3330 mdl 11, 3350, fixed block devices, 2560 and 5425 object time support. Library Option 1 is required for FORTRAN support of DOS/VSE with VSE Advanced Function Release 2. Support of other card readers, card punches and printers is commensurate with current DOS FORTRAN support for these device classes. Support of fixed block devices does not include object time support of direct access files.

**DESCRIPTION**

The features of the support include:

- 3330/3333 Disk Storage Facility
- 3340 Disk Storage Facility
- 3350 Disk Storage Facility
- 3330 Disk Storage Facility mdl 11
- Fixed Block Disk Device
- 3410 and 3420 Magnetic Tape Subsystems
- 3505 Card Reader and 3525 Card Punch
- 3211 and 4245 Printers
- 2560 Multifunction Card Machine
- 5425 Multifunction Card Unit

EBCDIC tape records can be expanded to a capacity of 32,767 bytes, disk records to track capacity size.

Data interchange with any computer system that supports the ASCII codes.

The ability to vary the blocksize of the records on tape from 18 to 2,048 bytes for ASCII as well as EBCDIC files. Tape capacity and tape processing time are improved by the ability to utilize larger blocksize.

Meets requirements for data interchange as defined by National and Federal Standards.

This is in addition to the existing support provided by DOS FORTRAN IV which includes:

- 3410 and 3420 Magnetic Tape Subsystems
- 3505 Card Reader and 3525 Card Punch
- 3211 and 4245 Printers

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum features required are those of the Disk Operating System and FORTRAN IV. These requirements are as follows:

- One I/O channel (either multiplexer or selector)
- One card reader (IBM 1442, 2501, 2520, 2540, 3505, 2560 or 5425)
- One printer (IBM 1403, 1404, and 1443, 3211 or 4245)
- One printer-keyboard (IBM 1052)
- One IBM 2311 Disk Storage Drive or IBM 2314 DASD or IBM 2319 Disk Storage or IBM 3330/3333 Disk Storage or IBM 3340 Disk Storage
- One 9-track IBM 2400/3400-series magnetic tape drive
- The standard instruction set
- The floating-point feature (#4427)
- FORTRAN compilation requires 40K bytes
- Object time execution of FORTRAN programs with ASCII support require at least 40K bytes in DOS releases prior to Version 5. The feature operates on S/360 if the ASCII support is required.

**SOFTWARE REQUIREMENTS**

In addition to the S/360 Disk Operating System with ASCII support, the following are required to operate DOS FORTRAN IV Library Option 1:

FORTRAN IV Compiler	360N-FO-479
FORTRAN Library	360N-LM-480

The DOS FORTRAN IV Compiler does not require a Library Option 1 to compile using the S/370 I/O devices.

The FORTRAN IV library with Option 1 will operate under the Disk Operating System, Release 27, and under all subsequent releases, versions, and modifications, unless otherwise stated in a future version of this document. The library will operate under DOS Releases 24 through 26 if the ASCII support option alone is desired.

Support of the 2560 Multi-function Card Machine is available with Release 28 and all subsequent releases, versions, and modifications unless otherwise stated in a future version of this document.

Support of the 3340 disk storage facility and the 5425 Multi-function Card Unit is available with Release 29 and all subsequent releases, versions, and modifications unless otherwise stated in a future version of this document.

Support of the 3350 and 3330 mdl 11 disk storage facilities is available with Release 34 and all subsequent releases, versions and modifications unless otherwise stated in a future version of this document.

Support of the fixed block disk storage devices is available with DOS/VSE with VSE/Advanced Functions Release 2 and all subsequent releases, versions and modifications unless otherwise stated in a future version of this document.

**COMPATIBILITY**

The DOS FORTRAN IV Library Option 1 in no way affects existing data sets. Data sets created by Library Option 1 are acceptable as input to any system that offers similar support. An ASCII file is specified by a CALL in the program to the OPSYS routine in the Library. Another compiler may require ASCII to be specified in a different way.

**DOCUMENTATION**

(available from Mechanicsburg)

*FORTRAN IV Language (GC28-6515) ... FORTRAN IV Programmer's Guide (GC28-6397) ... Specifications (GC28-6882).*



**PROGRAM PRODUCTS**
**LIFE INQUIRY/DATA ENTRY  
 5746-N11**
**PURPOSE**

Life Inquiry/Data Entry provides online terminal capability for inquiry into Consolidated Functions Ordinary (CFO) policy master records, policy value quotations, and direct entry of the file maintenance, accounting, and status transactions. Normally these transactions are input to the batch daily cycle programs, CFO II (5736-N13) and '62 CFO (Type II program 1401-IL-02X). Life Inquiry/Data Entry utilizes the 3270 Information Display System and operates under control of CICS/DOS/VS, CICS/OS/VS or IMS/VS.

Life Inquiry/Data Entry provides CFO II and '62 CFO users with a terminal entry facility for all CFO status, file maintenance and accounting transactions. Both CFO systems are sequential file, batch oriented processing systems. Inherent in these systems are 24-hour turnaround of policy information, and other delays associated with transaction preparation. Life Inquiry/Data Entry provides immediate policy and quotation information through 3270 screen displays. Terminal entry of the file maintenance, status, and accounting transactions provides online editing, transaction generation, and transaction warehousing for subsequent input to the CFO daily cycle.

A load/update utility program is provided to create and maintain the DASD (Direct Access Storage Device) policy master file. This program will also convert '62 CFO policy master records to the required CFO II format utilized by Life Inquiry/Data Entry. The DASD file which is created can be either a VSAM (Virtual Storage Access Method) file or a DL/I (Data Language/I) file.

**DESCRIPTION**

Life Inquiry/Data Entry, featuring the 3270 Information Display System, is designed to simplify CFO daily cycle transactions entry. The terminal operator simply enters a CFO transaction code and policy number. Life Inquiry/Data Entry responds with screen displays providing a 'conversation' with the terminal operator. The CFO transaction is then generated by the program and stored on a DASD file for subsequent input to the CFO daily cycle. A utility program is also provided which reformats the stored transactions into a form acceptable as input to the CFO daily cycle through program A00.

The inquiry function includes those status transactions in the batch system of CFO II and '62 CFO requesting policy image and quotation information.

The data entry logic provides transaction processing for all recognized CFO II and '62 CFO external transactions. In addition, two levels of editing are provided for all status transactions and the following high volume file maintenance transactions:

- Change name and address trailer
- Change billing fields
- Change par options
- Change suspend code
- Change state/area and branch/agency
- Add/delete change/notification trailer

In the event of a system failure, the restart facility provided with Life Inquiry/Data Entry will re-position the transaction output file, reconstruct the necessary operator and batch control tables, and allow the operator to identify the last transaction that was accepted.

**HIGHLIGHTS**

Improved policyholder and agent service - policy image and value quotation facilities in this terminal environment provide immediate answers to inquiries. This is in comparison to the turnaround in the CFO batch system.

Fewer rejected transactions in batch system - the editing facilities for the data entry transactions provide transaction correction at the terminal, thus reducing the number of rejections in the batch system and the overhead associated with correction.

Reduced turnaround of transaction entry - many transactions effectively require two daily cycles for entry, the first being an image display of the master record for the required information in the transaction. The need for this first cycle is eliminated because immediate image display and quote information is available via the 3270 Information Display system for entry of the transaction.

Reduced clerical effort in transcribing and keying transactions - since the program has access to the policy master file, much information required for keypunch creation of transactions is automatically generated by the program. The system also provides the user with the ability to have transactions entered at the point of origin - thereby eliminating the need for coding and, subsequently, keypunching the transactions.

Reduced paperwork - fewer hard-copy image and quotation requests are needed because of terminal displays. The overhead associated with internal routing of the batch system's printed output will be reduced due to lower volume.

Alpha Search Inquiry System (Program Number 5736-N14) interface - for CICS/VS, when the policy number is not readily available. Life

Inquiry/Data Entry processing may be initiated by policyholder name through an interface with the Alpha Search Inquiry System.

Utilization of the 3270 Information Display System - dual intensity screen, protected data fields, read modified data only, program tab, and 1920 character screen.

**CUSTOMER RESPONSIBILITIES**

To successfully install Life Inquiry/Data Entry, the user must:

Acquire a thorough knowledge and understanding of the Life Inquiry/Data Entry system, using the *Operations Guide* and *Program Reference Manual* written for the system.

Secure and generate the applicable CICS/DOS/VS, CICS/OS/VS, or IMS/VS system, and be knowledgeable in its operational and functional characteristics.

Be knowledgeable in the characteristics of the applicable operating system environment and in its data management facilities.

Insert values in the customer constants and customer tables supplied with the system.

Prepare parameters for tailoring the batch load/update program to the user's requirements.

Assemble and link the batch load/update program, the inquiry/data entry modules, and the transaction reformat program.

Create the DASD policy master file using the load/update program.

Review user modifications to the CFO daily cycle programs for their impact on the Life Inquiry/Data Entry system.

Develop appropriate procedures to input the data entry transaction file to the CFO daily cycle. This could include modifying program A00 to accept other than card input.

Train terminal operators in the operation of the 3270 Information Display Station.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

The minimum machine requirement is a S/370 processor operating with DOS/VS or OS/VS or with these operating systems operating under VM/370. A virtual partition or region size of at least 64K bytes (excluding access methods) is required for the batch load/update program. The Life Inquiry/Data Entry online modules require a minimum virtual partition or region which has 24K bytes in addition to the CICS/VS requirement or 80K bytes in addition to the IMS/VS requirement. The additional storage is divided as follows:

Description	Bytes	
	CICS/VS	IMS/VS
I/O Areas and Work Areas	2K	2K
Transaction Work Area (CICS) or Scratch pad area (IMS)	2K	8K
Main Application Area	18K	68K
Reserved for Maintenance	1K	1K
Reserved for Customer Modifications	1K	1K
Total	24K	80K

DASD space is required for the policy master file, the program libraries, transaction storage, and the system control program requirements. An 80-column card reader, 132 character/line printer, and two tape units are required for the load/update program.

Also required is the 3270 Information Display System with appropriate control units (local or remote). The display stations must include a 1920 position display screen with an appropriate keyboard (either #4631, #4633, or #4635).

In addition, it is assumed that the minimum configuration for installing and executing CFO II (5736-N13) or '62 CFO (1401-IL-02X) is available.

CICS main storage estimates are explained in the section entitled "Storage Estimates and Considerations" of the *CICS General Information Manual* (GH20-1280). To determine IMS/VS storage estimate, complete the worksheet in the *IMS/VS System/Application Design Guide* (SH20-9025).

DL/I DOS/VS storage requirements are explained in the *DL/I General Information Manual* (GH20-1246).

**SOFTWARE REQUIREMENTS**

This program product runs under either a Disk Operating System (DOS/VS) or Operating System (OS/VS) environment on S/370 with virtual storage capabilities. The programs are written in S/370 Assembler language Communication with CICS/DOS/VS or CICS/OS/VS is via CICS macro instructions. Communication with IMS/VS is via standard calls to IMS.



PROGRAM PRODUCTS

**Life Inquiry/Data Entry (cont'd)**

The batch load/update program operates as a single task within a partition. The Life Inquiry/Data Entry modules operate as single tasks under control of CICS/DOS/VS, CICS/OS/VS, or IMS/VS.

**For CICS/DOS:** In addition to DOS/VS components and options specified for CICS, (see the section entitled "Programming Systems" in the *CICS General Information Manual* (GH20-1280)), the following components are required:

Virtual Storage Access Method (VSAM) or Data Language/I (DL/I) DOS/VS (5746-XX1).

DOS Sort/Merge (5746-SM1) or DOS/VS Sort/Merge (5743-SM1).

**For CICS/OS/VS:** In addition to the OS/VS components and the options specified for CICS (see the *CICS General Information Manual* GH20-1280), or those options specified for IMS (see the *IMS General Information Manual* GH20-1260); the following components are required:

Virtual Storage Access Method (VSAM) or IMS/VS Data Base System (5740-XX2).

OS Sort/Merge (5734-SM1) or OS/VS Sort/Merge (5740-SM1).

**For IMS/VS:** When operating under the control of IMS/VS Life Inquiry/Data Entry requires the full capabilities of IMS/VS DB/DC System (5740-XX2).

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual* (GH20-1499) ... *Sales Flyer* (G520-2846).

## PROGRAM PRODUCTS

**BASIC TELECOMMUNICATIONS ACCESS METHOD  
EXTENDED SUPPORT (BTAM-ES)  
5746-RC5****PURPOSE**

The Basic Telecommunications Access Method Extended Support provides basic support for data communications on DOS/VSE systems.

**HIGHLIGHTS**

BTAM-ES is based on the Basic Telecommunications Access Method (BTAM) component of DOS/VS Release 34. It operates under the control of DOS/VSE and provides the same facilities as BTAM for performing the following operations:

- Initiating and answering calls to and from terminals on switched networks.
- Polling and addressing terminals on nonswitched multipoint lines.
- Changing the status of terminal lists.
- Transmitting and receiving messages.
- Posting completion status of messages.
- Managing buffer pools.
- Translating codes.
- Providing error recovery procedures.
- Providing online terminal test facilities.
- Keeping error statistics.

BTAM-ES supports the communications adapter of the 4331 Processor with Binary Synchronous and/or Start/Stop capability, in addition to the ICAs, 270X and 370X currently supported by BTAM.

BTAM-ES will operate on the DOS/VSE operating system in S/370 Compatibility mode or Extended Control Program Support for Virtual Storage Extended (ECPS:VSE) mode.

BTAM-ES will not operate with DOS/VS Release 34 or prior releases of DOS/VS.

**DESCRIPTION****ADVANTAGES**

The BTAM-ES facilities may be used in all or any of the DOS/VSE system partitions in either real or virtual mode, or may be used to design a dedicated data communications system in a system with a single partition.

Like BTAM, BTAM-ES provides a multiple WAIT macro instruction for use by data communications line operations only. This macro instruction enables the data communications program to release control of the central processing unit until one or more of a series of events has occurred (such as the completion of a BTAM-ES READ or WRITE operation). Thus it provides for the efficient concurrent operation of lower priority programs.

BTAM-ES will provide support for a variety of BSC and start/stop devices as well as for various channel attached devices. The support covers both low and high speed devices. This gives BTAM-ES considerable flexibility and provides for a wide range of applications. (See BTAM-ES Terminal Support Chart 1 for a list of terminals supported).

The user may employ any of the IOCS macro instructions provided by the system in the design of his telecommunications application.

**COMMUNICATION SERVICEABILITY FACILITIES**

Communication Serviceability Facilities are provided on an optional basis by BTAM-ES. The user is strongly advised to include these facilities with BTAM-ES since they increase system availability by providing statistics and diagnostic aids for system repair and preventive maintenance.

The following facilities are provided:

- Error Recovery Procedures are provided on a line basis. The operation in error is retried. If the error persists a descriptive message is output to the system console. Certain nonrecoverable errors result in termination of the job and a storage dump. Diagnostic Write and Read commands (2701 only) are performed to isolate nonrecoverable errors to either the control unit or external source.
- Error Counts are maintained on a line basis and output to the system console if the error rate becomes excessive. The user program can request error statistics from the cumulative counters to be output to the system console.

- Online Terminal Test Procedures operate concurrent with user programs and do not impact user operations apart from the time taken to perform their functions. (When tests use the IBM 2760 the film should be reloaded before continuing the job.) Tests requested from a terminal can be returned to that terminal or to any other terminal on the same system. Normal operation is maintained for unaffected terminals within the system.

**CUSTOMER RESPONSIBILITIES**

To install and use BTAM-ES, the customer must:

- Design the data communications configuration.
- Order and install all required communications equipment.
- Install BTAM-ES and the corequisite BTAM System Control Programming (SCP) modules and macros (Program Number 5747-CG1).

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

BTAM-ES runs in a virtual storage environment on the IBM processors supported by the Disk Operating System Virtual Storage Extension (DOS/VSE) in S/370 Compatibility mode or in Extended Control Program Support for Virtual Storage Extended (ECPS:VSE) mode.

**Communications Facilities:** See BTAM-ES Terminal Support Chart 2.

**Communications Controller Support:** See BTAM-ES Terminal Support Chart 1.

**SOFTWARE REQUIREMENTS**

BTAM-ES is designed to run on DOS/VSE with the VSE/Advanced Functions program product.

Use of BTAM-ES requires the concurrent installation of corequisite BTAM SCP modules and macros (Program Number 5747-CG1) which should only be installed by BTAM-ES users.

**COMPATIBILITY**

The BTAM-ES functions are source compatible with the functions of the BTAM component of DOS/VS Release 34.

As indicated under Migration Considerations, reassembly and link edit of the BTMOD macro is required.

**DATA SECURITY, AUDITABILITY AND CONTROL**

User management is responsible for the implementation of appropriate administrative and application controls to prevent unauthorized access to the system.

**PLANNING AND MIGRATION CONSIDERATIONS**

**Planning Considerations:** In a multiple partition environment, the teleprocessing program will normally operate in a high priority partition that will include the BTAM-ES modules and macros combined with the user's message processing routines.

**Data Communications Considerations:** All data communications devices with the exception of the 2701 SDA-II, the Integrated Communications Adapters of S/370 mdl 135/138, the Communications Adapter of the 4331 Processor, the 2840-2260 (local), the 3270 (local) and the 3704-3705-1/3705-II must be attached to the multiplexer channel, and no burst mode device may co-exist on the channel with data communications devices. Support for the 2701 SDA-II attached to a selector channel is limited to nonswitched (leased or private line connection) networks.

Refer to the appropriate processor or device documentation for specific attachment capabilities.

All start/stop terminals on a multipoint nonswitched line must be of the same type. Different types of terminals may be mixed within the same problem program.

Various BSC terminals and remote processors are supported by BTAM-ES.

Different types of BSC terminals may be mixed on the same multipoint line in a nonswitched network or on the same computer phone number in a switched network. The BSC terminal mix capability is shown in the BTAM-ES Terminal Support Chart 2.

**Migration Considerations:** For BTAM application programs running on DOS/VS Release 34, the BTMOD macro must be reassembled on DOS/VSE to produce the BTAM-ES logic module which must then be link edited with the BTAM application program. Reassembly of the whole BTAM application program is required to obtain the latest maintenance level of the BTAM macros.

In order to take advantage of new capabilities provided by the DOS/VSE system, changes may be required to user application programs now running on DOS/VS Release 34.

PROGRAM PRODUCTS

BTAM-ES (cont'd)

PERFORMANCE and STORAGE CONSIDERATIONS

Response time in a BTAM-ES system is dependent on a variety of processors and data communications load factors, such as:

- Line speeds.
- Number, type and organization of terminals.
- Number and type of macro instructions used.
- Amount of processing performed by the application programs.

For application programs using BTAM-ES, storage requirements depend on the BTAM-ES modules and macros themselves and also on the extent of the following user-specified areas and functions: I/O buffer areas ... terminal lists ... message processing routines ... number of macro instructions issued ... number of lines supported ... number of terminals per line ... line procedure specifications.

The design objective for BTAM-ES is to have no more than a minor increase in storage requirements over BTAM on DOS/V5 Release 34.

DOCUMENTATION  
(available from Mechanicsburg)

BTAM-ES Program Summary	GC38-0290
BTAM-ES Licensed Program Specifications	GC38-0291
BTAM-ES General Information	GC38-0292
BTAM-ES Programming	SC38-0293
BTAM-ES Installation	SC38-0294
BTAM-ES Messages	SC38-0295
BTAM SCP Specifications	GC38-0296
BTAM-ES Logic	LY27-8030

BTAM-ES TERMINALS SUPPORTED

BTAM-ES supports the following terminals, programmable features, transmission control units and communications controllers. Programmable features which change the control or transmission characteristics and which are not shown are not supported. Attempts to use BTAM-ES with unsupported features can cause unpredictable results.

The user should be aware that many terminal and control unit special features are transparent to programming, and therefore readily usable even though not specifically identified. Note that the appropriate line adapters and hardware attachment features must be included in the system configuration.

Terminals that are functionally equivalent to those specifically supported by BTAM-ES may also function satisfactorily with BTAM-ES; the customer is responsible for establishing equivalency. IBM assumes no responsibility for the impact that any changes to the IBM-supplied programs or products may have on such terminals.

REMOTE ATTACHMENT

Terminals and Terminal Features

SS LINES:

IBM TERMINALS

- 1030 Data Collection System on nonswitched lines:
  - 1031 Input Station (Mdl's A1,A2,A3,A4,A5,A6,A7) :
    - Supported: Attachment of 1031,1033, 1034,1035
  - 1031 Input Station (mdls B1,B2,B3,B4,B5,B6,B7) :
    - Supported: Attachment of 1035
  - 1033 Printer
  - 1034 Card Punch
  - 1035 Badge Reader
- 1050 Data Communication System on switched or nonswitched lines:
  - 1051 Control Unit (mdls 1,2) :
    - Supported: Attachment of 1052,1053,1054,1055,1056, 1057,1058,1092,1093
      - #1313 - Automatic EOB
      - #4795 - Line Correction
      - #4796 - Line Correction Release
      - #5465 - Open Line Detection
      - #6100 - Receive Interrupt
      - #9698 - Text Time-Out Suppression
      - #9700 - Transmit Interrupt
  - 1052 Printer-Keyboard (mdls 1,2) :
    - Supported: #1313 - Automatic EOB
      - #9567,#9597 - PTTC/BCD Code
      - #9571,#9591 - PTTC/EBCD Code
  - 1053 Printer (mdl 1) :
    - Supported: #9567,#9597 - PTTC/BCD Code
      - #9571,#9591 - PTTC/EBCD Code
  - 1054 Paper Tape Reader (mdl 1)
  - 1055 Paper Tape Punch (mdl 1)
  - 1056 Card Reader (mdls 1,3)
  - 1057 Card Punch (mdl 1)
  - 1058 Printing Card Punch (mdls 1,2)
  - 1092 Programmed Keyboard (mdls 1,2)
  - 1093 Programmed Keyboard (mdls 1,2)

2848 Display Control (mdls 1,2,3) on nonswitched lines:

- Supported: Attachment of 2260,1053
  - #3901 - Extended Cursor Control
  - #4787 - Line Addressing
  - #5340 - NonDestructive Cursor
  - #5341 - NonDestructive Cursor Adapter
- 2260 Display Station (mdls 1,2) :
  - Supported: #3606 - Extended Cursor Control, Alpha-meric Keyboard
    - #4766 - Alphameric Keyboard
    - Tab feature of #3606
  - Not Supported: #7801 - Tab
- 1053 Printer (mdl 4) :
  - Supported: #9567,#9597 - PTTC/BCD Code
    - #9571,#9591 - PTTC/EBCD Code

- 2845 Display Control (mdl 1) on nonswitched lines:
  - Supported: Attachment of 2265,1053
    - #3301 - Destructive Cursor
    - #4801 - Line Addressing
  - Not Supported: #7801 - Tab
- 2265 Display Station (mdl 1) :
  - Supported: #4766 - Alphameric Keyboard
- 1053 Printer (mdl 4) :
  - Supported: #9567,#9597 - PTTC/BCD Code
    - #9571,#9591 - PTTC/EBCD Code

- 2740 Communication Terminal (mdl 1) on switched or nonswitched lines:
  - Supported: #3255 - Dial Up (switched only)
    - #6114 - Record Checking
    - #7479 - Station Control (nonswitched only)
    - #8028 - Transmit Control (switched only)
    - #8301 - 2760 Attachment
    - #9567,#9597 - PTTC/BCD Code
    - #9571,#9591 - PTTC/EBCD Code
    - Correspondence Code
- 2740 Communication Terminal (mdl 2) on nonswitched lines:
  - Supported: #1495,#1496 - Buffer Expansion
    - #1499 - Buffer Receive
    - #6114 - Record Checking
    - #9571,#9591 - PTTC/EBCD Code

- 2760 Optical Image Unit (mdl 1) on switched or nonswitched lines
- 3232 Keyboard Printer (Mdl 51) on switched lines supported as a CPT-TWX 33-35
- 3767 Communication Terminal (mdls 1,2) (supported as a 2740-1) on switched or nonswitched lines:
  - Required: #7111 - 2740-1 Start/Stop
  - Supported: #9560 - Station Control
- 3767 Communication Terminal (mdls 1,2,3) (supported as a 2740-2) on nonswitched lines:
  - Required: #7112 - 2740-2 Start/Stop

6733 Typewriter Communication Module on switched lines supported as CPT/TWX 33/35

IBM PROCESSORS AS TERMINALS

(For details of programming support provided within the Processor when acting as a terminal, see appropriate sales pages)

System/7 (supported as a 2740-1 with checking) on switched or nonswitched lines:
 

- Required: #1610 - Asynchronous Communication Control

NON-IBM TERMINALS

- AT&T 83B3 Line Control Type on nonswitched lines
- CPT/TWX (mdl 33/35) Line Control Type on switched lines
- World Trade Telegraph on nonswitched lines
- WU 115A Line Control Type on nonswitched lines

BSC LINES:

IBM TERMINALS

- 2790 Data Communication System on switched or nonswitched lines:
  - 2715 Transmission Control Unit (mdl 2) :
    - Required: 2740
    - Supported: Attachment of 2798,1035,1053
      - #3801 - Expanded Capability
      - #4850 - Local 2740 Adapter
      - #9401 - Point-to-point Nonswitched
      - #9402 - Point-to-point Switched
      - #9403 - Multipoint Nonswitched
- 2740 Communication Terminal (mdl 1)
- 2798 Guidance Display Unit (mdl 1)
- 1035 Badge Reader (mdl 1)
- 1053 Printer (mdl 1)

PROGRAM PRODUCTS

BTAM-ES (cont'd)

2770 Data Communication System on switched or nonswitched lines:  
2772 Multipurpose Control Unit:

Supported: Attachment of 0050,0545,1017,1018,1053,  
1255,2203,2213,2265,2502,5496  
#1340 - Automatic Answering  
#1490 - Buffer Expansion (256 bytes)  
#1491 - Buffer Expansion Additional (512  
bytes)  
#1910 - Conversational Mode  
#3250 - Display Format Control  
#3650 - EBCDIC Transparency  
#3860 - 144 Character Print Line  
#4610 - Identification  
#4690 - Keyboard Correction  
#5010 - Multipoint Data Link Control  
#5890 - Horizontal Format Control  
#6555 - Space Compression/Expansion  
#7705 - Synchronous Clock  
#7950 - Transmit-Receive - Monitor-Print  
#9140 - Extended Re-Entry  
#9402 - Line Termination - 2-wire  
#9761 - Transmission Code EBCDIC  
#9762 - Transmission Code ASCII  
#9936 - Immediate WACK

0050 Magnetic Data Inscrber  
0545 Output Punch (mdls 3,4)  
1017 Paper Tape Reader (mdls 1,2)  
1018 Paper Tape Punch (mdl 1)  
1053 Printer (mdl 1)  
1255 Magnetic Character Reader  
2203 Printer (mdls A1,A2) :  
Supported: #5558 - Print Positions, 24 Additional  
2213 Printer (mdls 1,2)  
2265 Display Station (mdl 2)  
2502 Card Reader (mdls A1,A2)  
5496 Data Recorder

2780 Data Transmission Terminal on switched or nonswitched lines:

Supported: #1340 - Automatic Answering  
#1350 - Automatic Turnaround  
#3401 - Dual Communication Interface  
#5010 - Multiple Record Transmission  
#5020 - Multipoint Line Control  
#5820 - 120 Character Print Line  
#5821 - 144 Character Print Line  
#6400 - Selective Character Set  
#7850 - Terminal Identification  
#8030 - EBCDIC Transparency  
#9150 - Extended Retry Transmission  
#9761 - ASCII Transmission Code  
#9762 - EBCDIC Transmission Code

2980 General Banking System on nonswitched lines:

2972 Station Control Unit (mdl 8 - RPQ 858160, mdl 11 - RPQ  
858231) :  
Supported: Attachment of 2980,2971  
RPQ 835503 - Buffer Expansion  
RPQ 858165,858182 - 96-Character Buffer  
2980 Teller Station (mdl 1 - RPQ 835504, mdl 4 - RPQ 858147)  
2980 Administrative Station (mdl 2 - RPQ 835505)  
2971 Remote Control Unit (mdl 3 - RPQ 858144)

3270 Information Display System on nonswitched lines:

3271 Control Unit (mdls 1,2) :  
Supported: Attachment of 3277,3284,3286, 3287,3288  
#1550 - Copy  
#9761 - EBCDIC Code  
3274 Control Unit (mdl 1C, 21C, 31C, 51C [supported as a 3271] ):  
Supported: Attachment of 3262, 3268 mdl 2, 3277,  
3278, 3284, 3286, 3287, 3288, 3289  
Buffer sizes of 960,1920,2560,3440 are also  
supported.  
3276 Control Unit Display Station (mdls 1,2,3,4) [supported as a  
3271] :  
Supported: Attachment of 3268 mdl 2, 3278, 3287  
#6350 - Selector Light Pen  
#9082 - EBCDIC Character Set.  
Buffer sizes of 960,1920,2560,3440 are also  
supported

3277 Display Station (mdls 1,2) :  
Supported: #6350 - Selector Light-Pen  
#9082 - EBCDIC Character Set.

3278 Display Station (mdls 1,2,3,4) [supported as 3277] :  
Supported: #6350 - Selector Light Pen  
#9082 - EBCDIC Character Set.  
Screen sizes of 960,1920,2560,3340 are also  
supported

3262 Printer (mdls 3, 13) [supported as a 3286-2]  
3268 Printer (mdl 2) [supported as a 3284 or 3286]  
3284 Printer (mdls 1,2) :  
Supported: #9089 - EBCDIC Character Set.  
3286 Printer (mdls 1,2) :

Supported: #9089 - EBCDIC Character Set.  
3287 Printer (mdls 1,2) [supported as a 3284 or 3286]  
Supported: #9082 - EBCDIC Character Set.  
3288 Printer (mdl 2) [supported as a 3286-2] :  
Supported: #9089 - EBCDIC Character Set.  
3289 Printer (mdls 1,2) [supported as a 3286-2]

3270 Information Display System on switched lines or nonswitched  
lines:

3275 Display Station (mdls 1,2) :  
Supported: Attachment of 3284  
#6350 - Selector Light-Pen  
#9089 - EBCDIC Character Set.  
#9761 - EBCDIC Code  
3284 Printer (mdl 3) :  
Supported: #9089 - EBCDIC Character Set.

3624 Consumer Transaction Facility (mdl 1, 2, 11, 12) (supported as a  
2772)

Supported: Attached to a 3704/3705 via nonswitched  
lines only

3650 Programmable Store System (Supported as a S/3) on switched or  
nonswitched lines:

3651 Store Controller (mdls 25, 75) :  
Supported: Attachment of 3275, 3653, 3657 3659, 3675,  
3683, 3685, 3784

3275 Display Station (mdl 3)  
Supported: Attachment of 3284

3284 Printer (mdl 3)  
3653 Point of Sale Terminal  
3657 Ticket Unit  
3659 Remote Communications Unit (mdl 1)  
3663 Supermarket Terminal (mdl 1P and 3P)  
3683 Point of Sale Terminal (mdl 1)  
3685 Display Control Unit (mdls 1, 2)  
Supported: Attachment of 3686-1

3784 Printer (mdl 1)

3660 Supermarket Scanning System (supported as a S/3) on switched  
lines:

3651 Store Controller (mdls A60, B60) :  
Supported: Attachment of 3663,3669  
3663 Supermarket Terminal (mdls 1,2) :  
Supported: Attachment of 3666, 3667  
3666 Checkout Scanner (mdl 1)  
3667 Checkout Scanner  
3669 Store Communications Unit (mdl 1)

3660 Supermarket Key-Entry System (supported as a S/3) on switched  
lines:

3661 Store Controller:  
Supported: Attachment of 3663  
3663 Supermarket Terminal (mdls 1,2,3)

3680 Programmable Store System (supported as a S/3) on switched or  
nonswitched lines:

3684 Point of Sale Control Unit mdls 1 or 2

3735 Programmable Buffered Terminal (mdl 1) on switched or  
nonswitched lines:

Supported: Attachment of 5496,3286  
#5010 - Multipoint Data Link Control  
#9761 - EBCDIC Code  
#9762 - ASCII Code

3286 Printer (mdl 3)  
5496 Data Recorder (mdl 1)

3741 Data Station (mdl 2) on switched or nonswitched lines:

Supported: Attachment of 0129,3713,3715,3717  
#1680 - Expanded Communications  
#1685 - Expanded Communications/  
Multipoint Data Link Control  
#5450 - Operator Identification Card Reader  
#7850 - Terminal Identification

0129 Card Data Recorder (mdl 2)  
3713 Printer (mdl 1)  
3715 Printer (mdls 1,2)  
3717 Printer (mdl 1)

3741 Programmable Workstation (mdl 4) on switched or nonswitched  
lines:

Supported: Attachment of 0129,3713,3715  
#1680 - Expanded Communications  
#1685 - Expanded Communications/  
Multipoint Data Link Control  
#5450 - Operator Identification Card Reader  
#7850 - Terminal Identification

0129 Card Data Recorder (mdl 2)  
3713 Printer (mdl 1)  
3715 Printer (mdls 1,2)

3747 Data Converter (mdl 1) on switched or nonswitched lines:  
Supported: #1660 - Communications Adapter

PROGRAM PRODUCTS

BTAM-ES (cont'd)

3770 Data Communication System (supported as a 2770) on switched or nonswitched lines:

3771 Communication Terminal (mdls 1,2,3) :  
Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3773 Communication Terminal (mdls 1,2,3,P1,P2,P3):  
Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3774 Communication Terminal (mdls 1,2,P1,P2) :  
Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3775 Communication Terminal (mdls 1,P1) :  
Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3776 Communication Terminal (mdls 1,2) [supported as a 2772/3780]:  
Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3777 Communication Terminal (mdl 1) [supported as a 2772/3780]:  
Required: #1460 - SDLC/BSC, Switch Control, or #1461 - BSC Point-to-point, or #1462 - BSC Multipoint  
Supported: #1201 - ASCII Code

3780 Data Communications Terminal (mdl 1) [supported as a 2772 without component select] on switched or nonswitched lines:

Supported: #3601 - EBCDIC Transparency  
#5010 - Multipoint Data Link Control  
#5701 - Print Positions, Additional  
#9761 - EBCDIC Code  
#9762 - ASCII Code

4700 Finance Communication System on BSC nonswitched lines:  
4701 Contoller

5110 Computer (supported as a 2772) on switched or nonswitched lines:

Required: #2074 BSCA  
Supported: Attachment of a 5103, 5106, 5114  
The 5110 emulates the following 2772 features:  
Auto Answer  
Buffer expansion additional  
144 Character print line  
Identification  
Multipoint Data Link Control  
Horizontal Format Control  
Space Compression/expansion  
Synchronous Clock  
Transmission Code EBCDIC

5230 Data Collection System (supported as a 3741-2,-4) on switched or nonswitched point-to-point lines:

5231 Contoller (mdl 2):  
Required: #2704 - BSCA

5260 Retail System (supported as a 3741) on switched or nonswitched point-to-point lines  
5265 Communicating Model

5275 Direct Numerical Control Station (mdl 1) [supported as a 3275 with EBCDIC Code and EBCDIC Character Set] on switched or nonswitched lines

6670 Information Distributor (supported as a 2770) on switched, nonswitched or local attach lines:

Supported: The 6670 emulates the following 2770 features: (All items listed are standard on the 6670)  
Automatic Answering  
Buffer Expansion (256 bytes)  
Buffer Expansion (512 bytes)  
EBCDIC Transparency  
Identification (Terminal only)  
Space Expansion  
Synchronous Clock  
Extended Retry (Transmission)  
Transmission Code EBCDIC  
Transmission Code ASCII

(For details of programming support provided within the Processor when acting as a terminal, see appropriate programming sales manual pages)

1130 Computing System on switched or nonswitched lines:

1131 Central Processing Unit:  
Required: #7690 - Synchronous Communications Adapter

1800 Data Acquisition and Control System on switched or nonswitched lines:

1826 Data Adapter Unit:  
Required: #7550 - Communication Adapter

5280 Distributed Data System (supported as a 3271-2) on nonswitched lines:

5285 or 5288 Processor  
Required: #3270 - 3270 Emulation Communications Adapter

5280 Distributed Data System (supported as a 3741) on switched or nonswitched lines:

5285 or 5288 Processor  
Required: #2500 Communications Adapter

Series/1 (supported as a S/3) on switched or nonswitched lines:

4953 or 4955 Processor:  
Required: #2074, #2075, or #2094 Binary Synchronous Communications Adapter

System/3 on switched or nonswitched lines:

5406 or 5410 or 5415 Processing Unit:  
Required: #2074 - Binary Synchronous Communications Adapter

System/7 (supported as a S/3) on switched or nonswitched lines:

5010 Processor Module:  
Required: #2074 - Binary Synchronous Communications Adapter

System/32 (supported as a S/3) on switched or nonswitched lines:

5320 System Unit:  
Required: #2074 - Binary Synchronous Communications Adapter

System/34 (supported as a System/3) on switched or nonswitched lines:

5340 System Unit:  
Required: #2500, #3500 or #4500 Communications Adapter feature

System/36 (supported as a System/3) on switched or nonswitched lines:

5360 System Unit:  
Required: #2500 or #4500 Communications Adapter feature

System/38 (supported as a 3271 mdl 2) on a nonswitched line:

5381 System Unit  
Required: #1501 or 1502 Communications Attachment #2001 or 2003 Communications Control

System/360 mdl 20 on switched or nonswitched lines:

2020 Processing Unit:  
Required: #2074 - Binary Synchronous Communications Adapter

System/360 mdls 25,30,40,50,65,65MP,67(65mode), 75,85,91, 195 on switched or nonswitched lines:

Processing Unit:  
Required: #4580 - Integrated Communications Attachment, or 2701 Data Adapter Unit, or 2703 Transmission Control, or 3704 Communications Controller in emulation mode, or 3705-I Communications Controller in emulation mode, or 3705-II Communications Controller in emulation mode

All virtual storage S/370 Processors or 4300 Processors on switched or nonswitched lines:

Processing Unit:  
Required: #4640 - Integrated Communications Adapter, on S/370 mdls 115, 125, 135, 135-3, 138 or #1601 - Communications Adapter on 4331 Processor, or 2701 Data Adapter Unit, or 2703 Transmission Control, or 3704 Communications Controller in emulation mode, or 3705-I Communications Controller in emulation mode, or

PROGRAM PRODUCTS

BTAM-ES (cont'd)

3705-II Communications Controller in emulation mode

LOCAL ATTACHMENT

TRANSMISSION CONTROL UNITS AND COMMUNICATIONS CONTROLLERS

Integrated Communications Adapter of S/370 mdl 115:  
 Required: #4640 - Integrated Communications Adapter  
 Supported: #1291-#1296 - Autocall

Integrated Communications Adapter of S/370 mdl 125:  
 Required: #4640 - Integrated Communications Adapter  
 Supported: #1291-#1296 - Autocall

Integrated Communications Adapter of S/370 mdl 135, 135-3, 138:  
 Required: #4640 - Integrated Communications Adapter  
 Supported: EBCDIC Code is a standard feature  
 #9763-#9780 - Transparency  
 #9681-#9688 - ASCII Code  
 #9689-#9696 - 6-bit Transcode

Communications Adapter of 4331 Processor:  
 Required: #1601 Communications Adapter  
 Supported: #9681-#9688 - S/S Transmission Mode  
 #9671-#9678 - BSC Transmission Mode  
 Not Supported: #9691-#9698 - SDLC Transmission Mode

2701 Data Adapter Unit on local channel:  
 Supported: #1302, #1303, #1314 - Autocall  
 #3455 - Dual Code  
 #3463-#3465 - Dual Communication Interface  
 #8029 - Transparency  
 #9060 - EBCDIC Code  
 #9061 - ASCII Code  
 #9062 - 6-bit Transcode

2702 Transmission Control Unit on local channel:  
 Supported: #1290 - Autocall  
 #1319 - Autopoll  
 #8055 - 2741 Break

2703 Transmission Control Unit on local channel:  
 Supported: #1340, #1341 - Autocall  
 #7715 - EBCDIC Code  
 #7716 - ASCII Code  
 #7717 - 6-bit Transcode  
 #8055 - 2741 Break  
 #9100 - Transparency for ASCII

2715 Transmission Control Unit (mdl 1) on local channel:  
 Supported: See "2790" under *Local Terminals*

3704/3705-I/3705-II Communications Controller on local channel:  
 Supported: EBCDIC Code, ASCII Code, Autopoll and EBCDIC Transparency do not have special feature codes in the 3704/3705 EP/VS PEP

2795 Data Entry Unit (mdl 1)  
 2796 Data Entry Unit (mdl 1)  
 2797 Data Entry Unit (mdl 1)  
 2798 Guidance Display Unit (mdl 1)  
 1053 Printer (mdl 1)

3270 Information Display System on local channel:  
 3272 Control Unit (mdls 1,2) :  
 Supported: Attachment of 3277, 3284, 3286, 3287, 3288

3277 Display Station (mdls 1,2) :  
 Supported: #6350 - Selector Light-Pen  
 #9082 - EBCDIC Character Set.

3284 Printer (mdls 1,2) :  
 Supported: #9082 - EBCDIC Character Set.

3286 Printer (mdls 1,2) :  
 Supported: #9082 - EBCDIC Character Set.

3287 Printer (mdls 1,2) [supported as a 3284 or 3286 attached to 3272-1 or -2] :  
 Supported: #9082 - EBCDIC Character Set.

3288 Printer (mdl 2) (supported as a 3286-2) :  
 Supported: #9089 - EBCDIC Character Set.

3270 Information Display System on local channel: [Supported as a 3272]  
 3274 Control Unit (mdl 1B, 1D, 21B, 21D, 31D)  
 Supported: Attachment of 3262, 3268 mdl 2, 3277, 3278, 3284, 3286, 3287, 3288, 3289  
 Buffer sizes of 960, 1920, 2560, 3440 are also supported

3277 Display Station (mdls 1,2)  
 Supported: #6350 - Selector Light Pen  
 #9082 - EBCDIC Character Set.

3278 Display Station (mdls 1,2,3,4) [Supported as 3277]  
 Supported: #6350 - Selector Light Pen  
 #9082 - EBCDIC Character Set.  
 Screen sizes of 960, 2560, 3440 are also supported

3262 Printer (mdls 3, 13) [supported as a 3268-2]  
 3268 Printer (mdl 2) supported as a 3284 or 3286  
 3284 Printer (mdls 1, 2)  
 Supported: #9089 - EBCDIC Character Set.

3286 Printer (mdls 1, 2)  
 Supported: #9089 - EBCDIC Character Set.

3287 Printer (mdls 1,2) [Supported as a 3284 or 3286]  
 Supported: #9082 - EBCDIC Character Set.

3288 Printer (mdl 2) [Supported as a 3286-2]  
 Supported: #9089 - EBCDIC Character Set.

3289 Printer (mdls 1,2) [Supported as a 3286-2]

3270 Information Display System attached to the 4331 Processor Display/Printer Adapter and Display/Printer Adapter Expansion (Supported as a 3277-2):  
 3278 Display Station (mdl 2) [Supported as a 3277-2]  
 Supported: #9082 - EBCDIC Character Set.  
 3268 Printer (mdl 2) supported as a 3284 or 3286  
 3287 Printer (mdls 1,2) [Supported as a 3284 or 3286]  
 Supported: #9082 - EBCDIC Character Set.

2770 Audio Response Unit (mdl 3) on local channel

LOCAL TERMINALS

2848 Display Control (mdls 1,2,3) on local channel:  
 Supported: Attachment of 2260, 1053  
 #3901 - Extended Cursor Control  
 #4787 - Line Addressing  
 #5340 - NonDestructive Cursor  
 #5341 - NonDestructive Cursor Adapter

2260 Display Station (mdls 1,2) :  
 Supported: #3606 - Extended Cursor Control, Alpha-numeric Keyboard  
 Not Supported: Tab feature of #3606

1053 Printer (mdl 4):  
 Supported: #9567, #9597 - PTTC/BCD Code  
 #9571, #9591 - PTTC/BCD Code

2790 Data Communication System on local channel:  
 2715 Transmission Control Unit (mdl 1) :  
 Supported: Attachment of 2740, 2791, 2793  
 #3801 - Expanded Capability  
 #4850 - Local 2740 Adapter  
 Not Supported: #8110 - Two Processor Switch

2740 Communication Terminal (mdl 1)  
 2791 Area Station (mdls 1,2) :  
 Supported: Attachment of 1035, 2795, 2796, 2797, 2798, 1053

1035 Badge Reader (mdl 1)  
 2795 Data Entry Unit (mdl 1)  
 2796 Data Entry Unit (mdl 1)  
 2797 Data Entry Unit (mdl 1)  
 2798 Guidance Display Unit (mdl 1)  
 1053 Printer (mdl 1)  
 2793 Area Station (mdl 1) :  
 Supported: Attachment of 2795, 2796, 2797, 2798, 1053

PROGRAM PRODUCTS

BTAM-ES (cont'd)

TERMINAL SUPPORT CHART 1

Remote Attach (a)	via EP/VS (c)	via 270X (d)	via ICA (d)	via CA (e)
<b>SS Lines:</b>				
1031	X	1,2,3	115/125	-
1051	X	1,2,3	All	X
2260	X	1	135	-
2265	X	1	135	-
2740-1,-2	X	1,2,3	All	X
2760	X	1,2,3	All	-
3101	X	1	All	X
3232-51	X	1,2,3	All	X
3767-1,-2 (2740-1)	X	-	All	X
3767-1,-2-3 (2740-2)	X	1	All	X
System/7 (2740-1)	X	1,2,3	All	-
AT&T 83B3 or WU 115A				
Line Control Type	X	1,2,3	115/125	-
CPT/TWX (M33/35)				
Line Control Type	X	1,2,3	All	-
WT Telegraph	X	1,2,3	115/125	-
6733 (CPT-TWX 33/35)	X	1,2,3	All	X
<b>BSC Lines:</b>				
1131	X	1,3	All	X
1826	X	1,3	All	X
2715-2	X	1,3	All	X
2772	X	1,3	All	X
2780	X	1,3	All	X
2972-8,-11	X	1,3	All	X
3271-1,-2	X	1,3	All	X
3274-1C,21C,31C,51C				
(3271-1,-2)	X	1,3	All	X
3275-1,-2	X	1,3	All	X
3276 (3271-1,-2)	X	1,3	All	X
3624-1,-2,-11,-12				
(2772)	X	-	-	-
3651-25,-75 (S/3)	X	-	All	X
3651-A60,-B60 (S/3)	X	-	All	X
3661 (S/3)	X	-	All	X
3684-1,-2 (S/3)	X	-	All	X
3735	X	1,3	All	X
3741-2,-4	X	1,3	All	X
3747	X	1,3	All	X
3771-1,-2,-3 (2772)	X	1	All	X
3773-1,-2,-3 (2772)	X	1	All	X
3773-P1,-P2,-P3 (2772)	X	1	All	X
3774-1,-2 (2772)	X	1	All	X
3774-P1,-P2 (2772)	X	1	All	X
3775-1 (2772)	X	1	All	X
3775-P1 (2772)	X	1	All	X
3776-1,-2(2772/3780)	X	1	All	X
3777-1 (2772/3780)	X	1	All	X
3780 (2772)	X	1,3	All	X
4701 (g)				
5110 (2772)	X	1,3	All	X
5231-2 (3741-2,-4)	X	1,3	All	X
5265 (3741-2,-4)	X	-	All	X
5275 (3275)	X	1,3	All	-
5285/5288 (3271-2)	X	1,3	All	X
5285/5288 (3741)	X	1,3	All	-
6670	X	-	-	X
Series/1 (S/3)	X	1	All	X
System/3	X	1,3	All	X
System/7 (S/3)	X	1,3	All	X
System/32 (S/3)	X	1,3	All	X
System/34 (S/3)	X	1,3	All	X
System/36 (S/3)	X	1,3	All	X
System/36 (3271)	X	1,3	All	X
System/36 (360 (b))	X	1,3	All	X
System/38 (3271)	X	1,3	All	X
S/360-20	X	1,3	All	X
S/360 (b)	X	1,3	All	X
S/370 (b)	X	1,3	All	X
4300 Processors (b)	X	1,3	All	X
8100 (3271-1,-2) (f)	X	1,3	All	X

Local Channel Attach:

ICAs, TCUs, Local Communications Controllers:

- ICA - M115
- ICA - M125
- ICA - M135
- ICA - M135-3
- ICA - 138
- CA - 4331
- 2701

- 2702
- 2703
- 2715-1
- 3704 (EP/VS)
- 3705-I (EP/VS)
- 3705-II (EP/VS)

LOCAL TERMINALS:

- 2260
- 3272-1,-2
- 3274-1B,-1D,-21B,-21D,-31D (3272-2)
- 4331 Processor Display/Printer Adapter (3272-2)
- 7770-3

Legend:

- SS = Start/Stop
- BSC = Binary Synchronous Communications
- Local = Local Channel Attachment
- X = supported
- = not supported

Notes:

- (a) If shown, the terminal type in parenthesis designates the programming support provided. E.g., "System/7(2740-1)" means "the System/7 is supported as a 2740-1".
- (b) S/360 mdls 25, 30, 40, 50, 65, 65MP, 67 (65 mode), 75, 85, 91, 195 with either BOS, BPS, DOS, or OS. Any virtual storage S/370 Processor with either BOS, BPS, DOS, OS, DOS/VS, DOS/VSE, OS/VS1 or OS/VS2. 4331, 4341 Processor with either DOS/VSE or OS/VS1.
- (c) 3704/3705 EP/VS, or the Partitioned Emulation Programming (PEP) extension to 3704/3705 NCP/VS or ACF/NCP/VS, can be used to emulate the 270X.
- (d) 270X = 2701, 2702, 2703; column shows last digit of 270X support. ICA = M115 ICA, M125 ICA, M135 ICA, M135-3 ICA, M138 ICA.
- (e) CA = 4331 Processor Communications Adapter.
- (f) 8130, 8140 Processors with DPPX/BASE or DPPX/SP and DPPX/DSC program products.
- (g) BSC3.



PROGRAM PRODUCTS

BTAM-ES (cont'd)

TERMINAL SUPPORT CHART 2

Remote Attach (a)	Communications Code --				Communication Network -----		
	EBCDIC -----		ASCII -----		sw	nonsw ---	
	norm	trans	norm	trans	PTP	PTP	MP
<b>SS Lines:</b>							
1031	-	-	-	-	-	-	X
1051	-	-	-	-	X	-	X
2260	-	-	-	-	-	-	X
2265	-	-	-	-	-	-	X
2740-1	-	-	-	-	X	X	X
2740-2	-	-	-	-	-	-	X
2760	-	-	-	-	X	X	-
3232-51 (CPT-TWX M33/35)	-	-	X	-	X	-	-
3767-1,-2 (2740-1)	-	-	-	-	X	X	X
3767-1,-2,-3(2740-2)	-	-	-	-	-	-	X
System/7 (2740-1)	-	-	-	-	X	X(e)	X
AT&T 83B3, WU 115A	-	-	-	-	-	-	X
CPT/TWX (M33/35)	-	-	-	-	X	-	-
WT Telegraph	-	-	-	-	-	X	-
6733	-	-	-	-	-	-	-
(CPT-TWX 33/35)	-	-	X	-	X	X	-
<b>BSC Lines:</b>							
1131	X	X	-	-	S	X	M
1826	X	X	X	-	S	X	M
2715-2	-	X	-	-	S	X	M
2772	X	X	X	-	S	X	M
2780	X	X	X	-	S	X	M
2972-8,-11	X	-	-	-	-	-	M
3271-1,-2	X	-	X	-	-	-	M
3274-1C(3271-1,-2)	X	-	X	-	-	-	M
3275-1,-2	X	-	X	-	S	-	M
3276 (3271-1,-2)	X	-	X	-	-	-	M
3624-1,-2,-11,-12 (2772)	-	X	-	-	-	-	M
3651-25,-75 (S/3)	-	X	-	-	X	X	M
3651-A60,-B60 (S/3)	-	X	-	-	X	-	-
3661 (S/3)	-	X	-	-	X	-	-
3684-1,-2 (S/3)	-	X	-	-	X	X	M
3735	X	-	X	-	S	-	M
3741-2,-4	X	X	X	-	S	X	-
3747	X	X	-	-	S	X	-
3771,3773,3774, 3775 (2772)	X	X	X	-	S	X	M
3776-1,-2, 3777-1 (2772/3780)	X	X	X	-	S	X	M
3780 (2772)	X	X	X	-	S	X	M
5110 (2772)	X	X	-	-	S	X	M
5231-2 (3741-2,-4)	X	-	-	-	X	X	M
5265 (3741-2,-4)	X	-	-	-	X	X	-
5275	X	-	-	-	S	-	M
5285/5288 (3271-2)	X	X	-	-	-	-	M
5285/5288 (3741)	X	X	X	-	S	X	M
6670 (2770)	X	X	-	-	X	X	-
Series/1 (S/3)	X	X	X	-	X	X	-
System/3	X	X	X	-	S	X	M
System/7 (S/3)	X	X	X	-	X	X (f)	M
System/32 (S/3)	X	X	X	-	S	X	M
System/34 (S/3)	X	X	X	-	S	X	M
System/36 (S/3)	X	X	X	-	S	X	M
System/36 (S/360 (b))	X	X	X	-	S	X	M
System/36 (3271)	X	-	-	-	S	X	M
System/38 (3271)	X	-	-	-	-	-	M
S/360-20	X	X	X	X	S	X	M
S/360 (b)	X	X	X	X	S	X	-
S/370 (b)	X	X	X	X	S	X	-
4300 Processors (c)	X	X	X	X	S	X	-
8100 (3271-1,-2) [h]	X	-	-	-	-	-	M
<b>Local Terminals</b>							
2260	-	-	-	-	-	-	-
2715-1 (d)	-	X	-	-	-	-	-
3272-1,-2	X	-	-	-	-	-	-
3274-1B,1D (3272)	X	-	-	-	-	-	-
4331 Display/Printer Adapter (g)	X	-	-	-	-	-	-
7770-3	-	-	-	-	-	-	-

M = Group of terminals which can operate on same BSC MP line and same line speed.

S = Group of terminals which can share the same phone number(s).

Notes:

- (a) If shown, the terminal type in parenthesis designates the programming support provided. E.g., "System/7 (2740-1)" means "the System/7 is supported as a 2740-1".
- (b) S/360 mdl's 25, 30, 40, 50, 65, 65MP, 67 (65 mode), 75, 85, 91, 195 with either BOS, BPS, DOS or OS. Any virtual storage S/370 Processor with either BOS, BPS, DOS, OS, DOS/VSE, DOS/VSE, OS/VS1 or OS/VS2.
- (c) 4331, 4341, 4361, 4381 Processors with either DOS/VSE or OS/VS1.
- (d) Terminal operates on local channel using nonswitched programming support.
- (e) Supported at 134.5 bps only.
- (f) IPL of S/7 is not supported in this network configuration.
- (g) 4331/4361 Processor Display/Printer Adapter.
- (h) 8130, 8140 Processors with DPPX/BASE or DPPX/SP and DPPX/DSC program products.

Legend:

- SS = Start/Stop
- BSC = Binary Synchronous Communications
- Local = Local Channel Attachment
- X = supported
- = not supported



## PROGRAM PRODUCTS

**5746-RC7 - ACF/VTAME  
ADVANCED COMMUNICATIONS FUNCTION  
for VTAM ENTRY****PURPOSE**

Advanced Communications Function for VTAME Entry is a program product for users of the Disk Operating System/Virtual Storage Extended (DOS/VSE). ACF/VTAME provides support for the Communications Adapter (CA) of the 4331 Processor and also provides support for various channel attached devices. Key ACF/VTAM and ACF/NCP/VS functions are supported in ACF/VTAME including support for multisystem networking. The functions provided by ACF/VTAME are compatible with the analogous functions provided by ACF/VTAM Version 1 Release 2.

**HIGHLIGHTS**

- Support for the 4331 Communications Adapter instead of the 3705 Communications Contoller.
- Support for a variety of devices:
  - SNA-SDLC devices.
  - BSC 3270 devices.
  - SNA and nonSNA channel attached devices.
- Upwards compatible with ACF/VTAM Version 1 Release 2.
- Allows concurrent use of multiple ACF/VTAME application programs.
- Controls the sharing of network resources among ACF/VTAME application programs.
- Provides for application program to application program and application program to terminal sessions.
- Provides a multisystem networking capability as part of ACF/VTAME.
- Support of CICS/DOS/VS, VSE/POWER, DSX and other related IBM programs.
- Support of the Network Operation Support Program (NOSP) program product.
- Support of the Network Communication Control Facility (NCCF) program product.

**ADVANTAGES**

- ACF/VTAME is an access method with which users can build a variety of data communications systems. Its support for the Communications Adapter of the 4331 Processor provides for an entry version SNA system. It also provides support for a variety of related IBM programs as well as for user-written application programs.
- ACF/VTAME on DOS/VSE provides a Record Application Program Interface (Record API) compatible with the ACF/VTAM Version 1 Release 2 or ACF/VTAM Version 2 Record API on DOS/VSE, OS/VS1 and OS/VS2 (MVS).
- Allows the user to control sessions and data flow between application programs and terminals. A single request for a session or for data can be directed simultaneously to more than one terminal.
- Provides for the direct transmission of messages between application programs and terminals. It makes the lines and the Communications Adapter transparent to the application program.
- Allows for the sharing of network resources among the various applications. This provides for a more efficient use of lines, terminals and the Communications Adapter since these resources are not dedicated to a single application program.
- ACF/VTAME can be used in a single system environment as well as in a multiple systems environment using its multisystem networking functions.
- In a multiple systems environment, ACF/VTAME may be connected through an SDLC cross-domain link to other processors that have installed one of the following IBM program products:
  - ACF/VTAME
  - ACF/VTAM Version 1 with the Multisystem Networking Facility feature
  - ACF/VTAM Version 2
  - ACF/TCAM with the Multisystem Networking Facility feature

This allows application programs and terminals that are controlled by ACF/VTAME to communicate with application programs in another domain of the multiple system network. It also allows terminals controlled by another domain to communicate with ACF/VTAME application programs.

- ACF/VTAME provides network operation control facilities that allow the user to monitor and reconfigure the network to meet fluctuating requirements. The program operator facility allows an authorized user-written application program to enter ACF/VTAME network operator commands and to receive ACF/VTAME network operator messages.
- The Network Operation Support Program (NOSP) or the Network Communication Control Facility (NCCF) program product may also be used with ACF/VTAME to enable a properly authorized network operator to monitor and control the data communications network. Either NOSP or NCCF can be run as a subtask of ACF/VTAME in a single partition.
- ACF/VTAME's RAS functions and modular design assist in providing a reliable data communications network, assist in problem determination and ease maintenance. ACF/VTAME takes advantage of the facilities provided by the DOS/VSE Maintain System History Program (MSHP) to ease installation and maintenance. Online terminal tests are available for selected terminals through the Teleprocessing Online Test Executive Program (TOLTEP). These tests can be run concurrently with user programs.

**CUSTOMER RESPONSIBILITIES**

To install and use ACF/VTAME, the customer must:

- Design the single or multiple system network.
- Order and install all required communications equipment.
- Install ACF/VTAME and the corequisite ACF/VTAME System Control Programming (SCP) modules.
- Define the single or multiple system network to ACF/VTAME (and to ACF/VTAM and/or ACF/TCAM, if applicable) in each host.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

ACF/VTAME runs in a virtual storage environment on the IBM 4331 Processor in S/370 Compatibility mode or in Extended Control Program Support for Virtual Storage Extended (ECPS:VSE) mode.

ACF/VTAME supports the Communications Adapter for SDLC and BSC lines. BSC support is for nonswitched EBCDIC 3270 only. Start/stop lines are not supported by ACF/VTAME.

ACF/VTAME also supports various SNA and nonSNA channel attached devices.

**COMMUNICATIONS FACILITIES**

A wide range of line type and modem type variations are supported by the CA. The variations recognized by ACF/VTAME are nonswitched line, switched call in, switched call out and switched network back up. For a complete list of supported attachments, consult the 4331 CA documentation. The following is an extract from the CA list:

EIA RS232C/CCITT V.24, V.28  
EIA RS366/CCITT V/25  
DDS  
CCITT V.35

ACF/VTAME and the CA support 4-wire data communications facilities in Half Duplex data mode.

Full SNA-SDLC and BSC line protocols (for BSC 3270 only) are supported, including multipoint line control. Switched support for SNA devices is also provided.

**COMMUNICATIONS CONTROLLER SUPPORT:**

In a multisystem network, ACF/VTAME can communicate with a suitably featured ACF/NCP/VS in a 3705 (controlled by another domain) over an SDLC line but will not provide control point functions for NCP. That is, ACF/VTAME does not support a channel attached or remote 3705 and cannot take over or own resources in a line attached NCP.

**ACF/VTAME TERMINAL SUPPORT CHART (\*)**

**BSC Terminals:** [Note 1]

3271-1,-2  
3274-1C,-21C,-31C,-51C (3271-1,-2) [Note 3]  
3275-1,-2  
3276-1,-2,-3,-4 (3271-1,-2) [Note 3]  
5275 (3275-1,-2)  
5937 (3271-1,-2)  
5285/5288 (3271-2)  
System/34 (3271-2)  
System/36 (3271-2)  
8130 (3271-1,-2) [Note 3]  
8140 (3271-1,-2) [Note 3]  
System/38 (3271-1,-2) [Note 7]

PROGRAM PRODUCTS

**ACF/VTAME (cont'd)**

**SDLC Terminals:**

3232-1  
 3274-1C,-21C,-31C,-51C (3791) [ Note 1,3]  
 3276-11,-12,-13,-14 (3791) [ Note 3]  
 3276-1,-2,-3,-4, [ Note 4] (3791) [ Note 3]  
 3601, 3602  
 3614, 3624 [ Note 1]  
 3631, 3632 (3601, 3602)  
 3651-A50,-B50,-25,-75  
 3651-A60,-B60  
 3661 (Note 2)  
 3684 -1,-2  
 3694  
 3767-1,-2,-3  
 3771-1,-2,-3  
 3773-1,-2,-3  
 3773-P1,-P2,-P3  
 3774-1,-2  
 3774-P1,-P2  
 3775-1  
 3775-P1  
 3776-1,-2,-3,-4  
 3777-1,-3,-4  
 3791  
 3791/3730  
 3791/3760  
 4701-1,-2  
 5285/5288 (3274-1C or 3770)  
 6670 (Logical Unit 4)  
 8130 (3791)  
 8140 (3791)  
 8775-11,-12 (3274)  
 System/32 (3770)  
 System/34 (3770)  
 System/34 (3274-1C)  
 System/36 (3770)  
 System/36 (3274-1C)  
 System/38 (3770)  
 System/38 (3274) [ Note 7]

**Local Terminals:**

3272-1,-2  
 3274-1A,-21A,-31A (3791) [ Note 3]  
 3274-1B,-1D,-21B,-21D,-31D (3272-1,-2) [ Note 3]  
 3791  
 3791/3730  
 3791/3760  
 4331 Display/Printer Adapter (3272-2) [ Note 5]  
 4331 Loop Adapter (3274-1A) [ Note 6]

\* All of the above terminals have both single and multisystem support. The terminal type in parentheses designates the programming support provided by ACF/VTAME. E.g., "8130 (3791)" means "the 8130 is supported as a 3791". In a multisystem network, terminals supported by ACF/VTAM and ACF/TCAM, including those supported by ACF/VTAM through the Network Terminal Option program product, can communicate with ACF/VTAME application programs.

- Note 1: Nonswitched connection only.
- Note 2: Switched connection only.
- Note 3: Buffer sizes of 960, 1920, 2560 and 3440 characters are supported.
- Note 4: With SDLC/BSC Switch in SDLC mode.
- Note 5: 4331 Display/Printer Adapter and Display/Printer Adapter Expansion, supported as a 3272-2.
- Note 6: 4331 Loop Adapter Feature supported as a 3274-1A.
- Note 7: Buffer size of 1,920 is supported.

**SOFTWARE REQUIREMENTS**

ACF/VTAME is designed to run on DOS/VSE with the VSE/Advanced Functions program product.

Use of ACF/VTAME requires the concurrent installation of corequisite VTAM system control programming (SCP) modules (Program Number 5747-CG2). These SCP modules should only be installed by ACF/VTAME users.

ACF/VTAME will operate in a VM environment using a DOS/VSE guest operating system with the VSE/Advanced Functions program product in a 4300 Processor in S/370 Compatibility mode. Operation of ACF/VTAME under VM/370 may add additional processor overhead. If a user has specific throughput or terminal response requirements for a VM system, a benchmark under VM/370 should be planned to ensure that any proposed configuration will meet the user's performance needs.

**RELATED IBM PROGRAMS**

The following related IBM programs and program products are supported by ACF/VTAME:

DB/DC	CICS/DOS/VSE
Job Entry	VSE/POWER
Interactive	IIS, VSE/ICCF (*)
Device Support	SSS, BTP, DSX
Communications Network Mgmt.	NOSP, NCCF

(\*): VSE/ICCF is supported by ACF/VTAME through CICS/DOS/VSE.

Note: Refer to the appropriate pages and Announcement Letters for information on programming support for specific devices supported and other related IBM program capabilities.

**COMPATIBILITY**

The ACF/VTAME Record API is compatible with the ACF/VTAM Version 1 Release 2 or ACF/VTAM Version 2 record API.

The ACF/VTAM Release 1 record API is compatible with the ACF/VTAME API and with the ACF/VTAM Release 2 API except for the "SIMLOGON CONALL" function that has been changed to operate compatibly with the "OPNDST CONALL" function. However, user programs written at the ACF/VTAM Release 1 level may require changes to take advantage of the new capabilities offered by ACF/VTAME and ACF/VTAM Release 2.

The following is a summary of the functions unique to ACF/VTAME and of some of the key ACF/VTAM Release 1 and Release 2 functions included or excluded in ACF/VTAME.

**ACF/VTAME Unique Functions:**

- Support of the SDLC Communications Adapter
- Support of the BSC Communications Adapter (for nonswitched BSC 3270)

**ACF/VTAM Version 1 Release 1 Functions Included in ACF/VTAME:**

- SNA-SDLC terminal support (in Half Duplex data mode).
- Channel attached device support (3270, 3790).
- Record API.
- Record mode support for BSC 3270 terminals.
- Application program to application program communications.
- Program operator interface (POI).
- Cross domain sessions.
- Switched network backup.
- Host transit node.
- Inbound message traffic pacing.
- Display command enhancements.
- Dynamic allocation of buffers.
- Internal VTAM trace.

**ACF/VTAM Version 1 Release 2 Functions Included in ACF/VTAME:**

- Networking capabilities for channel attached 3270 terminals and for channel attached 3790.
- Application program to application program parallel sessions.
- Negotiable session initialization parameters.
- Terminal connectivity test.
- Enhanced network operator control for session termination.
- Support of the Network Communication Control Facility (NCCF) program product.

**ACF/VTAM Version 1 Release 1 Functions Excluded from ACF/VTAME:**

Control of the IBM 3705 Communications Controller with ACF/NCP/VSE.  
 Functions supported in conjunction with the 3705 with ACF/NCP/VSE:

- Support of the IBM 3271-11,-12 and 3275-11,-12.
- Configuration restart.
- Host backup.
- Tuning statistics.
- Line tracing.
- Backup links between 3705s.
- Backup link testing.

Basic mode API (for support of various start/stop and BSC devices:)

- Support of Full Duplex SDLC lines.

**ACF/VTAM Version 1 Release 2 Functions Excluded from ACF/VTAME:**

Additional functions in support of the 3705 with ACF/NCP/VSE.

- Support of the Network Terminal Option program product.
- Support of improved display and dump facilities for ACF/NCP/VSE.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices under ACF/NCP/VSE.
- Enhanced SDLC data link test with ACF/NCP/VSE.
- Intensive mode recording of SDLC data link errors.

**ACF/VTAME (cont'd)**

**MIGRATION AND PLANNING CONSIDERATIONS**

**ACF/VTAME vs ACF/VTAM CONSIDERATIONS:** To decide between installing ACF/VTAME with a Communications Adapter or installing ACF/VTAM with a 3705 and ACF/NCP/VS, the user should consider the following factors:

- The number of lines required in the network.
- The need for the additional ACF/VTAM or 3705 - ACF/NCP/VS functions in the user's data communications network, such as:
  - Support for Full Duplex SDLC lines.
  - Host Backup capabilities.
  - More extensive network problem determination functions.
  - Support of some start/stop terminals with the Network Terminal Option program product.
  - Support of 3271-11,-12 and 3275-11,-12.
- System performance requirements that may be affected by:
  - The additional processor cycles required to operate the Communications Adapter.
  - The somewhat greater working set size of ACF/VTAME.
  - The somewhat greater path lengths of ACF/VTAME.

**COMMUNICATIONS NETWORK CONSIDERATIONS**

For SNA-SDLC, ACF/VTAME supports switched and nonswitched lines attached to the Communications Adapter. Nonswitched networks are supported as point-to-point or multipoint as appropriate for the device. Switched networks are supported as point-to-point, manual dial or automatic dial, and automatic answer. Each station has a unique transmission identifier within the network, as defined by the installation.

BSC support is for nonswitched EBCDIC BSC 3270 devices.

**MULTISYSTEM CONSIDERATIONS**

Use of ACF/VTAME in a multiple system environment requires the Communications Adapter with an SDLC link to another domain. Also required is the definition of the resources in other domains with which ACF/VTAME will communicate. This is accomplished via CDRM (Cross Domain Resource Manager), CDRSC (Cross Domain Resources), and Path Table definition statements.

ACF/VTAME will communicate with ACF/VTAM and ACF/TCAM through an SDLC-line-attached 3705 with ACF/NCP/VS. ACF/VTAM and ACF/TCAM require the Multisystem Networking Facility feature for this communication.

In a multisystem network, the terminals supported by ACF/VTAME can communicate with ACF/VTAM, ACF/TCAM and other ACF/VTAME application programs in other domains. Similarly, the terminals supported by ACF/VTAM and ACF/TCAM in other domains, including those supported by ACF/VTAM through the Network Terminal Option program product, can communicate with ACF/VTAME application programs.

In a mixed ACF/VTAME - ACF/TCAM multisystem environment, the ability of ACF/VTAME to determine the device characteristics of terminals controlled by ACF/TCAM is limited to those indicators defined and maintained by ACF/TCAM. In particular, the ability to determine the physical device address used in the 3270 copy function is not supported.

**OTHER CONSIDERATIONS**

When used only for data communications between a channel attached device and an application program in the same processor, or between two application programs in the same processor, ACF/VTAME does not require the Communications Adapter.

**CONVERTING FROM BTAM TO ACF/VTAME**

Conversion to ACF/VTAME from BTAM or other access methods involves most of the same considerations and advantages of a move to ACF/VTAM, except that ACF/VTAME users will not have ACF/NCP/VS considerations.

Except for nonswitched BSC 3270, ACF/VTAME does not support BSC or start/stop devices. However, applications that support BSC or start/stop devices with the BTAM Extended Support (BTAM-ES) program product may coexist in the same host with ACF/VTAME. The Communications Adapter of the 4331 Processor, if equipped with the appropriate hardware features, supports concurrent use of any two of the three line disciplines: SDLC, BSC, start/stop. This eases the migration of existing BTAM systems to ACF/VTAME through the concurrent use of ACF/VTAME and BTAM-ES. It should be noted, however, that ACF/VTAME and BTAM-ES cannot share lines. The terminals controlled by BTAM-ES application programs do not participate in the ACF/VTAME single or multiple domain network. If a line is controlled by a BTAM-ES application program, the BTAM-ES application program must be terminated before the given line may be activated through ACF/VTAME.

**MIGRATING ACF/VTAME to ACF/VTAM**

On DOS/VSE, ACF/VTAME application programs will run without change or recompilation on ACF/VTAM Version 1 Release 2 or 3 or ACF/VTAM Version 2.

Recompilation of ACF/VTAME application programs is required for them to run with ACF/VTAM Version 1 Release 2 or 3 or ACF/VTAM Version 2 on OS/VS1 or OS/VS2 MVS. Moreover, changes may be required to the portions of the application programs that are dependent on operating system functions and facilities.

The main considerations in a migration from ACF/VTAME to ACF/VTAM Version 1 Release 2 or ACF/VTAM Version 2 will be:

- Conversion of Communications Adapter (CA) major node definitions to an NCP generation for ACF/NCP/VS.
- Transfer of the communication lines from the CA to the 3705.

Note that ACF/VTAME and ACF/VTAM cannot be run concurrently on the same processor, except using VM/370. However, the communications adapter support in ACF/VTAM Version 2 Release 1 for VSE facilitates the migration from ACF/VTAME to ACF/VTAM Version 2.

**DATA SECURITY, AUDITABILITY AND CONTROL**

ACF/VTAME enables the installation to establish and maintain the integrity of the data communications network. The installation can control sessions between application programs and terminals. The installation can also control the access and use of data within the system.

Like ACF/VTAM, ACF/VTAME provides a confidential text capability. The data on sessions defined by the user to contain confidential text is not included in buffer traces. Moreover, buffers containing confidential text are cleared before being returned to the buffer pool.

User management is responsible for the selection, application, adequacy and implementation of these features and for appropriate application and administrative controls.

**PERFORMANCE AND STORAGE CONSIDERATIONS**

Machine and estimated storage requirements will be provided in the *Advanced Communication Function for VTAM Entry (ACF/VTAME) Installation (SC27-0439)*.

The design objectives for ACF/VTAME are to have total storage requirements and path lengths somewhat greater for ACF/VTAME than for an equivalent ACF/VTAM Release 2. This is due to the significant number of NCP-like functions performed by ACF/VTAME, which in an ACF/VTAM system, are performed by the network control program (ACF/NCP/VS) in the 3705 Communications Controller.

Specific user storage requirements will be dependent on the specific configuration and upon the following user-specified areas and functions:

- I/O buffer areas.
- Number and organization of terminals.
- Number and type of macro instructions used.

Note also that the Communications Adapter on the 4331 shares the processor for its processing and will thus have some effect on the total system performance as compared to an equivalent system using a 3705.

Response time in a single system environment is dependent on a variety of processor and data communication load factors, such as:

- Line speeds.
- Number, type and organization of terminals.
- Number and type of ACF/VTAME commands and exits used by the application programs.
- Amount of processing performed by the application programs.

Response time in a multisystem environment will depend on the factors above and on various network load factors, including the number of nodes traversed.

**DOCUMENTATION**  
(available from Mechanicsburg)

ACF/VTAME Program Summary	GC27-0436
ACF/VTAME Licensed Program Specifications	GC27-0437
VTAM System Control Programming Specs	GC27-0440
ACF/VTAME General Information:Introduction	GC27-0438
ACF/VTAME General Information:Concepts	GC27-0451
ACF/VTAME Installation	SC27-0439
ACF/VTAME Pre-Installation Planning	SC27-0441
ACF/VTAME Programming	SC27-0442
ACF/VTAME Reference Summary	SX27-3032
ACF/VTAME Operation	SC27-0443
ACF/VTAME Messages and Codes	SC27-0444
ACF/VTAME Diagnostic Techniques	SY38-3012
ACF/VTAME Logic Overview	LY38-3013
ACF/VTAME Logic	LY38-3014
ACF/VTAME Data Areas	LY38-3016
ACF/VTAME Control Block Overview	LX27-3033

PROGRAM PRODUCTS

**DOS/VSE REMOTE JOB ENTRY  
WORKSTATION PROGRAM PRODUCT  
5746-RC9**

**PURPOSE**

The DOS/VSE Remote Job Entry Workstation Program enables a S/370, 3031 Processor Complex or the 4300 Processor to function simultaneously as:

A Multi-leaving Remote Job Entry Workstation for submitting jobs to a central system for execution under OS/VS.

A local processor for execution of DOS/VSE batch jobs in other DOS/VSE partitions.

**DESCRIPTION**

The DOS/VSE RJE Workstation Program executes in one partition of DOS/VSE; other partitions can be used to run other DOS/VSE jobs.

The Workstation Program includes a teleprocessing communication supervisor, input/output device support and operator command routines to allow the remote computer (workstation) to transmit jobs to a central computer. Jobs are entered on a workstation operating under DOS/VSE. They are submitted to a central computer for OS/VS processing under one of the following systems:

- VM/370 Release 5 with RSCS, VNET PRPO or
- VM/370 Release 6 with RSCS Networking PP.
- OS/VS1 Release 6 with RES.
- OS/VS2 Release 1.7 with ASP Version 3.1 or
- HASP II Version 4.0.
- OS/VS2 Release 3.7 with JES2 or JES3 or
- NJE for JES2 PP.

Data sets, as well as jobs, can be transmitted between the workstation and the central computer. Two utility programs are distributed with the DOS/VSE RJE Workstation Program. These utilities are link-edited into the OS/VS Link Library. JCL statements are transmitted from the workstation to the central computer to cause execution of the utilities under OS/VS to provide the data set transmission function.

The Workstation Program executes in virtual mode under DOS/VS on a S/370 mdl 115, 125, 135, 138, 145, 148, 155II or 158, or 3031 Processor Complex or 4300 Processor. The system must be equipped with binary synchronous communication facilities. The DOS/VSE Workstation Program and the Remote Terminal Access Method (RTAM), used by each of the OS/VS systems to service workstations, provide Multi-leaving support to allow fully synchronized two-directional transmission of data between the central computer and one or more devices on the workstation.

Each workstation requires a DOS/VSE RJE Workstation Program generated to conform to the hardware at the workstation location, the software at the central installation and the optional functions desired. Thus, for example, the program can be tailored to provide support for file transmission, spooling, telecommunication line tracing and specific devices and features on the workstation.

The DOS/VSE RJE Workstation Program includes routines to:

Enable binary synchronous transmission to and from the central computer, perform communication line error processing and error logging and trace communication line reads and writes onto tape.

Support up to seven input functions, with job streams permitted from a card reader, tape, disk or diskette.

Support up to seven print and seven output functions, that print, punch, create files or spool print and punch output onto tape or disk, or write it on a diskette. Device support is provided for the card interpret function of the 3525 Card Read Punch and for the forms control buffer (FCB on 3203, 3211 and 5203 printers) and universal character set buffer (UCSB on 1403, 3203, 3211 and 5203 printers).

Support up to seven output writers running concurrently that punch, create files or spool punch output onto tape or disk, or write it on a diskette.

Analyze commands entered at the workstation, process local commands and transmit central system commands. The central system commands enable the workstation user to monitor and control the execution of jobs submitted from the workstation to the central computer.

Print messages transmitted from the central computer or other workstations, and send messages entered at the workstation.

Operation of the DOS/VSE RJE Workstation Program is initiated by a LOGON/SIGNON statement entered at the workstation and transmitted to the central computer. A password and workstation identification, specified during generation of the program, can be required to help security of data and prevent unauthorized access to the central computer. The workstation session need not encompass the total time for processing jobs submitted to the central computer. The program can be terminated after transmitting the jobs, then restarted later to obtain the output.

Since the workstation is used for local batch processing as well as for transmitting jobs to the central computer, the DOS/VSE RJE Workstation Program competes with other DOS/VSE jobs for resources. The dynamic assignment of symbolic devices to physical I/O units by the program helps to optimize usage of all I/O resources. However, the operator must start input units to submit jobs, and start output units when notified by the central computer that output is ready for transmission. The DOS/VSE Workstation Program can unassign the units at end of file, if this option is specified.

Monitoring and control of job processing by the workstation operator is provided. The operator can control the transmission of output to other workstations or to output units on the central computer. A central display command enables the operator to check the status of transmitted jobs. With the local command MAP, the operator can verify that workstation functions are started and that central requests to transmit output are serviced. Although automatic recovery action for communication line errors is provided, the operator can review severe errors that may affect turnaround time, by using the LOG command. In addition, the TRACE command can be used to record complete line traffic.

**HIGHLIGHTS**

**Non-dedicated workstation:** The DOS/VSE RJE Workstation Program occupies one partition of DOS/VSE; other partitions can be used for batch processing of DOS/VSE jobs.

**Job transmission:** Jobs are transmitted over a binary synchronous communication lines for execution under OS/VS on the central computer.

**Data set transmission:** Sequentially-organized data sets can be transmitted between the central computer and the workstation.

**Full Multi-leaving support:** The DOS/VSE RJE Workstation Program and the Remote Terminal Access Method (RTAM) provide telecommunications support to transmit data concurrently between the central computer and multiple I/O devices at the workstation.

**Output spooling:** Output data can be spooled onto tape or disk devices and later printed or punched via a spool utility provided with the program.

**FCB and UCSB load facility:** The operator is notified when loading of the forms control buffer (FCB) or universal character set buffer (UCSB) is required, and can load the buffer with operator commands.

**Dynamic assignment of I/O units:** Input/output units are automatically assigned to functions as required and unassigned at end of file, without operator intervention.

**Operator communication:** The operator has full communication with the system via local commands to the workstation, system commands to the central computer and message transmission to and from the central computer and other workstations.

**DEVICE SUPPORT**

Input/Output units on the workstation computer that are supported by the DOS/VSE RJE Workstation Program include:

- Card Readers
- 2501, 3504, 3505
- Card Read Punches
- 2520, 2540, 2560, 1442, 3525
- Printers
- 1403 (and 1403 with UCS), 1443, 3203, 3211, 3262, 4245, 5203 (and 5203 with UCS)
- Magnetic Tape
- 2400, 8809, 3410, 3420
- Direct Access Storage Devices
- 2314/2319, 3330, 3340, 3344, 3350, 3310, 3360
- Diskette
- 3540

**USE**

The DOS/VSE RJE Workstation Program offers advantages to the user in increased processing capability at the workstation, more efficient production at the central computer and convenient support of DOS/VSE to OS/VS transition.

The DOS/VSE user with limited local processing capability gains access, through the DOS/VSE RJE Workstation Program, to a central computer and to OS/VS. Thus, jobs submitted at the workstation can use all the processing power and programming functions of the central computer. Data sets maintained on the central computer are also available to the workstations.

Companies with a centralized OS/VS system can benefit from use of the DOS/VSE RJE Workstation Program. It enables online input and immediate processing of information from remote offices, plus direct distribution of reports to those locations, thus eliminating the delays

**DOS/VSE RJE Workstation Program (cont'd)**

and inefficiencies inherent in the conventional shipping of jobs and reports.

The DOS/VSE user converting to OS/VS can use the DOS/VSE RJE Workstation Program as a transition aid. By establishing a temporary interface to an OS/VS system, the user can test programs under OS/VS and convert production runs from DOS/VSE to OS/VS operation, without interrupting scheduled work under DOS/VSE.

**CUSTOMER RESPONSIBILITIES**

Order and install communications equipment based on processing needs.

Generate DOS/VSE Supervisor for remote processor with options required by DOS/VSE RJE Workstation Program.

Tailor DOS/VSE RJE Workstation Program to include desired features.

Establish password and priorities for workstation.

Install DOS/VSE RJE Workstation Program and test with application programs.

Train system operators in use of OS/VS commands in addition to DOS/VSE and DOS/VSE RJE Workstation Program commands and operation

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum machine requirements for the DOS/VSE RJE Workstation program are the same as those needed for operation of any IBM S/370, 3031 Processor Complex or 4300 Processor supported by the IBM Disk Operating System/Virtual Storage Extended (DOS/VSE). The I/O device configuration is dependent on the functions to be utilized.

In addition, the system must be equipped with a communication line and one of the following binary synchronous communication facilities:

- Integrated Communications Adapter (ICA).
- Communications Adapter (CA).
- 2701 Data Adapter Unit.
- 2703 Transmission Control Unit.
- 3704 Communications Controller in Emulation Mode.
- 3705 Communications Controller in Emulation Mode.

The Workstation Program can transmit to the central computer via a point-to-point (leased or switched) communication line that may be either two-wire half duplex or four-wire half duplex.

The typical size of a Workstation Program is approximately 40K bytes of virtual storage. Real storage partition allocation is not required.

The amount of processor storage required for execution of the DOS/VSE RJE Workstation Program depends on the following factors:

- Number of service processors running concurrently.
- Number and size of communication line buffers.
- Speed of communication lines.
- Operator communication facilities used.
- I/O functions generated (spool/file transmission).
- Type of I/O units used.
- Optional functions generated and used (TRACE/UCSB/FCB, etc.).

**SOFTWARE REQUIREMENTS**

The DOS/VSE RJE Workstation Program is written in Assembler language and runs in virtual mode on a S/370, 3031 Processor Complex or 4300 Processor under control of the Disk Operating System/Virtual Storage Extended (DOS/VSE) and the VSE/Advanced Functions Program (5746-XE8). It executes in a single partition of DOS/VSE using standard multitasking. There is no known technical dependency on the VSE/Advanced Functions program product by the DOS/VSE Workstation Program. However, the specified operating environment for DOS/VSE includes the VSE/Advanced Functions program product.

There are certain limitations.

If the DOS/VSE System has a 3800 printer that is to be used for local printing of output from the DOS/VSE RJE Workstation Program, the DOS/VSE RJE workstation program provides support for the basic print/space functions of the 3800 printer. Other 3800 printer functions, including burst and flash must be provided by using the DOS/VSE RJE workstation program in conjunction with the VSE/POWER program product (5746-XE3). These additional functions can then be specified by using the DOS/VSE RJE workstation 1st command.

The DOS/VSE Supervisor requires specific options to support the DOS/VSE RJE Workstation Program. The supervisor generation macros NAPCOMR and SYSCOM are required for generation of the workstation program. If POWERVS = Yes is specified, IPW\$DDE and IPW\$DPD are also required. A DOS/VSE Supervisor Generation may be necessary, to include the Supervisor options required.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual ... Licensed Program Specifications.*

## PROGRAM PRODUCTS

**VSE INTERACTIVE PROBLEM CONTROL SYSTEM  
VSE/IPCS RELEASE 3 (5746-SA1)****PURPOSE**

VSE/IPCS assists in problem determination by providing a uniform mechanism for reporting and diagnosing software failures.

The VSE System contains facilities that collect problem data resulting from errors detected within the Supervisor, subsystems or user programs. The problem data is recorded on a DASD file.

VSE/IPCS provides problem dump data management, creation of a problem description report with a symptom string, problem dump data display, special formatting of the VSE System and VSE/POWER control blocks and assistance with APAR reporting.

VSE/IPCS can be executed in either a VSE System partition or a VSE/ICCF partition.

To operate, VSE/IPCS commands are entered from either the system input device, the system console or a VSE/ICCF controlled terminal.

**HIGHLIGHTS**

- **Problem Data Collection**

The System Dump and Standalone Dump programs provided with the VSE System perform the problem data collection. The option is provided to collect storage dumps and supplementary information on SYSDMP, a newly defined Symbolic Unit.

- **Problem-Data Management**

The migrate utility program of VSE/IPCS can offload SYSDMP contents to magnetic tape. This feature allows not only for economizing on direct access storage space, but also for processing on another VSE System installation.

- **Problem Description Report**

VSE/IPCS searches the available problem data and prepares a structured summary of the problem. Operator comments may be added via commands. The resulting Problem Description Report can be viewed or printed. Problem symptoms contained in the report can be compared to symptoms of other problems to determine if the current problem is a duplicate of a previous problem.

- **Display and Analysis**

Support is provided for storage dumps in either S/370 mode or ECPS:VSE mode. Via commands, all or selected parts of the dump can be formatted and displayed on the system console or can be printed.

- **APAR Submission**

The APAR function creates a report with known information filled in by the system. This report is used as source information required for filling in the standard APAR form. The APAR form, together with the console log and a printed dump, or optionally a magnetic tape containing the offloaded dump, can then be submitted to IBM. Only problems arising from IBM System Control Programs (SCP), Program Products and their respective documentation are covered by the APAR process.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VSE/IPCS operates in either S/370 mode or Extended Control Program Support (ECPS:VSE) mode on any IBM S/370, 303X or 4300 Processor that meets the minimum requirements for the VSE System.

VSE/IPCS provides support for SYSDMP on the following DASD devices: 2314, 2319, 3330-1, 3330-11, 3350, 3340 (both 35 and 70MB), 3344, 3310 and 3370.

The interface to VSE/IPCS is via the system console or card reader and printer or a VSE/ICCF terminal.

IPCS requires 400 blocks of Core Image Library space and a 200K virtual partition. The migrate utility requires 140 blocks of Core Image Library space and a 116K virtual partition.

DASD space is required for the IPCS dump buffer, a work file used during IPCS processing. The size of this file is dependent on the maximum size of a dump on the SYSDMP files and other factors as described in the *VSE/IPCS General Information Manual* (GC34-2017).

A VSE supported tape drive is required for the migrate utility (a component of VSE/IPCS) and the IPCS PUTDUMP function.

**SOFTWARE REQUIREMENTS**

VSE/IPCS may operate under VSE/ICCF but is not dependent upon it.

VSE/IPCS Release 3 operates with VSE and its subsequent releases and modification levels unless otherwise stated, using Release 3 of the VSE/Advanced Functions program product. Because of differences in dump formats, VSE/IPCS Release 3:

- Does not operate with or process dumps from SYSDMP files produced by Releases 1 or 2 of VSE/Advanced Functions.
- Does not process tapes produced by VSE/IPCS Releases 1 or 2.

**DEPENDENCIES**

VSE/IPCS Release 3 is designed to operate with the VSE System using Release 3 of the VSE/Advanced Functions program product. SYSDMP, the VSE System Logical Unit, and MSHP, the Maintain System History Program must be included in this environment. VSE/IPCS can operate under VSE/ICCF, but is not dependent upon it.

**SECURITY**

Security of information at the user installation must be externally controlled. The installation must continue to take specific action to prevent unauthorized access to dumps containing sensitive data.

**PERFORMANCE CONSIDERATIONS**

The problem data collection mechanism is invoked by the system or by the operator when an error is detected by the VSE System. Storage is recorded on SYSDMP, always assigned to a direct access storage device. The performance impact on any other continuing programs is the same as when a dump is recorded on SYSLST, and SYSLST is assigned to a direct access storage device. The partition in which VSE/IPCS is to be executed can be assigned any priority desired to conform to the customer's performance requirements. During VSE/IPCS operation the response time for the various VSE/IPCS commands will vary with the complexity of the command, the size of the dump, the speed of the processor and the current system load.

RPQs ACCEPTED: No



## PROGRAM PRODUCTS

**DOS/VS SORT/MERGE  
5746-SM1****PURPOSE**

The DOS/VS Sort/Merge provides additional features and improved performance in virtual mode over the DOS Sort/Merge (5743-SM1). All sort and merge applications that run on 5743-SM1 will run on the DOS/VS Sort/Merge without changes to the control statements or to the interface with user programs with the following exceptions:

- 2311 workfiles are not supported.
- The design point is 16K virtual storage (10K for 5743-SM1).

DOS/VS Sort/Merge operates only in a S/370 virtual systems environment on DOS/VS Release 29 and subsequent releases.

**HIGHLIGHTS**

- Support of the 3340 Disk Storage Facility for input, output and work data sets.
- Support of Key-Sequenced and Entry-Sequenced VSAM data sets for input to and output from the sort and merge.
- Ability to incorporate a user-written routine to read input for merging. This feature was previously available only for sorting applications.
- Ability to specify a subset of the input file to be selected for the sort or merge by using new types of control statements. The selection of a record may be based upon one or more relations between two fields in the record, or between a field in the record and a constant in the control statement. Floating point data may not be used as a basis for selection.
- Ability to specify that the sorted or merged output records should contain selected parts of the input records by using a new type of control statement.
- Ability to request that a summary sort should be performed and which fields should be summarized by using a new type of control statement. When two records have equal control fields, the contents of the summary fields are added, the sum is placed in one of the records and the other record is deleted. Floating point data may not be summarized.
- Ability to specify a collating sequence other than EBCDIC and/or ASCII by using a new type of control statement.

**Other Features:** DOS/VS Sort/Merge includes all functions, facilities and options of the 5743-SM1 program product among which are:

- Support of the 3330/3333 Disk Storage and the 3410, 3411 and 3420 tape devices for input, output and work data sets.
- Ability to be invoked by DOS COBOL, PL/I or the Auto Report Feature of RPG II programs.
- Ability to operate in both foreground and/or background partitions.
- Ability to sort or merge on control fields with mixed data formats.
- Ability to use any programmer logical unit numbers for input, output and work data sets.
- Ability to route messages to either the console device or the printer device.
- Ability to produce unblocked variable length records in the output file.
- Ability to accept records of full-track length in sort applications.

The Rotational Position Sensing feature of the 3330/3333 and 3340 Disk Storage Facility will be supported by DOS/VS Sort/Merge for input, output and work data sets. This support will be concurrent with the DOS/VS support of RPS.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The minimum IBM configuration supported by the DOS/VS Sort/Merge program is:

- Any IBM processor supported by DOS/VS.
- A minimum virtual or real partition of 16K for the Sort/Merge.
- One disk storage device for system residence.
- Unit record equipment as required by the system.
- Three tape units when tape work data sets are used.
- Additional tape units if tape input/output is desired.
- Sufficient direct access space when direct access input, output and/or work data sets are used.

DOS/VS Sort/Merge will utilize storage given by the smallest of the following values: STORAGE, SIZE or Partition Size. If for virtual mode neither STORAGE nor SIZE is specified, Sort/Merge will calculate its

requirements (though it will then try to limit the storage requirement to 64K). For work data sets Sort/Merge will utilize up to 8 extents on 2314, 2319, 3330, 3333 or 3340 direct access devices or up to ten 2401, 2415, 2420, 3410, 3411 or 3420 tape units.

**SOFTWARE REQUIREMENTS**

DOS/VS Sort/Merge executes under the IBM DOS/VS Operating System. Sort/Merge support of the 3340 Disk Storage requires the DOS/VS release which provides 3340 support. Sort/Merge support of the RPS feature requires the DOS/VS release which provides RPS support.

**COMPATIBILITY**

A valid set of Sort/Merge control statements, Job control statements and user written exit routines prepared for the 5743-SM1 program product or Type I 360N-SM-483 program can be used without change for the DOS/VS Sort/Merge program product with the following exceptions:

- 2311 workfiles are not supported.
- The design point is 16K virtual storage (10K for 5743-SM1).

SAM data sets used and produced by DOS/VS Sort/Merge are completely compatible with the data sets used and produced by 5743-SM1 (and 360N-SM-483 for non-ASCII data sets).

360N-SM-483 or 5743-SM1 cannot reside together with the DOS/VS Sort/Merge program product in the same (Private) Core Image Library without renaming those phases that have identical names.

**PERFORMANCE**

The DOS/VS Sort 5746-SM1 is designed to improve performance in virtual mode compared to 5743-SM1. It is particularly important to use this new sort if the user plans to run his DOS/VS system with significant overcommitment of real storage. In real mode the performance of the two sorts is approximately the same. In either mode, this assumes the same storage allocation, devices, etc. The support of the 3340 Disk Storage in 5746-SM1 utilizes the improved access and data transfer time of the 3340.

**DOCUMENTATION:** (available from Mechanicsburg)

*Specifications* (GC33-4025) ... *General Information Manual* (GC33-4030)





## PROGRAM PRODUCTS

**DOS/VS-VM/SP SORT/MERGE  
VERSION 2 RELEASE 5 (5746-SM2)****PURPOSE**

DOS/VS-VM/SP Sort/Merge Version 2, Release 5, Modification 0 provides additional functions that improve the productivity of DOS/VS-VM/SP Sort/Merge Version 2 users running under the control of DOS/VS Releases 33 and 34, DOS/VSE with VSE/Advanced Functions, and CMS with VM/SP.

**DESCRIPTION****NEW with RELEASE 5.0**

DOS/VS-VM/SP Sort/Merge Version 2, Release 5.0 provides new functions which are designed to improve the productivity of the DOS/VS-VM/SP Sort/Merge Version 2 user. These include:

- **Enhanced Control Field Handling**
  - The maximum number of control fields that can be specified are increased from 12 to 64.
  - The maximum total length of the control fields is increased from 256 bytes to 3,072 bytes.
- **New COPY function**
  - A new function - COPY - is added to permit an input file to be copied to an output file within the invocation of DOS/VS-VM/SP Sort/Merge Version 2. Functions available in merging files such as user exits, INCLUDE/OMIT, OUTREC and ANA-LYZE are available to be used with the COPY function.
- **Enhanced ADDROUT function (ADDROUT=D)**
  - A new ADDROUT=D keyword on the OPTION control statement will permit each sorted output record of DOS/VS-VM/SP Sort/Merge Version 2, Release 5.0 to contain the direct access address of the input record followed by the corresponding control field. This function was previously available in DOS/VS Sort/Merge (5746-SM1) and is now incorporated into DOS/VS-VM/SP Sort/Merge Version 2, Release 5.0 (5746-SM2).
- **Enhanced OUTREC function**
  - The currently available OUTREC function in DOS/VS Sort/Merge Version 2 Release 4.0 is being enhanced to permit the reformatting of input records to DOS/VS-VM/SP Sort/Merge Version 2, Release 5.0 to include padding with blanks and/or binary zeros before, between, and/or after the input fields.
- **A new function - INREC**
  - INREC will allow the input records to DOS/VS-VM/SP Sort/Merge Version 2 to be formatted before they are sorted. With this function, it is now possible to reformat input records before sorting without having to develop and maintain E15 exit programs. Thus, INREC may be used to reduce the size of input records to achieve more efficient sorting. This function has the same functional capabilities of OUTREC with the following additions:
    - INREC will not operate with COPY
    - The input records will be reformatted before sorting by INREC. Output records will be in the format specified by INREC, unless OUTREC is specified.
    - When INREC is specified, DOS/VS-VM/SP Sort/Merge Version 2, Release 5.0 reformats the input records after user exit E15 and/or INCLUDE/OMIT processing is completed.
    - In general, INREC should be used to reduce the length of input records as much as possible to achieve the most efficient sort. OUTREC should be used to reformat the records for output.
- **New Installation Options and Control Options**
  - A new keyword - ALTSEQ - provides the capability to specify a default alternate collating sequence in the installation macro to be used by DOS/VS-VM/SP Sort/Merge Version 2, Release 5.0 when comparing AQ format control fields defined in the SORT, MERGE, OMIT, and INCLUDE control statements.
  - Another new installation keyword - CHALT - is provided to be used in the installation macro to specify that the alternate collating sequence will apply to control fields specified with format CH as well as AQ in the SORT, MERGE, OMIT, and INCLUDE control statements.
  - The ALTSEQ control statement will completely override the default alternate collating sequence.
  - Two new keywords - CHALT and NOCHALT - have been added to the OPTION control statement. These new keywords permit the sort user to override the corresponding installation options at DOS/VS-VM/SP Sort/Merge Version 2 execution time. CHALT specifies that the alternate collating sequence applies to control fields specified in CH format as well as AQ formats. NOCHALT

specifies that the alternate collating sequence applies only to control fields specified in AQ format.

DOS/VS-VM/SP Sort/Merge, Version 2 Release 5.0, includes other important features available in its previous releases:

**Capabilities with VM/SP-CMS**

- Operating under the CMS/DOS environment of VM/SP, DOS/VS-VM/SP Sort/Merge Version 2, Release 5.0 can:
  - Sort or merge records from up to nine input files and, if necessary, use direct access devices as intermediate work areas.
  - Use CMS files as intermediate work files when needed.
- Sort/Merge accepts CMS, DOS, SAM, and VSAM files for input to sort or merge. There can be up to nine input files. Output can be to CMS or VSAM files.
  - CMS files are supported in two formats. They can be in regular CMS format or in simulated VSE format. CMS files are normally assumed to be in regular CMS format and are processed as such. CMS files are processed as simulated VSE files only when filemode 4 has been specified for the file on the DLBL command or as input to the DOSSORT EXEC.
  - Variable length simulated VSE files contain record descriptor words (RDW), while regular CMS variable length files do not. Sort adds an RDW to regular CMS variable length files prior to sorting or merging. The length of the RDW must be included when specifying sort or merge control fields.
  - Sort output to simulated VSE variable length files includes the record descriptor word.
  - Simulated VSE file support in Sort/Merge allows users to design and develop applications under CMS for use in DOS/VS or VSE/Advanced Function environments without changing Sort/Merge's control statements.

Intermediate work files (CMS format) can be on minidisks that are formatted with 1K, 2K, or 4K-byte block sizes. 800-byte block size CMS minidisks are not supported for sort work file use.

**Program Invocation with CMS with VM/SP**

- Sort/Merge can be executed using the DOSSORT EXEC, by the FETCH command, or by calling it from another program operating under CMS/DOS with VM/SP.
- The DOSSORT EXEC is provided as an easy means of getting started using Sort/Merge with CMS. It provides the following functions:
  - Prepares the environment and performs housekeeping needed to run Sort/Merge.
  - Sets default values.
  - Assigns units.
  - Issues DLBL commands for files used.
  - Can, when needed, prompt the user for file ID information (file name, file type, file mode).
  - Prompts for the names of DOS-LIBs containing user exits.
- DOS/VS-VM/SP Sort/Merge Version 2 can be initiated from programs written in:
  - Basic Assembler language (sort and merge)
  - DOS/VS COBOL (sort and merge)
  - DOS/PL/I (sort only)
  - DOS/VS RPG II with the Auto-Report Feature (sort only)

**Capabilities with DOS/VS, DOS/VSE with VSE/Advanced Functions, and VM/SP-CMS**

- Acceptance of VSAM-managed SAM files (CI-format) as input and output files. They may be accessed either as SAM or VSAM files. Managed files may be used as work files. It is possible to mix managed and non-managed files.  
**Note:** Not applicable to operation under CMS with VM/SP.
- Use of Simplified Symbolic Unit Handling and DOS/VSE Simplified Job Control for VSAM and VSAM-managed SAM files.  
**Note:** Not applicable to operation under CMS with VM/SP.
- DOS/VSE: The program will be able to detect whether it executes in S/370 compatibility mode or ECPS:VSE mode. When it runs in ECPS:VSE mode, the relocating channel function of the E-series hardware will be used by the program.
- Fixed Block Architecture (FBA): Devices operating in Fixed Block Mode can be used as input, output, work or checkpoint data sets.

PROGRAM PRODUCTS

DOS/VS Sort/Merge V2 R5.0 (cont'd)

- Variable length spanned records: The program will allow SAM input and output files to contain spanned records.  
**Note:** Not allowed when operating under CMS with VM/SP.
- Installation/Generation Options: The program options EQUALS, ERASE, DIAG, DUMP, VERIFY, PRINT=, ROUTE=, STORAGE=, SORTIN=, SORTOUT= and SORTWK= may receive installation unique default values.
- SORT or MERGE control fields can overlap each other.
- OUTREC fields can be located beyond byte 4092 of a record.
- When the program is invoked, the control statement images are optionally printed.
- When the program is invoked, messages may be routed to a printer other than SYSLST.
- A new statement, ANALYZE, makes it possible to get information on how Version 2 will optimize, and what capacity a sort job will have, without actually sorting or merging.
- More and better information messages and improved diagnostic handling.
- Automatic sequence checking in sort applications.
- Command chaining: The program will, if sufficient storage is available, use command chaining when it reads SAM input or writes SAM output for CKD (Count-Key-Data) and tape devices in sort applications. In most cases where command chaining is used, significant performance improvements can be experienced. The smaller the input/output block sizes of a sort application are, the greater the possibilities for performance improvements are. This function is not available for VSAM-managed SAM files. For those files and FBA files a large control interval (CI) may give similar results.  
**Note:** Not applicable to operation under CMS with VM/SP.
- Can sort records from up to nine input files, using direct access devices as work areas, and can merge up to nine presorted files.
- Has an improved disk sorting technique that reduces workfile space requirements and provides performance improvements for presequenced files, compared to earlier IBM DOS Sort/Merge offerings.
- Under certain conditions, sorting can be performed in main storage, regardless of whether workfiles have been allocated.
- Reentrant code is used in most of the program modules. These can therefore be stored in the SVA (Shared Virtual Area) to obtain enhanced performance.  
**Note:** Not applicable to operation under CMS with VM/SP.
- Subtasking of the program is allowed, that is, more than one sort program can be used concurrently in a partition.  
**Note:** Not applicable to operation under CMS with VM/SP.
- Work files can be allocated on a combination of any two of the permitted device families.
- Input and output files can be any VSAM data set, or SAM data sets on tape or disk devices.
- Split cylinder input and output CKD SAM files are allowed.  
**Note:** Not applicable to operation under CMS with VM/SP.
- A mixture of device types (tape and disk) is allowed for the input files to any sort or merge job.
- Control statement syntax is simplified, compared to earlier IBM DOS Sort/Merge offerings.
- The Sort/Merge can be dynamically invoked by programs written in COBOL, PL/I, the Auto Report Feature of RPG II or Assembler language.
- Input records can be fixed or variable length, blocked or unblocked.  
**Note:** For CMS support, see above.
- The input order of records with equal control fields can be preserved.
- Input records can be included or omitted from the output.
- Records with equal control fields can be summarized.
- Output records can be reformatted.
- Deviation from the standard EBCDIC collating sequence can be specified (alternative collating sequence).
- ASCII collating sequence can be specified.
- The checkpoint/restart facility of the DOS/VS system can be used.  
**Note:** Not applicable to operation under CMS with VM/SP.
- Final sort output can be given in the form of CKD direct access addresses of the input records for SAM data sets, and relative byte addresses for VSAM entry sequenced data sets (ESDS). For

VSAM relative record data sets (RRDS), the output can be given as a relative record number.

- The program may be extended at certain points called program exits.
- A formatted dump of the Sort/Merge communication areas, and trace information, is obtained if the program ends abnormally and the DUMP option has been specified.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The program is designed to execute on any IBM configuration supported by DOS/VS Releases 33 and 34, DOS/VSE or VM/System Product.

**Work File Devices**

**DOS/VS and DOS/VSE:** 3370 (FBA), 3310 (FBA), 3350, 3340/3344, 3330 mdls 1, 2 and 11, and 3333 mdls 1 and 11, 3375, and 2314/2319 devices.

**VM/SP:** Work files can be allocated on those devices supported by VM/System Product for use with CMS files. The work files can be on minidisks that are formatted with 1K, 2K or 4K-byte block sizes. 800-byte block size minidisks are not supported for work files.

**Input/Output Files**

**DOS/VS and DOS/VSE:** Input/output files can reside on 3370 (FBA), 3310 (FBA), 3350, 3340/3344, 3330 mdls 1, 2 and 11, and 3333 mdls 1 and 11, 3375, 2314/2319, 2311, 3420, 3410, 2400, and 8809 in start/stop mode.

**CMS:** Input/Output files can reside on any of the above direct access devices supported by VM/System Product for use with CMS.

**Note:** The use of the above devices with Version 2 requires the release level of the control program and the hardware system in which support is provided.

**SOFTWARE REQUIREMENTS**

DOS/VS-VM/SP Sort/Merge, Version 2, is designed to run under DOS/VS Releases 33 and 34 and DOS/VSE with VSE/Advanced Functions, or under the CMS/DOS environment of VM/System Product.

When running under DOS/VS or DOS/VSE, the program requires that the relocating loader feature (standard in DOS/VSE, optional in DOS/VS Releases 33 and 34) be generated into the DOS/VS control program. The program also requires a minimum of 32K bytes of virtual storage when it is executed. VSAM and VSAM-managed SAM file processing with DOS/VSE requires VSE/VSAM, VSE/VSAM Space Management for SAM feature and VSE/Advanced Functions licensed programs to be present in the system.

When running under VM/SP, the program has no requirements for additional supporting products, unless VSAM files are used. In this case, VSE/VSAM Release 2 must be present in the system.

**Installation:** Sort/Merge is installed on VSE/Advanced Functions systems using MSHF. Installation on DOS/VS Release 33/34 systems is accomplished by running a restore job using the System Restore Facility. Installation on VM/SP is accomplished by loading the program from tape with VMFPLC2 (a standard VM/SP utility). Additionally, the CMSBAM and CMSDOS discontinuous saved segments must be defined and generated in the VM/SP system.

**COMPATIBILITY**

Release 5.0 is compatible with prior releases.

Some functions are restricted and cannot be performed if the input files are on devices in fixed block mode:

- ADDROUT cannot be used.
- BYPASS applies only to wrong length variable length "logical" records.

For VSAM-managed SAM files accessed through SAM:

- ADDROUT cannot be used.
- BYPASS applies only to CI in error instead of block in error.

Certain sort and system functions are handled differently by Sort/Merge and CMS from the way they are handled in the DOS/VS Release 33/34 and VSE/AF environments.

- ADDROUT is supported by VSAM files only.
- Nonstandard labels are not allowed.
- Tape files are not allowed.
- Split cylinder files cannot be used with CMS.
- DOS SAM records cannot be specified for output.
- Checkpoint option is ignored.

**DOS/VS Sort/Merge V2 R5.0 (cont'd)**

- DUMP option is ignored.
- BYPASS option is ignored.
- No page fixing is done and the VIRT option is ignored.
- Subtasking of Sort/Merge is not supported for use with CMS.
- VSAM-managed SAM files are not supported by VM/SP and CMS.
- INPFIL/OUTFIL BLKSIZE parameter is accepted for simulated VSE files only. It is ignored for regular CMS files.
- Sort or merge control statements for Sort/Merge applications invoked by the DOSSORT EXEC or the FETCH command must be contained in a CMS file.

Version 2, 5746-SM2, is functionally compatible with DOS/VS Sort/Merge, 5746-SM1, with the following exceptions:

- Tape workfiles cannot be used.
- Phase 2 program exits are ignored (E21, E25, E27).
- VSAM exit list must be used to handle additional I/O error processing at program exits E18, E38 and E39.
- Program exits E18, E38 and E39 are ignored for non-VSAM files.
- The workfile(s) cannot be pooled with other files. However, pooling of input and output files is now simplified, compared to earlier IBM DOS Sort/Merge offerings.
- Output data with a separate key (KEYLEN) cannot be requested.
- Minimum virtual storage has been increased to 32K bytes, from 16K bytes.
- No label processing can be performed by the user for the workfile(s).
- The sort options ALTWK, CALCAREA, TP, PRESEQ, and SIZE are ignored.
- The ALTSEQ function cannot be used with ASCII data.

**Note:** Programs, or user routines, relying on the internals of previous Sort/Merge programs will not execute properly. Furthermore, virtual storage requirements for a given application may have to be increased, especially if the program is not executed in the SVA.

**CONVERSION**

The *Programmer's Guide* for 5746-SM2 contains conversion information for users of old IBM DOS-DOS/VS Sort/Merge programs, the S/3 Disk Sort, and the S/360 model 20 Disk Sort/Merge program.

**PERFORMANCE**

Version 2 will in many cases give better performance in terms of reduced processor time and elapsed time than earlier IBM DOS Sort/Merge offerings. Performance improvements should be considerable for files that can be sorted in main storage, and for very large files if they have some degree of non-randomness. Furthermore, Version 2 does not require information about presequencing or filesize for its optimization.

When command chaining is used, the number of SIO operations are reduced, leading to shorter elapsed time and longer processor utilization in most cases.

Installations with a high sort or merge workload will reduce system overhead by storing the reentrant part of the program in the SVA.

The work space requirements are reduced by up to 40%.

Performance usually improves when main storage given to sort is increased, but the ratio between real and virtual storage space will also affect performance.

The sort for fixed length records has improved storage utilization and reduced requirements on the number of buffers.

The sort will, where applicable, attempt to fix buffer pages and translate channel programs to reduce system overhead.

The sort will optimize use of the workfiles and try to avoid disk arm contention.

**Note:** The above performance statements are not applicable to operation under CMS with VM/SP. Performance in the DOS/VS and DOS/VSE with VSE Advanced Functions environments is unchanged by DOS/VS-VM/SP Sort/Merge Version 2 Release 5.0.

**DOCUMENTATION**

(available from Mechanicsburg)

*DOS/VS-VM/SP Sort/Merge Version 2, Release 5.0, General Information Manual* (GC33-4043), and *Program Product Specification* (GC33-4047).

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**5746-SU1 - 1401/1440/1460 EMULATOR  
IBM SYSTEMS 1401/1440/1460  
EMULATOR PROGRAM RELEASE 1  
5746-SU1**

**PURPOSE**

The IBM Systems 1401/1440/1460 Emulator Program -- hereafter referred to as the 1400 Emulator -- allows the execution of 1400 programs on 4331 Processors equipped with the 1400 Compatibility Feature and on 4341 and 4381 Processors with the 1400 Simulator generated as part of the 1400 Emulator. The simulation of disk I/O on fixed-block-mode devices is provided. The 1400 Emulator runs as a problem program under control of DOS Release 26, DOS/VS Release 34 and DOS/VSE with VSE/Advanced Functions. As a problem program it is possible to integrate the 1400 Emulator into a DOS, DOS/VS or DOS/VSE system and to take advantage of the capabilities of such a system. Several 1400 Emulators, up to the number of partitions available, can run concurrently.

**HIGHLIGHTS**

Emulation is provided for 1401, 1440 and 1460 systems with core storage sizes of from 1,400 to 16,000 positions of core storage. All basic features of these systems are emulated, together with the following optional features: Expanded Print Edit ... Inverted Print Edit ... High-Low-Equal Compare ... Multiply/Divide ... Processing Overlap ... Sense Switches ... Advanced Programming/Indexing ... Bit Test ... Print Storage ... Additional Print Control ... Space Suppression ... Column Binary ... Binary Transfer ... 51-column Card ... Punch-Feed Read ... Card Image (on 1442) ... Selective Stacker ... Scan Disk.

Features and operations not emulated are: Selective Tape Listing (on 1403) ... Compressed Tapes ... Mixed Density Tapes ... Read Compare Feature (on 1404).

The following input and output devices are emulated (full details of input and output device correspondence are to be found in the manual *1401/1440/1460 DOS/VS Emulator on S/370*): 1402 Card Read Punch ... 1442 Card Read Punch ... 1442 Card Reader ... 1444 Card Punch ... 1407 Console Inquiry Station ... 1447 Console ... 1403 Printer ... 1404 Printer (continuous forms only) ... 1443 Printer ... 729 Magnetic Tape Units ... 7330 Magnetic Tape Units ... 7335 Magnetic Tape Units ... 1301 Disk Storage ... 1311 Disk Storage ... 1405 Disk Storage.

Input and output devices not emulated are: 1445 Printer ... 7340 Hypertape Drive ... 1011 Paper Tape Reader ... 1012 Paper Tape Punch ... Optical Readers ... Magnetic Character Readers ... Teleprocessing Devices ... Audio Response Units.

Two tape formatting programs are provided with the emulator program: (1) to assist the user in converting his tape files before emulation so that they can be used more efficiently by the emulator program, and (2) to convert tape files produced during emulation back to the 1401/1440/1460 format so that they can then be used on the original system.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The 1400 Emulator operates on any IBM 4331, 4341, or 4381 Processor. The IBM 1401/1440/1460 Compatibility Feature (for the 4331 Processor) is required unless the simulator option (for the 4341 and 4381 Processor) of the 1400 Emulator is used (see "Software Requirements", below).

The processor storage requirement under DOS Release 26 ranges from 24K to 44K bytes, depending on the configuration of the 1400 series machine to be emulated.

If the 1400 emulator is executed virtual under DOS/VS or DOS/VSE, the storage requirement is within the range of the minimum partition size.

If seven-track tape files are to be processed, the data conversion feature is required.

**SOFTWARE REQUIREMENTS**

The 1400 emulator is designed to execute under the control of DOS Release 26, under DOS/VS Release 34 or under DOS/VSE with VSE/Advanced Functions.

The following supervisor options are required:

- EU = YES For all DOS/VS or DOS/VSE Releases (if 7 track tapes are used)
- OC = YES For all DOS, DOS/VS or DOS/VSE Releases (standard with DOS/VSE)
- PFIX = YES For all DOS/VS or DOS/VSE Releases (standard with DOS/VSE)

The following emulator option is required if the 1401/1440/1460 Compatibility Feature is not available.

- SIMUL = YES (Results in reduced throughput).

**COMPATIBILITY**

1400 application programs will run under the emulator without the need of modification, provided the programs are written in accordance with 1400 programming conventions and the chosen hardware configuration is compatible.

**PERFORMANCE CONSIDERATIONS**

In an I/O oriented environment where the CPU utilization is less than 50%, the 1400 Emulator Program Product, in conjunction with the 4331, will perform equal to CS 30 (S/360 mdl 30 under DOS) environments.

As CPU utilization increases, the relative performance of the 1400 Program Product on the 4331 will decrease.

**DOCUMENTATION**

(available from Mechanicsburg)

- Licensed Program Design Objectives GC33-6070
- Licensed Program Specifications GC33-6071

PROGRAM PRODUCTS

**VSE/INTERACTIVE COMPUTING AND  
CONTROL FACILITY - RELEASE 1  
5746-TS1**

**PURPOSE**

The VSE/Interactive Computing and Control Facility (VSE/ICCF) program product is an interactive system designed to run on DOS/VSE with VSE/Advanced Functions. It is an extension of the ETSS FDPs (ETSS I, ETSS II and TCS/VS). The VSE/Interactive Computing and Control Facility extends the benefits of interactive computing to the DOS/VSE users of the 4300 Processors and S/370 across all industries.

The VSE/Interactive Computing and Control Facility is a tool for productivity increase, ease-of-use improvements and data security assistance (access control). The VSE/ICCF changes DOS/VSE from a batch to an interactive operating system, by adding interactive capabilities to the DOS/VSE batch operating system.

**GENERAL DESCRIPTION**

The VSE/Interactive Computing and Control Facility Program Product Release 1 (VSE/ICCF Release 1) is an adaption of the widely used DOS/VS Entry Timesharing System (FDP 5798-CLR) to DOS/VSE. VSE/ICCF Release 1 uses either CICS/DOS/VS (for local and remote, SS, BSC, SDLC) or its integrated Terminal Transaction Facility TTF (local 327X) for terminal control, thus allowing users to establish a single, unified terminal environment supporting both timesharing and transaction oriented applications.

Both 4300 Processors and S/370 are supported in VSE/ICCF Release 1. The fixed blocked mode DASD devices are supported as VSE/ICCF library, as SYSRES and for user files accessed by programs from the VSE/ICCF interactive partitions. Terminal access methods are local BTAM-ES for the integrated terminal transaction facility (TTF) or BTAM-ES and/or ACF/VTAM Version 1 Release 2 or Release 3 or ACF/VTAM Version 2 or ACF/VTAME if CICS/DOS/VS is used for terminal handling. The specified operating environment is DOS/VSE with VSE/Advanced Functions.

The VSE/Interactive Computing and Control Facility is an interactive system designed to extend the power of the computer to multiple terminal users concurrently. The functional capabilities brought to the terminal users can provide significant productivity benefits in many different user environments. The timeshared computer concept, while having nearly unlimited applications, has proven to be of particular benefit in the areas of individual problem solving, programming development and maintenance and education.

VSE/ICCF is a tool providing online program development and online library maintenance capability, a set of interactive usability aids, a powerful context and full screen editor, a text manipulation facility, a job entry function, a timesharing/job execution monitor, a facility for development and execution of interactive problem programs and data security assistance (access control).

For problem solving, VSE/ICCF provides the framework for even complex problem solving utilizing the user's various high level language application programs. The professional programmer may use the VSE/Interactive Computing and Control Facility not only for program development, but for library maintenance and creation of complex job streams.

High level language as well as Assembler programs may be compiled, tested and executed directly from the terminal. The user can write, edit, compile and execute programs without leaving the terminal. Execution of compilers and programs can be done either in interactive or batch partitions. Submit-to-batch is provided via VSE/POWER. In both modes, results can be received back at the terminal or directed to the system printer and punch. Interactive support of VS APL in a DOS/VSE environment is provided through CICS/VS and is not available in VSE/ICCF.

Interactive usability aids (Prompts) assist the user to create various DOS/VSE jobs without having to deal with DOS/VSE job control or job entry control language, thus lowering the skill requirements for the DOS/VSE user.

VSE/ICCF provides functions to assist the user in meeting his data security needs. Logging, auditing and reporting are executed by the complementary VSE/Access Control - Logging and Reporting program product (5746-XE7).

**HIGHLIGHTS**

- An interactive facility for DOS/VSE on 4300 Processors and S/370.
- An online library system to store programs, jobs and data.
- An online source program and data entry, update and maintenance facility -- an aid to help improve productivity.
- An online library maintenance tool with copy, purge, insert, rename and resequence functions, data compression capability, library change control and auditing assist functions -- another productivity and security tool.

- A powerful editing function -- context and full screen editor, improves the efficiency of correcting and updating programs, jobs and data in the VSE/ICCF libraries.
- A direct job execution facility -- providing compile-load-and-go capabilities in all DOS/VSE programming languages, interactively if desired, with results received back at the terminal or at the central system printer and punch.
- A facility to run most existing DOS/VSE batch programs (single task) of all DOS/VSE languages as interactive programs by substituting card input/printer-punch output through terminals.
- An environment to execute new interactive programs.
- A submit-to-batch via VSE/POWER -- allowing the user to initiate jobs from the terminal for later batch processing with printed results available at the terminal or at the main system printer, or both. Because of this capability, VSE/ICCF should be considered a "must" in cardless systems.
- Interactive usability aids -- prompter facilities to ease creation of DOS/VSE, VSE/POWER and VSE/ICCF jobs, ease installation and operation and to lower the skill requirements. These interactive usability aids are supported on display terminals with a screen of at least 1920 characters.
- System data security aid (access control) -- allowing each installation to select the security provisions most appropriate to local needs.
- A procedure processor with logic capabilities -- allowing the installation and the users to build their own commands and procedures.
- Dynamic disk space allocation -- freeing the installation from having to pre-allocate and pre-define files.
- Support of fixed blocked mode devices.
- Support of BTAM-ES and ACF/VTAM Version 1 Release 2 or Release 3 or ACF/VTAM Version 2 or ACF/VTAME TP access methods.
- 3270 Terminal System oriented -- Display terminal full screen support, program access keys and program function keys for command substitution, forward/backward paging, right/left line shift, etc.
- The ability to share terminal devices with CICS/VS, thus eliminating the need for separate terminal networks and duplicated terminal control functions.
- Storage protection for interactive partitions is standard.
- Improved interfaces to VSE/POWER -- This function called \$DQ (Display Queues) displays at VSE/ICCF terminals the status of jobs in VSE/POWER queues based on various selection criteria. Header and format of the displays are similar to those of VSE/POWER. A help function is available.
- Display current status of DOS/VSE partitions -- This function called \$DA (Display Active) displays the current status of DOS/VSE partitions by interrogating DOS/VSE control blocks and Job Accounting tables. In order to obtain the full benefit of the "Display Active" function, the Job Accounting parameter in the "FOPT" supervisor generation macro has to be specified.
- DL/I MPS support for one interactive partition -- This function allows concurrent access to DL/I files from jobs running in one interactive partition of VSE/ICCF and DOS/VSE partitions under control of DL/I/MPS.

**DEVICE SUPPORT**

**Direct Access Support:** The VSE/Interactive Computing and Control Facility supports the following direct access storage device types: 2314, 2319, 3330 (mdl 1, 2, 11), 3333, 3340, 3344, 3350, 3310, 3375 and 3370. RPS is a function supported in VSE/ICCF and may be specified if the block multiplex capability is present and RPS = YES is supported in the DOS/VSE supervisor.

**Tape Support:** VSE/ICCF supports all tape drives supported by DOS/VSE and VSE/Advanced Functions.

**TERMINAL SUPPORT**

Terminals supported through VSE/Interactive Computing and Control Facility with integrated Terminal Transaction Facility (TTF): VSE/ICCF with integrated TTF supports the following control units and terminals locally attached to a multiplexer, block multiplexer or selector channel or to the MSSS of 4300 Processors.

Control unit 3272 mdl 2 with 3277 mdl 2, 3284 mdl 2, 3286 mdl 2, 3287 mdl 1 and 2, 3288 mdl 2 terminals.

**PROGRAM PRODUCTS**
**VSE/ICCF R1 (cont'd)**

Control unit 3274 mdl 1B with 3268 mdl 2, 3277 mdl 2, 3278 mdl 2, 3284 mdl 2, 3286 mdl 2, 3287 mdl 1 and 2, 3288 mdl 2, 3289 mdl 1 and 2 terminals.

3278 Display terminals attached to the MSSS of 4300 Processors.

Terminals supported through VSE/Interactive Computing and Control Facility with CICS/DOS/VS: The 3272 and 3274 control units (mdls 1A, 1B) may be locally attached to a multiplexer, block multiplexer or selector channel. The 3271, 3274 (mdl 1C), 3275 control units may be remotely attached via nonswitched communication lines. In addition, the 3275 control units may be attached to dial-up switched lines. The 2740 (and 3767 in 2740 mode) may be remotely attached via non-switched communication lines. The 2741 terminal is supported on switched or nonswitched lines only as point-to-point devices.

Remote terminals/control units (3271, 3275 or 2740) of the same type may be multi-dropped from the same communication line. However, if multi-dropping 2740 (or 3767 in 2740 mode) terminals, it is recommended to use the buffered (2740 mdl 2) terminal. When including remote 3270s in the configuration, a line speed of 4800 BPS or higher is desirable, especially if multi-dropping 3271s or 3275s.

- 2740 Communication Terminal mdl 2 with record checking (required). If the buffered receive feature is installed, only the largest buffer size (440) will be supported by VSE/ICCF. If this feature is not installed, the minimum buffer size is adequate. The buffered receive feature will improve overall performance if multi-dropping IBM 2740/3767 terminals on a single line.
- 2741 Communication Terminal is supported.
- 3767 Communication Terminal, when equipped with the appropriate features to make it appear as one of the supported 2740 or 2741 configurations.
- 3277 Display Station (mdl 2 only) through the 3272 or 3271 mdl 2 Control Unit with, optionally, one or more 3284/3286/3287/3288 mdl 2 Printers. 3278 (mdls 2, 3, 4) through the 3276 (mdls 2, 3, 4, 12, 13, 14) or the 3274 control unit optionally with one or more 3268 mdl 2, 3284, 3286, 3287, 3288, 3289 Printers attached, or attached to the 4300 Processors MSSS in 3277 mode.
- The recommended keyboards for the 3276/3277 are the EBCDIC typewriter keyboard with the 12 program function keys or the operator console keyboard with the 12 program function keys. Although the program function keys are not required, their inclusion is recommended.
- 3275 Display Station (mdl 2 or mdl 12) with control with, optionally, one 3284 Printer mdl 3.
- The system console is supported as a terminal under CICS/VS, but not in TTF.

**Other I/O Devices as Terminals**

- Sequential devices such as card readers, line printers, tapes, and disks are supported as VSE/ICCF terminals under CICS/DOS/VS, but not in TTF. Under CICS/DOS/VS, the main system printer may be specified as a hardcopy terminal destination.

**PROGRAMS SUPPORTED**

Note: This is not a complete list of programs which are supported

**Control Program**

DOS/VSE  
 VSE/Advanced Functions  
 VSE/POWER  
 VSE/VSAM

**Language/SORT**

DOS/VS RPG II  
 DOS/VS COBOL  
 DOS/VS PL/I Optimizer  
 DOS FORTRAN IV  
 VS/BASIC  
 Assembler (contained in DOS/VSE)  
 SORT/MERGE Version 2  
 INTERACTIVE DEBUG FDP 5798 - CKF

**Telecommunications**

BTAM-ES (CICS and TTF)  
 ACF/VTAM Version 1 Release 2 or Release 3 or  
 ACF/VTAM Version 2 (CICS)  
 ACF/VTAME (CICS)

**Data Base/Data Communications**

DL/I/DOS/VS  
 CICS/DOS/VS  
 VSE/Data Interfile Transfer, Testing and Operations Utility  
 (VSE/DITTO)

**APPLICATION AREAS**

**Usability and Installability of DOS/VSE:** Interactive usability aids (Prompters) are provided to assist the end-users as well as system programmers, application programmers and operators in doing their jobs more efficiently. The interactive usability aids reduce the need for the DOS/VSE user to refer to the SRLs.

The prompters are interactive and easy to use facilities which allow a relatively inexperienced user to utilize the resources of DOS/VSE via display terminals.

Depending on the kind of job he wants to do, the user of the prompters needs to have only a basic knowledge of DOS/VSE. He does not have to know details of the various components of DOS/VSE, e.g., the format and sequence of required control statements, nor does he have to deal with the characteristics of a certain device he wants to use, e.g., number of blocks per diskpack.

The prompters are application programs running in a VSE/ICCF interactive partition. They act as an interface between the user and DOS/VSE and/or VSE/ICCF. The user enters his input from the terminal. The prompter then generates a DOS/VSE or VSE/ICCF job stream which may be saved as a member in the VSE/ICCF library and/or submitted to a DOS/VSE partition via VSE/POWER or executed in a VSE/ICCF interactive partition.

These interactive usability aids (Prompters) are available to create jobstreams in DOS/VSE JCL, VSE/POWER JECL and VSE/ICCF JES for VSE/VSAM AMS, System and Librarian Utilities, and user jobs.

**INTERACTIVE PROGRAM DEVELOPMENT**

**Application Programming:** Application programmers are supported in interactive program development and test, program maintenance, library maintenance as well as in creation of even complex jobstreams. Programming languages supported are all DOS/VSE compilers, e.g. ASSEMBLER, BASIC, COBOL, FORTRAN, PL/1, RPG II. Programs can be compiled and tested directly from the terminal with results received back at the terminal. A submit to DOS/VSE batch is also provided via VSE/POWER with results either displayed back at the terminal and/or directed to the system printer or punch. Invoking and defining DOS/VSE system utilities is also fully supported.

VSE/ICCF supports the "Interactive Debug Facility" FDP (5798-CKF), which provides extensive but easy to use tools for online program testing and debugging, thus enhancing programmer productivity even further. (Refer to SB21-1898 for detail).

DOS/VS RPG II Release 3 uses VSE/ICCF to utilize the interactive source entry facility.

The application programmer should experience higher productivity through some of the interactive usability aids, such as the prompters for JCL, VSE/VSAM and various utilities.

A terminal user can enter source programs, data, procedures and macros, DOS/VSE JCL or JECL statements and store this information as a member of the VSE/ICCF library. These library members may later be updated via a context or a full screen editor. Logical tabbing support is provided to facilitate entry of fixed format data. A library member can be displayed, paged, updated, deleted or edited at any time. Library changes can be traced with the utility function D TSAUDIT.

**System Programming:** The system programmer can use VSE/ICCF for library and system maintenance and to install/test new application packages. He will use the interactive usability aids for easier system organization.

**Personal Computing and Problem Solving:** VSE/ICCF provides the framework for even complex problem solving supporting VS BASIC, FORTRAN and PL/1.

The advantage of using VSE/ICCF for Personal Computing consists of the user having access to data files available in the system and thus allowing extensive data analysis (DA) for the End-Users. Supported are SAM, DAM, ISAM, VSAM and DL/I files.

**Online Prompt:** The interactive usability aids (Prompters) will assist users working with DOS/VSE services and programs.

**Interactive Applications:** Application programs developed for DOS/VSE batch (single task) processing can run in VSE/ICCF interactive partitions. This means, a program designed for batch processing can run interactively under VSE/ICCF. Programs developed to run in interactive partitions can also run in batch partitions. Programs can reside in the DOS/VSE system libraries as well as in the VSE/ICCF library.

The end-user's advantage in using VSE/ICCF is to access a DP-system at any time he wants to do "personal computing", and not being dependent on job scheduling in the DP-Shop. The end user can start jobs from the terminal for immediate execution in a VSE/ICCF interactive partition. Thus by using VSE/ICCF, long turn-around time can be avoided.

**VSE/ICCF R1 (cont'd)**

**Interactive System Operation:** The system operator has the capability to run the system interactively by preparing and invoking jobstreams via the terminal. He can display the status of a submitted job at his VSE/ICCF terminal and has access to VSE/POWER job queues to modify them. This facility is also available to a remote operator. The library of VSE/ICCF is a single and flexible easy-to-use procedure library. JCL, programs and data, and all other information necessary to operate a system can be stored. Nesting and mixing is possible. Variables can be included at job submission and/or execution time. Operating a DOS/VSE system from a VSE/ICCF terminal makes it possible to offer a cardless system with full DOS/VSE functions. VSE/POWER is required in conjunction with cardless interactive system operation.

The system operator and application programmer can be less skilled and/or experienced when using the DOS/VSE interactive usability aids.

**Access Control:** This function provides a facility to assist the user in protecting data from unauthorized usage, provided that programs properly use standard interfaces.

Certain facilities of DOS/VSE, for example the file protect facility, should be used as suggested by systems publications to enhance the value of the access control facility.

For an installation to safeguard its data, it must not only consider the functions provided through the system, but also provide the necessary physical protective measures and implement effective information management practices. The capabilities of VSE/ICCF have been designed to help customers attain their data security, however, protection may not be fully effective against programmers with detailed knowledge of the internal design of DOS/VSE. Thus, while no guarantee can be made for complete security of any system, the installation goal of improved security at an acceptable cost can best be attained through consideration of the full spectrum of available measures. Installation security is the customers responsibility.

The following functions are provided through VSE/ICCF:

**User Identification and Verification:** Identifies and verifies the user by user-id and password for authorization to use the system and to access protected resources. Users are defined in the VSE/ICCF profile and in the Security Resource Table.

**Data Access Control:** Allows the authorized user to access protected files and denies access to other users depending upon the security classes and read/write authorization levels assigned. Authorization classes are given to the user in the profile record and compared to the security classes and authorization levels assigned to the protected files in the Security Resource Table.

**Program Access Control:** The system also restricts access to protected private libraries as described above when an ASSGN SYSCLB/SYSRLB/SYSSLB or // EXEC is encountered. Another level of protection is offered to the user, since phases within core image libraries can also be protected based on the security classes assigned to the user and those assigned to protected resources.

**Automatic and Dynamic Protection of Files and Programs:** New files and programs can be protected automatically and dynamically through defining them within group names until the newly created name is placed in the tables for protected resources. The existing GROUP entries are always scanned after the library, file or phase name.

**Logging and Reporting:** VSE/ICCF creates a set of data for each access control related event. This data can be recorded into an access log file on disk and be printed by the VSE/Access Control - Logging and Reporting program product 5746-XE7 for auditing purposes.

**CUSTOMER RESPONSIBILITIES**

Installation and maintenance of VSE/ICCF is performed using DOS/VSE MSHP (Maintain System History Program). The user can choose between pregenerated systems and systems completely tailored to the users configurations and requirements. In the case of a pregenerated system, only the definition of tables (terminals, users, programs) is required. Tailoring of a system will require the compilation of VSE/ICCF. Details of this System Generation Process are described in *Installation Reference* (SC33-6067). (Note: CICS/DOS/VS is not in MSHP format.)

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VSE/ICCF executes on any IBM S/370 and 4300 Processor which is supported by DOS/VSE and VSE/Advanced Functions. It is recommended that the system have at least 192K bytes of real processor storage, if the Terminal Transaction Facility (TTF) (part of VSE/ICCF) is used or, 256K bytes of real processor storage, if CICS/DOS/VS is used for terminal control. For performance reasons, at least two spindles of DASD are recommended to be attached to the system. Tape drives are not required for operation of VSE/ICCF. One terminal, preferably an IBM 327X display with keyboard, is required.

**SOFTWARE REQUIREMENTS**

VSE/ICCF Release 1 is designed to operate on DOS/VSE with VSE/Advanced Functions. Either Terminal Transaction Facility (TTF), available as part of VSE/ICCF, or CICS/DOS/VS provide terminal support. TTF uses BTAM-ES, CICS/DOS/VS uses either BTAM-ES or ACF/VTAM Release 2 or ACF/VTAME as the TP access method.

**COMPATIBILITY**

The following describes the compatibility between ETSS FDPs and VSE/ICCF:

VSE/ICCF provides language and command upward compatibility from the ETSS I and ETSS II FDPs. Libraries created under ETSS II are usable under VSE/ICCF. For conversion to fixed block mode or from ETSS I, a backup/restore is necessary. The command language for all functions remains basically unchanged.

For easy installation some of the supervisor and ETSS II generation options have been removed or defaulted in VSE/ICCF. For 4300 Processors, a few new parameters were added.

The dual partition function of ETSS II will not be supported in VSE/ICCF Release 1. However, VSE/ICCF with TTF can run in a second partition totally isolated from CICS/DOS/VS.

Submit to DOS/VSE batch is supported via VSE/POWER only. External messages have been formalized with the DOS/VSE system message assignment for subsystems.

FDPs and IUPs running under ETSS II 5798-CLR should continue to run under the VSE/ICCF program product.

The following FDPs will not be supported by VSE/ICCF:

MTCS/VS 5798 - CFK	Minimum Terminal Control System
TCS/VS 5798 - CRX	Now part of VSE/ICCF called Terminal Transaction Facility (TTF) providing minimum terminal support.

The following FDP has been tested for continued support on VSE/ICCF:

ETSS & DOS/VSE Interactive Debug FDP 5798-CKF.

**CONVERSION**

**General Considerations:** Users of VSE/ICCF have to install the specified operational environment of DOS/VSE and VSE/Advanced Functions.

**DOS/VS Entry Time Sharing System (ETSS II) to VSE/Interactive Computing and Control Facility:** VSE/ICCF is externally compatible with the ETSS II FDP version. A terminal user will see only minor differences when the program product is installed. Installing VSE/ICCF is different from, but easier than installing ETSS II, because many installation parameters have been dropped or defaulted and MSHP is used for installation. Pregenerated systems are available. The differences are described in the *VSE/ICCF Installation Reference Manual* (SC33-6067).

An ETSS library created under the ETSS FDPs can be used under VSE/ICCF if the library still resides on a 2314, 2319, 3330 (mdl 1, 2, 11), 3333, 3340, 3344 or a 3350 direct access storage device. To move an ETSS library onto a 3310 or 3370 fixed block mode device, a VSE/ICCF backup/restore utility execution has to be performed.

The interfaces for the currently supported program products under ETSS II will continue to be supported under the VSE/ICCF Release 1 program product. The Minimum Terminal Control System (MTCS) will not be supported by the program product. The main functions of TCS/VS 5798-CRX are now integrated into VSE/ICCF (called Terminal Transaction Facility TTF), thus automatically available with VSE/ICCF.

**Source Program Maintenance On Line (SPM) TO VSE/Interactive Computing and Control Facility**

**THE LIBRARY FILE:** Formats, structure and blocking factors of the SPM Library file are different: Therefore VSE/ICCF cannot access a SPM library file without modification.

The first approach is to read a SPM Backup tape and modify it in order to get a tape which will be a valid input for the DTSUTIL program. The DTSUTIL utility program is a VSE/ICCF program which loads new members into the VSE/ICCF library file.

The second approach is to use VSE/ICCF procedures in order to select conversationally the existing SPM programs to be transferred as VSE/ICCF members.

**COMMAND LANGUAGE:** The VSE/ICCF command language is different from SPM because of extended functions of VSE/ICCF.

**PERFORMANCE CONSIDERATIONS**

The results of performance measurements taken on a 4331 Processor with 512K bytes of main storage (of which 326K were available to the user) show for the following different loads the amount of resources consumed by the VSE/ICCF with CICS/DOS/VS for terminal control:

PROGRAM PRODUCTS

VSE/ICCF R1 (cont'd)

Terminals and Lines	Message Rate/Min.	Response Times (Sec)		CPU Utilization %
		90% Avg.	Average	
10/1	30	.44	.74	20
20/2	60	.54	1.25	50
30/2	90	.71	1.74	65

Line mode was BSC, speed 4800 bps, attached to the ICA of the IBM 4331 Processor. All response times are system response times measured by TPNS; all terminals are remote terminals simulated by TPNS.

For the low-end user with five local attached terminals, similar measurements have shown the following performance when using TTF instead of CICS/VS.

Terminals	Message Rate/Min.	Response Times (Sec)		CPU Utilization %
		90% Avg.	Average	
5	15	.35	.75	12

Terminal activities: Data entered into the terminals consisted of:

- 40% text entered in /INPUT mode.
- 40% text entered in /EDIT mode together with simple EDIT commands.
- 20% library commands including copy, compress, decompress, delete, resequence and save of library members. Library member size was about 450 statements each. The performance data shown above was for a selected set of workloads and is for information purposes only. There is no warranty or guaranty that the same performance characteristics will apply to the users configuration.

**DOCUMENTATION**  
(available from Mechanicsburg)

General Information Manual	GC33-6066
Installation and Operations Reference	GC33-6067
Terminal User's Guide	SC33-6068
Messages	SC33-6069
Program Logic Manual Vol.1	LY33-9081
Program Logic Manual Vol.2	LY33-9093
Reference Summary	SX33-9006

**HIGHLIGHTS of RELEASE 2**

VSE/Interactive Computing and Control Facility Release 2 provides all functions of Release 1 and the following enhancements:

1. Use of the extended VSE/POWER interfaces:
  - a) The VSE/POWER queues can be displayed at the user terminal in the same way as is currently done at the operator console.
  - b) VSE/POWER jobs may be password protected. The VSE/POWER job numbers are used in addition to the job names to achieve uniqueness of names.
  - c) Access to VSE/POWER list and punch queues via GETL and GETP procedures.
  - d) Selective display of VSE/POWER print files by locating character strings.
2. VSE/VSAM share option 4 is supported for programs running in interactive partitions.
3. Support of concatenated relocateable libraries with LINKGO.

**SPECIFIED OPERATING ENVIRONMENT**

VSE/ICCF Release 2 executes on any IBM S/370, 3031 and 4300 Processors supported by VSE/Advanced Functions Release 2, which is a prerequisite product. For details, refer to the description of VSE/ICCF Release 1.

**PERFORMANCE CONSIDERATIONS**

For VSE/ICCF Release 2, no or only minor changes in the overall performance can be expected compared to Release 1. Improved performance will be obtained especially for the display of VSE/POWER list output due to the use of the buffered GETSPOOL function.

**HIGHLIGHTS of RELEASE 3**

Release 3 of VSE/ICCF provides the following new functions:

1. Support of the cross-partition communication facility (VSE-XPC) in interactive partitions.
2. Support of CICS/VS Multi-region operation.
3. Support of 3278 mdl 5 (wide screen) under CICS/VS Release 1.5.
4. Improved support of print output from Interactive Partitions.

5. Notification facility.
6. Extension of full screen support.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum hardware requirements for VSE/ICCF Release 3 are the same as those for VSE/Advanced Functions Release 3 which is a prerequisite product.

For more information on the specific device types supported by DOS/VSE, see the *Introduction to the VSE System* (GC33-6108).

**SOFTWARE REQUIREMENTS**

VSE/ICCF Release 3 is designed to operate with VSE/Advanced Functions Release 3 which is a prerequisite product.

**PERFORMANCE CONSIDERATIONS**

For VSE/ICCF Release 3, no or only minor changes in the overall performance can be expected compared to Release 2. The performance may be improved through the reduction of the path length in the access routine for the ICCF library.

**RELEASE 3 MODIFICATION LEVEL 5**

VSE/Interactive Computing and Control Facility 1.3.5 (VSE/ICCF 1.3.5) improves serviceability of VSE/Interactive Computing and Control Facility Release 3, introduces better information about network activities together with VSE/POWER Version 2, and reduces restart time by eliminating unnecessary recovery runs.

Additional focus was given to quality enhancements, installability, and tailoring.

**HIGHLIGHTS of RELEASE 3 MODIFICATION LEVEL 5**

- **Multilevel Program Functions Keys**  
The extension of the PF-key setting will be used to define and work with four different sets of PF-keys: One individual set for each, COMMAND mode, LIST/SPOOL-mode, EDIT-mode and EXECUTION/READ-mode. Each set can be up to 24 PF-keys and thus fully utilize the extended PF-key keyboards. This facility is used to substitute PF-keys for commands, etc., for ease-of-use and productivity purposes.
- **@Exit Macro Order in the ICCF Macro Language**  
The new macro order will be used to exit a macro without reaching the physical end of a macro. This provides controlled flexibility in macro processing, comparable to procedures.
- **Removal of @ Prefix for Macro Invocations**  
Macros may now be invoked in command mode by specifying the macro name without the @-prefix. Thus a terminal user can invoke macros like he can invoke procedures. This functional extension improves ease-of-use, and simplifies the human machine interface in VSE.
- **VSE/ICCF Notify Support**  
A communication link will be established between VSE/ICCF and VSE/POWER (via NOTIFY) so that, for example, batch job ending messages can be routed to the terminal user who submitted the job. This function notifies the terminal user about the job events automatically rather than have him query the system to get the information, thus providing a better level of information. This function complements the NOTIFY support in VSE/POWER.
- **/INCLUDE Job Entry Statement Resolved by DTSUTIL**  
The new parameter INCL will be introduced for the DTSUTIL-commands PRINT, PUNCH and PRTPCH to allow printing or punching of included members. This function provides ease-of-use in ICCF library handling. It relieves the user of analyzing library members to create extra PUNCH or PRINT commands for each /INCLUDE statement within members. The /INCLUDE statement will be automatically resolved by DTSUTIL.
- **Skip Recovery (via DTSANALS) if Library is Correct**  
DTSANALS will have the capability through the optional parameter OPT on the commands ANALYZE, RECOVER, and REORG, to decide whether these commands should really be executed or not, depending on the current status of the ICCF library. This reduces and improves restart/recovery time because unnecessary recovery runs can be eliminated.
- **Generation Independence of ICCF**  
The user no longer needs to reassemble many ICCF modules if he wants to tailor ICCF to his needs. All he has to do now is to assemble one table (DTSIGEN) and catalog it to the core image library. Also, if he wants to modify the ICCF security tables, he only needs to assemble and relink these tables, but he no longer needs to reassemble the ICCF control program. This is an ease-of-use item for the ICCF system administrator.

**VSE/ICCF R1 (cont'd)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VSE/Interactive Computing and Control Facility 1.3.5 has the same machine requirements and supports the same hardware as VSE/ICCF Release 3.

VSE/ICCF 1.3.5 supports the IBM 3290 Information Panel as a 3278 mdl 2-5 compatible display.

**SOFTWARE REQUIREMENTS**

- VSE/ICCF 1.3.5 requires CICS/VS 1.6.0 if CICS is the terminal control program.
- For the NOTIFY support, VSE/POWER 2.1.0 with PTF UD25257 is required.
- Either BTAM-ES 1.1.0 (CICS/VS or TTF) or ACF/VTAM 2.1.0 (CICS/VS only) is required.
- VSE/AF 1.3.5 (5746-XE8) is required.

**COMPATIBILITY**

VSE/ICCF 1.3.5 is fully compatible with VSE/ICCF Release 3 with the following exceptions:

- SEGMENT option has been removed from SUBMIT function.
- POWRPCH and NXTNTS tailoring options are ignored now.
- Other tailoring options used for shipped ICCF 1.3.5 system. (Reference: *Installation and Operations Reference*, SC33-6067).
- Interactive Debug (FDP 5798-CKF) no longer supported.

**DOCUMENTATION**

(available from Mechanicsburg)

*Program Summary (GC33-6159) ... Licensed Program Specifications (GC33-6065) ... Installation and Operations Reference (SC33-6067) ... Diagnosis Reference (LY33-9098) ... Terminal User's Guide (SC33-6068) ... Messages (SC33-6069) ... Reference Summary (GX33-9006) ... Introduction to Interactive Programming (SC33-6138) ... Diagnosis Guide (SC33-6169) (to be used in conjunction with VSE/AF Diagnosis Guide, SC33-6112).*

RPQs ACCEPTED: Yes



PROGRAM PRODUCTS

**VSE/DATA INTERFILE TRANSFER, TESTING  
AND OPERATIONS UTILITY, RELEASE 3  
5746-UT3**

**PURPOSE**

VSE/Data Interfile Transfer, Testing and Operations Utility licensed program (hereinafter referred to as VSE/DITTO) is a general-purpose utility program for card, magnetic tape and disk input/output devices. It provides the facility to list, copy, alter and create files or portions of files. The wide range of user-oriented functions is intended to aid programmer testing, reduce the need for separate specialized utility programs and provide greater operational productivity. VSE/DITTO offers the user an efficient and easy-to-use tool for testing and file-handling in both a batch and interactive environment.

**HIGHLIGHTS of NEW FUNCTIONS in RELEASE 3**

VSE/DITTO Release 3.0 provides the following new functions and improvements to existing functions:

3540-compatible diskette devices are supported with functions that are similar to those provided for disk support. These functions are:

- List diskette data on either a physical address or file basis.
- Scan, display and alter the volume identifier and alter or initialize the index track on a physical address basis.
- Copy diskette data to or from cards, tapes, disks or diskettes on a file basis.

A tapemap function (TMP) to list the contents of a tape reel. The information listed includes the contents of the first record or records of a file, record length, number of records, and length of tape used in meters and feet.

A copy function for labeled tape files (TFT). Single and multi-volume tape files can be copied or reblocked, or both.

Buffer functions to create simple test data on tape, SAM, ISAM, VSAM, and diskette files directly from data in an in-core buffer according to user specifications.

A display VTOC function (DVT) to list VTOC data, which can be sorted by name, date or extents. The listing can include information about free extents.

A process VTOC function (PVT) to rename or delete VTOC entries.

The tape and disk scanning functions (TRS and DRS) have been extended to operate in batch mode.

The disk to console (DCN) and disk dump (DD) functions have been extended to display and list the contents of home address, record 0, and record count fields.

The disk record load function (DRL) has been extended to allow CKD EOF records to be changed.

VSAM files can be created directly from card input (CVS function), and card files can be created directly from VSAM card-image files (VC and VI functions).

The SET function has been extended to also run in batch mode and to allow the user to specify:

- ASCII to EBCDIC translation (tape to printer functions).
- Exclusion of the header information from a listing produced by a tape or disk function, and left-justification of the listed data.
- Begin and end columns of data records to be printed.

Significant ease-of-use improvements, for example:

- Prompting messages accept the reply "U" to interrupt the function currently in use.
- A message is issued when a tape mark is reached during FSR (Forward Space Record) or BSR (Backspace Record) operations.
- A check is made for the presence of a tape ring in an input or output tape file.
- Volume identifier alteration functions do not change the volume identifier to blanks if EOB/ENTER is entered. TP (Tape to Printer), TPV (Tape to Printer, Variable Length Records), and TPD (Tape to Printer, Deblocked) can specify more than one file.
- The disk alteration functions (DRL, DID, EOF, and PVT) have been moved to a separate phase. This allows greater flexibility in reserving such functions in secured phases that require authorization levels.
- DEFAULT.MODEL.SAM.ESDS information is used, if available, when no job control EXTENT information is provided for VSAM-managed SAM files that are defined dynamically.

**HIGHLIGHTS of NEW FUNCTIONS in RELEASE 2**

- Environments with VSE/VSAM Release 2.0 installed can take advantage of VSAM's Space Managed SAM feature for the dynamic allocation of SAM files.
- Multivolume/labeled tape support is available for file-based functions to facilitate the copying and restoring of large files to tape.
- VSAM relative-record data sets (RRDS) are supported.
- More than one VSAM user catalog can be used in interactive mode.
- The user can specify his own DLBL filenames rather than the standard filenames previously required for executing a file-based function.
- New functions to print output data spooled to disk are available.
- The user can specify his own end-of-data delimiter for card input operations in interactive mode.
- Enhancements to the tape-to-console (TCN) and disk-to-console (DCN) functions provide for the repositioning to other records without reinvoking the function.
- New card I/O support allows execution on cardless systems and from procedure libraries.

**CUSTOMER RESPONSIBILITIES**

In order to install and use VSE/DITTO Release 3 successfully, the customer must have DOS/VSE and VSE/Advanced Functions installed (for details see "Software Requirements"). If VSAM functions are to be used, the VSE/VSAM program product (Program Number 5746-AM2) must be installed.

For installations which have implemented the security assist function of the VSE/Interactive Computing and Control Facility program product (Program Number 5746-TS1), VSE/DITTO allows the user to reserve selected function groups for authorized use.

The distribution medium contains a private core image library, a private relocatable library and a component history file. The distribution medium may be tape or disk. If it is tape, RESTORE format is used.

VSE/DITTO is installed by invoking the INSTALL COMPONENT function of the VSE/Maintain System History Program (MSHP).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

VSE/DITTO is designed to operate on all IBM processors supported by VSE, that is, IBM S/370 mdls 115 to 158, 3031 and 4300 processors.

VSE/DITTO can be used with the following devices:

CARD	IBM 1442, 2501, 2520, 2540, 2560, 2596, 3504, 3505, 3525, 5424 and 5425.
TAPE	IBM 2401, 2420, 3410, 3411, 3420 and 8809.
DISK	IBM 2311, 2314, 3310, 3330-1, 3330-11, 3340, 3350, and 3370.
DISKETTE	All 3540-compatible devices.
CONSOLE	Any SYSLOG-eligible device (screens in keyboard/printer mode only).
PRINTER	All printers supported by VSE.

**Specific Requirements**

- IBM 3525 Card Punch features: VSE/DITTO supports either the two-line (feature #8839) or the multi-line (feature #5273) print feature for punched output. For interpreting pre-punched cards, in addition to one of the above print features, the punch card read feature (feature #1533) is required.
- IBM 2560 Multi-Function Card Machine features: Punched output can be interpreted if the 2560 is equipped with the card print feature (feature #1575, 1576 or 1577).

A minimum partition size of 128K bytes (including 48K bytes default GETVIS area) is sufficient for most executions of the program. Devices, such as 3350 DASDs or magnetic tapes which potentially contain large record sizes may, however, require additional buffer space and, consequently, larger partition sizes. Some file-based functions may require a larger GETVIS area.

**SOFTWARE REQUIREMENTS**

VSE/DITTO Release 3 is designed to operate under VSE/Advanced Functions Release 2.0 or Release 3.0 (Program Number 5746-XE8).

If VSAM functions are to be used, VSE/VSAM (Program Number 5746-AM2) must be installed. For the dynamic allocation of SAM files, the VSE/VSAM Space Management for SAM feature is required.

VSE/DITTO operates in any partition. All input/output areas are dynamically allocated, based on processing needs.



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PP 5746-UT3.2  
Nov 83

PROGRAM PRODUCTS

**VSE/DITTO R3 (cont'd)**

VSE/DITTO executes in either real or virtual mode.

**COMPATIBILITY**

VSE/DITTO is compatible with the existing Field Developed Programs 'DOS/DITTO' (5798-ARN) and 'Extensions to DOS/DITTO' (5798-CAF) as regards functions already available with these programs.

**DOCUMENTATION**

(available from Mechanicsburg)

Licensed Program Specification  
General Information

GH19-6071  
GH19-6072

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**VSE/OPERATOR COMMUNICATIONS CONTROL  
FACILITY RELEASE 1 (5746-XC5)**

**PURPOSE**

The VSE/Operator Communication Control Facility (VSE/OCCF) is designed to reduce operator interaction for the operation of a DOS/VSE controlled IBM computing system and to allow operation of the system from a remote console. The program provides functions and services that allow the user to reduce the activities normally executed by an operator at the system console by predefined certain activities.

The functions and services of VSE/OCCF are of particular interest in a distributed data processing (DDP) environment where a network operator controls one or more DOS/VSE satellite systems. In this environment, operator attendance and DP skill at the satellite systems can be reduced to a minimum.

VSE/OCCF is also applicable in environments with several single systems. For example, a number of single systems can be controlled via terminals that are centralized at one location remote from the systems.

**HIGHLIGHTS**

The Routing Functions of VSE/OCCF permit control of one or several DOS/VSE satellites through one NCCF operator station. This NCCF operator station may be locally or remotely attached to the satellite system or to a remote host. Messages can be routed from the DOS/VSE satellites to the NCCF operator station; commands and replies can be routed back to the DOS/VSE satellites. There may be more than one NCCF operator station attached to the host, each controlling a separate set of DOS/VSE satellites.

Message Reduction is possible through suppression of information type messages and/or pregeneration of message replies. This reduces the time normally required at an operator's station and allows the operator to concentrate on those situations that really need attention; for example, responding to decision type messages. This means that personnel fulfilling general duties at satellite processor locations in a DDP environment can handle the occasionally required responses to messages and exceptional (error) conditions.

Translations and/or Modifications of Text for Operator Messages can be pre-defined and supplied to VSE/OCCF in table form to cause messages normally issued by the system in English to be displayed in other languages. This can eliminate potential language problems at the operator console by adjusting the messages to the skill available at the console (trained operator, end-user).

**CUSTOMER RESPONSIBILITIES**

Define the actions on messages together with the branch office support. Install message action and/or message translation table. These tables have to be generated by the customer.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

VSE/OCCF runs on any IBM processor that is supported by DOS/VSE and VSE/Advanced Functions current at availability of VSE/OCCF.

The operator console must be an IBM 3277 mdl 2 or 3278 mdl 2A CRT display device, or 3277 compatible system consoles of 3138, 3148, 3158 or 3031.

VSE/OCCF requires for its execution a partition of its own. The partition size depends on the specified functions. The DOS/VSE minimum partition size of 128K normally suffices for the single system environment without NCCF operator station support.

**SOFTWARE REQUIREMENTS**

VSE/OCCF is designed to operate with DOS/VSE and VSE/Advanced Functions on the release level available from PID at the time of program availability in either environment; the single system environment with or without remotely located control stations or the DDP environment with remote control.

For operation in the single system environment, where a locally attached console is used for controlling the system, no functions beyond those of DOS/VSE and VSE/Advanced Functions are required.

Operations in the single system environment, where a remotely located terminal is used for controlling the system, requires programming support depending on the processor as shown below:

Programming Support	Processor	
	4331	4341 or /370
DOS/VSE and VSE Advanced Functions	X	X
NCCF	X	X
VSE/OCCF	X	X
ACF/VTAME or ACF/VTAM	X	
ACF/VTAM		X

The programming requirements shown for the IBM 4341 apply to all processors supported by DOS/VSE and VSE Advanced Functions, except for the IBM 4331.

For specific terminal and communications support refer to the individual program products.

For operation in a DDP environment, ACF/VTAM Version 2 or the Multi-System Networking Facility feature of ACF/VTAM Version 1 is required in addition, provided that ACF/VTAM is the TP access method used. The host may be either an MVS VS1, or VSE host as shown below.

In particular, the programming support required in the host is as shown in the following two tables:

• MVS or VS1
• ACF/VTAM Ver. 1 (1) or ACF/VTAM Ver. 2
or
• ACF/TCAM (1)
• NCCF
(1) with the Multi-System Networking Facility feature

or

Programming Support	Processor	
	4331	4341 or /370
DOS/VSE and VSE/Advanced Functions	X	X
NCCF	X	X
ACF/VTAME or ACF/VTAM Ver. 1 or ACF/VTAM Ver. 2	X	
ACF/VTAM Ver. 1 (1) or ACF/VTAM Ver. 2		X
(1) with the Multi-System Networking Facility feature		

The programming requirements shown for the IBM 4341 apply to all processors supported by DOS/VSE and VSE/Advanced Functions, except for the IBM 4331.

For specific terminal and communication support refer to the individual program products.

**COMPATIBILITY**

Messages to the operator from user programs are only accepted if they follow the rules described in the VSE/OCCF documentation. The following restrictions apply:

- Messages with the same message-id (first up to eighth characters) but different text cannot be distinguished by VSE/OCCF. This means that different actions cannot be specified for messages with the same identifier.
- Messages longer than 247 characters cannot be processed by VSE/OCCF. These messages are truncated and an additional warning message is routed to the same destination as specified for the truncated message.
- The maximum reply/command length from an NCCF operator station is 80 characters. The 80 characters include all routing information which has to be typed in addition to the data. The number of characters required as routing information is environment dependent. If a program expects a command/reply longer than the maximum that can be typed, VSE/OCCF passes the data actually typed plus a residual count to the requestor.
- Channel programs have to follow the rules described in the VSE/OCCF documentation.



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PP 5746-XC5.2  
Nov 83

PROGRAM PRODUCTS

VSE/OCCF (cont'd)

SECURITY and INTEGRITY

The access control facilities of the program products VSE/ICCF together with VSE/Access Control Logging and Reporting allow a customer to restrict the access to VSE/OCCF or to user generated VSE/OCCF control tables to certain users. The security facilities of NCCF can be applied to restrict the remote DOS/VSE control to certain users.

**DOCUMENTATION:** (available from Mechanicsburg)

*VSE/Operator Communication Control Facility (OCCF) General Information (GC33-6113).*

*VSE/Operator Communication Control Facility Installation Guide and Reference* will be provided at the time the product is available.

PROGRAM PRODUCTS

**ADVANCED FUNCTIONS - DOS/VS  
5746-XE2**

**PURPOSE**

Advanced Functions - DOS/VS provides additional facilities and improved performance over DOS/VS.

**HIGHLIGHTS**

**Additional Partitions:** Advanced Functions - DOS/VS provides support for up to seven partitions on DOS/VS Release 34. The level of multiprogramming is limited to six partitions when system residence is on 3340/3344 DASD.

**Additional partitions** provide users with the opportunity for continued growth within DOS/VS, improved batch capability for DB/DC environments and transition to products having multiple partition requirements (i.e., VTAM, VSPC).

**Dynamic Partition Balancing:** Advanced functions - DOS/VS dynamically changes the execution priority within a set of selected partitions. The priorities are assigned based on the Processor activity of these partitions within a specific time interval.

The partitions selected for partition balancing are specified during system generation, and can later be added or removed from the selected group by using an expanded PRTY command.

The dynamic partition balancing facility can minimize the task of scheduling jobs to balance processor resources and may improve throughput performance (see "Performance" section).

**Asynchronous Operator Communications:** With the new asynchronous operator communications facility, Advanced Functions - DOS/VS assigns reply numbers to all messages that require operator response. The system console remains free to display messages from other tasks and partitions, since the operator is not forced to reply to messages in the same sequence as they were displayed.

When the operator is ready to act upon a message, use of the reply-ID associates the response with the proper outstanding message. Responses to one message per active task may be deferred without causing DOS/VS to inhibit additional messages from appearing on the system console.

The capability of having multiple replies outstanding can permit more flexible operator action, reduce console bottleneck situations and allow more effective multiprogramming.

**Console Support ...** the asynchronous operator communications facility is supported for all DOS/VS operator console devices. The S/370 mdl 158 "Display" mode operator console can be specified as a 3277 only in conjunction with the Asynchronous Operator Communications feature and with the following restrictions:

- No light pen support.
- No support for the optional 3213 printer.

**Fast Linkage Editor:** The DOS/VS linkage editor sequentially reads single blocks from the relocatable library directory and uses a single buffer while searching for the appropriate entry. With Advanced Functions - DOS/VS installed, the linkage editor reads multiple directory records per EXCP and uses double buffering.

Since the directory lookup may be a significant portion of the total time required to include relocatable modules, the improved search can reduce linkedit times (see "Performance" section).

**Private Library Device Independence:** Advanced Functions - DOS/VS permits private libraries to reside on a DOS/VS supported DASD type different than that used for system residence.

Since private relocatable and source statement libraries are no longer restricted to the same DASD type as SYSRES, users have greater flexibility in configuring their system and converting to new DASD devices.

**VM Linkage Enhancements Functions: Non-Paging Mode ...** The linkage enhancements facility eliminates DOS/VS paging and CCW translation since these functions are performed by VM/370.

**Pseudo Page-Fault Handling ...** With the linkage enhancements support, a DOS/VS virtual machine spends less time in VM/370 page wait.

**BTAM Dynamic CCW Modification ...** The VM/370 overhead in servicing BTAM is reduced by eliminating use of the program control interrupt (PCI) linkage to test the autopoll CCW sequence.

**CP Close ...** The linkage enhancements facility enables POWER/VS to automatically close printer and punch files that have been spooled by POWER/VS at the end of each POWER/VS job.

**Job Accounting ...** The linkage enhancements support enables VM/370 to update the interval timer at the proper times, thereby improving the accuracy and repeatability of DOS/VS accounting in a VM/370 environment.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

Advanced Functions - DOS/VS requires DOS/VS Release 34 and a minimum processor storage size of 96K bytes as a prerequisite for installation. All other prerequisites for the installation and operation of Advanced Functions - DOS/VS are the same as for DOS/VS Release 34.

**Clock Comparator and Processor Timer ...** The Advanced Functions - DOS/VS product requires the optional Clock Comparator and Processor Timer feature of the S/370 mdls 135 and 145. All other DOS/VS supported systems include the Clock Comparator and Processor Timer as a standard feature.

**SOFTWARE REQUIREMENTS**

**VM Environment ...** A DOS/VS supervisor generated with linkage enhancements support can only be utilized in a VM/370 operating environment. A supervisor generated without the linkage enhancements facility can operate directly on a S/370 or in a virtual machine under VM/370.

When utilizing the linkage enhancements support of Advanced Functions - DOS/VS, the system requirements are:

- VM/370 Release 3 at a PLC 8 or later level.
- A real machine with a processor storage size of at least the minimum for VM/370.
- A virtual machine size of at least the total of the VSIZE and RSIZE specifications for the DOS/VS supervisor being used and less than 16 megabytes.

**COMPATIBILITY**

User programs that execute on DOS/VS Release 33 will generally be object-code compatible with Advanced Functions - DOS/VS installed on DOS/VS Release 34. An exception may be programs that do not use standard DOS/VS external user interfaces.

**PERFORMANCE**

**Non-VM environment ...** The Advanced Functions - DOS/VS performance improvements described below are relative to a DOS/VS Release 34 system without Advanced Functions - DOS/VS installed.

**Dynamic Partition Balancing:** For environments that contain non-paging combinations of strongly processor-oriented partitions and I/O-oriented partitions, dynamic partition balancing may improve overall throughput by up to 25%.

The maximum performance gains of partition balancing are typically achieved in systems that have untuned job scheduling and are monopolized by a high processor-utilization partition. Laboratory measurements have shown that small degradations may result from partition balancing if the workload environment is already optimally tuned, or if paging rates have activated the load leveler.

**Fast Linkage Editor:** The degree of performance improvement realized with the Advanced Functions - DOS/VS linkage editor facility is dependent upon the number of relocatable members to be included and the location of the members in the relocatable library.

The larger the library size and the further away from the beginning of the library that the member resides, the greater the linkedit performance improvement.

Laboratory measurements have shown that performance gains of up to 50% may be realized with the Advanced Functions - DOS/VS Linkage editor.

**Multiprogramming Improvements:** The system throughput gains that can be obtained by utilizing more partitions or by implementing asynchronous operator communications are dependent upon the specific processor and I/O configuration, the workload and the operator.

**VM Environment:** Measurements have shown that a DOS/VS system generated with linkage enhancements provides the following performance gains compared to the same system without linkage enhancements support:

System Type	Storage Size	Workload	Reduction In Processor Busy Time
138	1024K	Batch	13%
138	1024K	Batch + CICS	19%
138	1024K	Batch + CMS	13%
148	2048K	Batch	25%

All performance measurements were made with a systems measurement instrument (SMI) and included use of the Extended Control Program Support for VM/370.

Note that the S/370 mdl 138 measurements utilized a selector channel configuration, whereas the S/370 mdl 148 measurement was conducted on a block multiplexer channel configuration.



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PP 5746-XE2.2  
Nov 83

PROGRAM PRODUCTS

**Advanced Functions - DOS/VS (cont'd)**

The performance data above was for a select set of workloads and is for information purposes only. There is no warranty or guarantee that the same performance characteristics will apply to other users and system configurations.

**DOCUMENTATION: (available from Mechanicsburg)**

<b>Title</b>	<b>Order Number</b>
Specifications	GC33-6050
General Information Manual	GC33-6040

PROGRAM PRODUCTS

**VSE/POWER RELEASE 1 WITH  
VSE/POWER REMOTE JOB ENTRY FEATURE  
5746-XE3**

**PURPOSE**

The licensed program VSE/POWER Release 1 -- hereafter referred to as VSE/POWER -- is a program product developed on the POWER/VS component of DOS/VS Release 34. It is a spooling system that provides the user with automatic staging of unit-record input and output and priority scheduling for all programs executed under its control. VSE/POWER resides in one partition and is able to control all remaining partitions of the DOS/VSE environment placed under its control, provided these have a lower system dispatching priority than that of the VSE/POWER partition.

**DESCRIPTION**

VSE/POWER dynamically uses the address space and acquires real processor storage on an as-needed basis. Page frames released by VSE/POWER tasks are freed and returned to the page pool. Programs executing under VSE/POWER control may be executed in virtual or real mode.

VSE/POWER is generated by assembly of macros that allow the user to specify the options appropriate to his own system environment, and creates the VSE/POWER generation table. The resultant object deck contains the code necessary to invoke VSE/POWER.

The system maintains input and output queues on direct access storage for the card readers, diskette I/O units (input only), card punches and printers associated with the partitions under its control. These queues are filled or emptied by the appropriate physical devices. When a program under VSE/POWER control makes an input or output request to one of these devices, VSE/POWER presents it with the next record from the appropriate input queue or collects the record and places it in the appropriate output queue. These operations take place at main storage or direct access storage speeds: Hence, programs execute quicker and take better advantage of the system environment.

VSE/POWER is transparent to the programs executed under its control: these do not require modification to take advantage of the system's capabilities.

Since the queues are under optional operator control, the system operator can modify the order in which programs are executed by manipulating the queues with VSE/POWER operator commands. The effective substitution of direct access storage devices for unit-record devices reduces the number of the latter needed to operate the system efficiently in a multiprogramming environment.

The use of partition-independent input classes simplifies the operational characteristics of this licensed program. The dynamic partition scheduling provides automatic balancing of the input between the various partitions controlled by VSE/POWER.

VSE/POWER Release 1 will be available as a basic system that provides spooling in batch mode; this basic system may be upgraded by inclusion of the separately orderable optional VSE/POWER Remote Job Entry Feature that allows spooling via remote BSC or SNA terminals or SNA workstations. In the following, this feature will be referred to as the Remote Job Entry Feature.

**HIGHLIGHTS**

- Fully compatible with POWER/VS of DOS/VS Release 34.
- Support of DOS/VSE (5745-020) and related functions provided by the following products:
  - VSE/Advanced Functions (5746-XE8).
  - DOS/VS ACF/VTAM Release 2 (5745-010), (for RJE, SNA).
  - ACF/VTAME, Program Number 5746-RC7.
  - DOS/VS Network Control Program Version 5.0, Program Number 5747-AJ2.
  - DOS/VS Emulation Program, Program Number 5747-AG1. (For RJE, BSC, if IBM 370x Control Units are used.)
  - Virtual machine environment.
- Support for IBM 4300 Processors.
- Support of VSE/POWER files on Count/Key/Data (CKD) and Fixed Block Mode (FBM) devices. Also a mix of different DASD types is possible.
- SYSIN tape reader function. Blocked or unblocked standard-label or unlabeled tapes may be provided as SYSIN files on IBM 2400 or 3400 or 8809 Magnetic tape units.
- Save and restore capability. This backup facility enables the user to save VSE/POWER queues on tape and to restore saved queues from tape intermediate storage. It also allows the offline transfer of queues from and to different VSE/POWER installations.
- Nesting of "Source Library Include" (SLI) statements up to a usable level.

- For the Remote Job Entry Feature, a BSC multileaving facility allows the online transmission of VSE/POWER jobs between different VSE/POWER installations.
- Support of the 8809 Magnetic Tape Unit.
- Integration of the 3800 Printing Subsystem support.
- Expanded PALTER command which allows the input classes for a running partition to be changed without PSTOPping the partition.
- PHOLD command which allows the operator to HOLD the total VSE/POWER queue. Jobs in disposition D will be changed to disposition H, and those in disposition K will be changed to disposition L.
- Page count based on passing channel 1. This means that for jobs not using page eject it is now possible to perform restart of print output at a specified page number.
- SNA support of exchange media inbound.
- Support of the expanded communication feature for the 3741.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

In addition to the machine requirements for DOS/VSE, for VSE/Advanced Functions, for DOS/VSE ACF/VTAM (Program Number 5746-RC3, and co-requisite SCP component 5747-CF1) or ACF/VTAME Release 1 (Program Numbers 5746-RC7 and 5747-CG2) (optionally if the Remote Job Entry Feature is being used), and for user programs, VSE/POWER has the following machine requirements:

	Batch VSE/POWER (K Bytes)	RJE Feature Additional (K bytes)	
		RJE, BSC	RJE, SNA
Real Storage	14 - 128	4	--
Virtual Storage	172	40	34

The following is a list of the maximum numbers of resources supported by VSE/POWER (including the RJE feature):

- Up to 8 logical printers, 8 logical punches and 1 logical reader per partition.
- Up to 25 BSC terminals in concurrent operation.
- Up to 200 BSC terminals and SNA workstations in Synchronous Data Link Control (SDLC) mode. This figure may include up to 25 BSC terminals.
- For each SNA workstation, one console, one logical reader, one logical punch, up to three logical printers and up to six simultaneous sessions.

By providing more real, virtual and/or external storage as well as additional unit-record resources, the user may increase throughput and system performance.

**SOFTWARE REQUIREMENTS**

VSE/POWER Release 1 is designed to operate with VSE/Advanced Functions Release 1. If the Remote Job Entry Feature is being used, BSC operation has no dependencies. While operating in RJE-SNA mode, ACF/VTAM Version 1 Release 2 for DOS/VSE (Program Numbers 5746-RC3 and 5747-CF1) or ACF/VTAME Release 1 (5746-RC7 and 5747-CG2) and DOS/VS Network Control Program (5747-AJ2) must be installed.

**COMPATIBILITY**

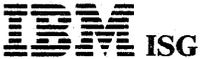
Jobs executing under POWER/VS of DOS/VS Release 34 will also run under VSE/POWER without any modifications.

**PERFORMANCE CONSIDERATIONS**

Although the execution time of individual jobs may slightly increase due to a certain increase of processor requirements, the user can expect a higher overall system throughput even if there is only one unit-record device of each type (reader, punch, printer) available for all DOS/VSE partitions served by VSE/POWER compared to a system without spooling capability. By providing additional resources in terms of real and virtual storage, DASD space and unit-record devices, the system throughput may be further improved.

**DOCUMENTATION:** (available from Mechanicsburg)

Licensed Program Design Objectives	GH12-5031
General Information Manual	GH12-5128



PROGRAM PRODUCTS

**VSE/POWER RELEASE 2 WITH  
VSE/POWER SHARED SPOOLING FEATURE  
5746-XE3**

**PURPOSE**

The licensed program VSE/POWER Release 2 is an enhancement of VSE/POWER Release 1. It is a spooling system that provides the user with automatic staging of unit-record input and output and priority scheduling for all programs executed under its control. VSE/POWER resides in one partition and is able to control all remaining partitions of the DOS/VSE environment placed under its control, provided these have a lower system dispatching priority than that of the VSE/POWER partition.

**DESCRIPTION**

VSE/POWER makes dynamic use of the address space and acquires real processor storage on an as-needed basis. Page frames released by VSE/POWER tasks are freed and returned to the page pool. Programs executed under VSE/POWER control may be executed not only in virtual mode but also in real mode.

VSE/POWER is generated by assembly of macros that allow the user to specify the options appropriate to his own system environment, and creates the VSE/POWER generation table. The resultant object deck contains the code necessary to invoke VSE/POWER.

The system maintains input and output queues on direct access storage for the card readers, diskette I/O units (input only), card punches and printers associated with the partitions under its control. These queues are filled or emptied by the appropriate physical devices. When a program under VSE/POWER control makes an input or output request to one of these devices, VSE/POWER presents it with the next record from the appropriate input queue or collects the record and places it in the appropriate output queue. These operations take place at main storage or direct access storage speeds: Hence, programs execute quicker and take better advantage of the system environment.

VSE/POWER is transparent to the programs executed under its control: These do not require modification to take advantage of the system's capabilities.

Since the queues are under optional operator control, the system operator can modify the order in which programs are executed by manipulating the queues with VSE/POWER operator commands. The effective substitution of direct access storage devices for unit-record devices reduces the number of the latter needed to operate the system efficiently in a multiprogramming environment.

The use of partition-independent input classes simplifies the operational characteristics of this licensed program.

VSE/POWER will be available as a basic system that provides spooling in batch mode; this basic system may be upgraded by inclusion of the following separately orderable optional features:

- VSE/POWER Remote Job Entry Feature. This feature allows spooling via remote BSC or SNA terminals or SNA workstations.
- VSE/POWER Shared Spooling Feature. This feature allows different VSE/POWER systems operating on different machines to gain access to a common set of VSE/POWER queues and optionally a common account file.

**HIGHLIGHTS**

- 3262 Line Printer Support.
- Fully compatible with VSE/POWER Release 1 (except Cross Partition Communication Interface).
- Support of environments with up to 12 partitions.
- Improved Cross Partition Communication Interface (Q-display, security).
- Optionally, sharing of common VSE/POWER files between two or more VSE/POWER installations on different machines (Shared Spooling Feature).

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

In addition to the machine requirements for DOS/VSE, for VSE/Advanced Functions, for DOS/VSE ACF/VTAM (Program Number 5746-RC3, and co-requisite SCP component 5747-CF1) or ACF/VTAME Release 1 (Program Numbers 5746-RC7 and 5747-CG2) (optionally if the Remote Job Entry Feature is being used), and for user programs, VSE/POWER has the following machine requirements:

	Batch VSE/POWER (K Bytes)	RJE Feature Additional (K bytes)	
		RJE, BSC	RJE, SNA
Real Storage	14 - 128	4	--
Virtual Storage	176	40	34

If the Shared Spooling Feature is being used, 1K additional bytes of real storage, and 4K bytes of additional virtual storage have to be added to the above figures.

The following is a list of the maximum numbers of resources supported by VSE/POWER.

- Up to 8 logical printers, 8 logical punches and 1 logical reader per partition.
- Up to 25 BSC terminals in concurrent operation. (Remote Job Entry Feature installed.)
- Up to 200 BSC terminals and SNA workstations in Synchronous Data Link Control (SDLC) mode. This figure may include up to 25 BSC terminals. (Remote Job Entry Feature installed.)
- For each SNA workstation, one console, one logical reader, one logical punch, up to three logical printers and up to six simultaneous sessions. (Remote Job Entry Feature installed.)

By providing more real, virtual and/or external storage as well as additional unit-record resources, the user may increase throughput and system performance.

**SOFTWARE REQUIREMENTS**

VSE/POWER Release 2 is designed to operate with VSE/Advanced Functions Release 2. If the Remote Job Entry Feature is being used, BSC operation has no dependencies. While operating in RJE-SNA mode, ACF/VTAM Version 1 Release 2 for DOS/VSE (Program Numbers 5746-RC3 and 5747-CF1), or ACF/VTAM VSE Version 2 (Program Number 5666-280) or ACF/VTAME Release 1 (5746-RC7 and 5747-CG2), and DOS/VS Network Control Program (5747-AJ2) must be installed. If the Shared Spooling Feature is being used, DOS/VSE Advanced Functions Release 2 is required.

**COMPATIBILITY**

Jobs executing under POWER/VS of DOS/VS Release 34 and VSE/POWER Release 1 will also run under VSE/POWER Release 2 without any modifications. However, if the Shared Spooling Feature is being used and VSE/POWER job accounting is performed, the account records produced by VSE/POWER Release 2 are not compatible with those produced by Release 1. Therefore, a DSECT generation macro is provided for the alignment of symbolic addresses from the VSE/POWER Release 1 to the Release 2 record format. Programs using Cross Partition Communication Interface (GETSPOOL, PUT-SPOOL, etc) have to reassemble.

**PERFORMANCE CONSIDERATIONS**

Although the execution time of individual jobs may slightly increase due to a certain increase of processor requirements, the user can expect a higher overall system throughput even if there is only one unit-record device of each type (reader, punch, printer) available for all DOS/VSE partitions served by VSE/POWER compared to a system without spooling capability.

VSE/POWER Release 2 will be equal in performance as compared to Release 1. The contention between two systems may impact the performance when using shared spool files.

**DOCUMENTATION: (available from Mechanicsburg)**

Licensed Program Design Objectives	GH12-5031
General Information Manual	GH12-5131

## PROGRAM PRODUCTS

**5746-XE6 - JOB ENTRY PROGRAM  
5748-XE6 - FILE TRANSFER PROGRAM****PURPOSE**

The Job Entry Program provides the basic interconnection mechanism between a DOS/VSE subhost, either a S/370, a 3031 Processor or 4300 Processors, to a job entry subsystem host, either under OS/VS or DOS/VSE, using ACF/VTAM Version 1 with the Multisystem Networking Facility (MSNF) feature or ACF/VTAM Version 2 or ACF/VTAME. It offers job submission from a subhost to a job entry subsystem at the host and routing of job output back to the originating subhost or to an alternate destination.

**DESCRIPTION**

JEP exclusively executes at the subhost together with VSE/POWER. It does not limit the number of subhosts that can be connected to the host concurrently. However, limits are imposed by the host capabilities. JEP communicates with the following entry subsystems at the host:

- OS/VS2 MVS JES2
- OS/VS2 MVS JES3
- OS/VS2 MVS NJE/JES2
- OS/VS1 RES/JES
- DOS/VSE with VSE/Advanced Functions and VSE/POWER with Remote Job Entry (RJE) feature.

Details on these systems are contained in the section "Specified Operating Environment".

JEP can also communicate with two or more host systems concurrently. The maximum number of host systems depends on SNA limits.

JEP employs VSE/POWER capabilities. It runs without requiring the VSE/POWER Remote Job Entry (RJE) feature as a prerequisite. However, the RJE feature and JEP can coexist. With the RJE feature installed, JEP offers the capability for SNA workstations and BSC terminals connected to VSE/POWER in the DOS/VSE subhost to submit jobs through the subhost to the host.

The File Transfer Program, referred to as FTP, expands the capabilities of JEP. It executes under DOS/VSE, OS/VS1 or OS/VS2. With JEP at the subhost the FTP installed at the host offers capabilities required to centralize program maintenance activities to the host, thus saving the user the cost for keeping programmer teams at each subhost location. With JEP and the FTP, jobs can be submitted from the host to the subhost, and the job output can be transmitted back to the originating host or to an alternate host system. Additionally, with the FTP installed at the host and the subhost, JEP and FTP offer transmission of sequential files between the DOS/VSE subhost and the host in both directions. The file transfers can be initiated in either direction either at the subhost or at the host.

**HIGHLIGHTS**

- Collection of data and periodic transmission of the data in the form of jobs or files to a divisional center or a corporate headquarters for integrated processing.
- Transmission of the output data to remote locations in the form of job output or files for final processing and/or printing.
- Transmission of data files between the host and the subhosts for processing at the host or at the subhost.
- Submission of jobs and routing of job output from the subhost to the host and from the host to the subhost in order to:
  - Allow for centralization of program maintenance at the host.
  - Utilize resources at a remote system which are not available at the submitting system.
  - Offload the submitting system, in particular in a DOS/VSE-to-DOS/VSE environment.
  - Submit OS/VS jobs at a DOS/VSE installation.
  - Submit DOS/VSE jobs at an OS/VS installation.
- Sharing of the communications link among various applications. JEP allows line sharing between transaction and batch applications in a DOS/VSE-to-DOS/VSE as well as a DOS/VSE-to-OS/VS environment.
- Coexistence: Together with VSE/POWER and the VSE/POWER RJE feature, JEP provides coexistence between SNA and BSC components. It allows job submission from SNA workstations, such as an IBM 3790 or BSC terminals such as an IBM 3740 through the DOS/VSE subhost to the host system, having the DOS/VSE subhost act as an intermediate subhost.
- Ease-of-Use: JEP and FTP offers ease-of-use in the areas of:
  - Installation and generation, where the VSE/POWER procedure is adopted for JEP. FTP does not require regeneration
  - Automatic initialization and LOGON to the host system as system generation option

– Operator communication with JEP using commands compatible with VSE/POWER commands

- Security and Integrity: When establishing a connection between JEP and a host system, security and integrity is assured by means of:
  - JEP generation parameters: Host connections can be established according to the generated configuration only.
  - Authorization passwords: Optional system internal and operator passwords are required at LOGON time.
  - User management is responsible for the selection, implementation and adequacy for such controls.

**CUSTOMER RESPONSIBILITIES**

VSE/POWER must be generated to include JEP.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The Job Entry Program (JEP) executes in the VSE/POWER partition of any IBM S/370, 3031 Processor or 4300 Processor (subhost) and requires a minimum of 64K bytes of virtual storage in this partition. For the communication between a S/370, a 3031 Processor or a 4300 Processor and the host system, a 3705 Communication Controller is required. A 4331 Processor also communicates with the host via the Communications Adapter with SDLC Transmission Mode.

The File Transfer Program (FTP) executes in the host and, optionally, in the subhost and requires up to 72K bytes of virtual storage in addition to the programming requirements listed below.

The host can be either an IBM S/370, 3031, 3032, 3033 or 4300 Processor with a 3705 Communications Controller or an IBM 4331/4361 Processor with the Communications Adapter with SDLC Transmission Mode.

The subhost can be either an IBM S/370, 4300 or 3031 Processor with a 3705 Communication Controller or an IBM 4331/4361 Processor with the Communications Adapter with SDLC Transmission Mode.

**SOFTWARE REQUIREMENTS**

The programming requirements for JEP and ETP are described separately for the subhost and the host. The programming systems mentioned in this section execute also in the environment of the Virtual Machine Facility/370 (VM/370). Where release numbers are given, the following statements apply also to subsequent releases or modification levels of the named programming systems unless otherwise stated.

**Subhost**

If the subhost is a S/370, a 3031 Processor or a 4300 Processor:

- DOS/VSE, Program Number 5745-020.
- VSE/Advanced Functions, Program Number 5746-XE8, Release 2.0.
- VSE/POWER, Program Number 5746-XE3, Release 2.0.
- ACF/VTAM Version 2, Program Number 5666-280.
- Advanced Communication Function for VTAM Version 1 (ACF/VTAM) with Multisystem Networking Facility (MSNF) feature, Program Number 5746-RC3, Release 2.0.

In this case, the Advanced Communication Function for Network Control Program/Virtual Storage (ACF/NCP/VS), Program Number 5735-XX3, Release 1.0 or 2.0 is required in the IBM 3705 Communications Controller.

If the subhost is an IBM 4331 Processor with the Communications Adapter for SDLC Transmission Mode:

- DOS/VSE, Program Number 5745-020.
- VSE/Advanced Functions, Program Number 5746-XE8, Release 2.0.
- VSE/POWER, Program Number 5746-XE3, Release 2.0.
- Advanced Communications Function for VTAM Entry (ACF/VTAME), Program Number 5746-RC7.

**Host**

Depending on the operating system used, the host can be:

For DOS/VSE: S/370, 3031 or 4300 Processor.

For OS/VS1: S/370, 3031, 3032, 3033 or 4300 Processor.

For OS/VS2: S/370, 3031, 3032 or 3033 Processor.

## PROGRAM PRODUCTS

**JEP + File Transfer Program (cont'd)**

If the host is a S/370, 3031, 3032, 3033 or 4300 Processor, the Advanced Communication Function for Network Control Program/Virtual Storage (ACF/NCP/VS), Program Number 5735-XX3, Release 1.0 or 2.0 is required in the IBM 3705 Communication Controller.

If the host executes under DOS/VSE, the same programming requirements as mentioned above under 'Subhost' apply, except that the Remote Job Entry (RJE) feature of VSE/POWER is required on the host. Additionally, VSE/POWER Release 1.0 (with the RJE feature) is also supported in conjunction with VSE/Advanced Functions Release 1.0.

For OS/VS, one of the following job entry subsystems is required:

- OS/VS1 Remote Entry Services/Job Entry Subsystem (OS/VS1 RES/JES), Program Number 5741-VS1, Release 6.0 or 6.7, with ACF Version 2, Program Number 5662-280, Advanced Communication Function for VTAM Version 1 (ACF/VTAM), Program Number 5735-RC2, Release 1.0 or 2.0 (OS/VS1 Release 6.7 only), including the Multisystem Networking Facility (MSNF) feature.
- OS/VS2, Program Number 5752-VS2, Release 3.7 with Job Entry Subsystem 2 (JES2) Release 4.1 (SU 25) or Job Entry Subsystem 3 (JES3) Release 3.0 (SU 23) or Network Job Entry/Job Entry Subsystem 2 (NJE/JES2), Program Number 5740-XR8, Release 3.0, together with one of the following:
  - ACF/VTAM Version 2, Program Number 5665-280.
  - Advanced Communications Function for VTAM Version 1 (ACF/VTAM), Program Number 5735-RC2, Release 1.0, or 2.0 (OS/VS 2 Release 3.8 only), including the MSNF feature.
  - Advanced Communications Function for TCAM (ACF/TCAM) Version 2, Program Number 5735-RC3, Release 2.0, including the MSNF feature (OS/VS Release 3.8 only).

**DOCUMENTATION**  
(available from Mechanicsburg)

**For JEP and FTP:**

*Licensed Program Design Objectives (GH12-5044) ... General Information Manual (GH12-5129) ... Program Reference and Operations Manual (SH12-5331) ... Program Logic Manual (LY12-5031).*

**For FTP only:**

*General Information Manual (GH12-5140) ... Program Reference and Operations Manual (SH12-5342) ... Program Logic Manual (LY12-5033).*

## PROGRAM PRODUCTS

**VSE/ACCESS CONTROL - LOGGING and REPORTING  
RELEASE 1 (5746-XE7)****PURPOSE**

The VSE/Access Control - Logging and Reporting Release 1 Program Product is part of the data security assist functions offered for all users of DOS/VSE and designed to assist in auditing a DOS/VSE data processing installation.

The system access control functions consist of the following:

Provided by DOS/VSE and VSE/Interactive Computing and Control Facility (VSE/ICCF) 5746-TS1:

- Utility and macro functions to define and maintain profiles for protected resources.
- User identification and verification for DOS/VSE batch jobs and VSE/ICCF jobs.
- Checking a user's authority to access protected data sets, libraries and programs.
- Creation of information about access related events to protected resources.

Provided by VSE/Access Control - Logging and Reporting 5746-XE7:

- Logging and recording of access related event information created by VSE/ICCF.
- Generation of reports for auditing.

**HIGHLIGHTS**

- Logging of information about access related events to protected resources (such as data sets, libraries, programs) to a sequential disk data set, called the log data set. Logging is optional.
- Logging is performed asynchronously by a DOS/VSE subtask attached to the VSE/Interactive Computing and Control Facility.
- Reporting provides a printout of selected data from the log data set for auditing purposes.
- Selection criteria are provided to the reporting module during program execution by means of control statements.
- Several reports corresponding to various selection criteria may be obtained in one program run.
- Access event data may be archived on a tape and restored from tape for deferred reporting.
- The log data set consists of two parts used alternatively: While one part is used for logging, the other part may be used for reporting.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for:

- Generating the access control option in DOS/VSE.
- Installing the program products VSE/Interactive Computing and Control Facility 5746-TS1 and VSE/Access Control - Logging and Reporting 5746-XE7.
- Setting up the access control environment (User identifications, authorizations, events to be logged).
- Specifying the reporting criteria.
- Starting the reporting program if the log data set is full.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VSE/Access Control - Logging and Reporting requires the Compare and Swap instructions which is standard on the IBM 4300 Processors and on the IBM S/370 mdls 115, 125, 135-3, 138, 145-3, 148, 155-II and 158.

The Compare and Swap instruction is optionally available via the Conditional Swapping Feature (#1051) on the S/370 mdls 135 and 145 and via the Advanced Control Program Feature (#1001) on the S/370 mdl 145.

**SOFTWARE REQUIREMENTS**

VSE/Access Control - Logging and Reporting is designed to operate on DOS/VSE with VSE/Advanced Functions. VSE/Interactive Computing and Control Facility (VSE/ICCF) (5746-TS1) is required to generate the input data for VSE/Access Control - Logging and Reporting. If the data to be reported should be sorted, Sort/Merge Version 2 is required.

**PERFORMANCE REQUIREMENTS**

The performance of the logging program depends on the following factors:

- Number of entries generated for the internal log queue.
- Number of logging requests and size of the log data set.

- Priority of the main task to which the logging program is attached as a DOS/VSE subtask (VSE/Interactive Computing and Control Facility).

During measurements on S/370 mdl 145 with 3330 disk devices a CPU-time increase of less than 2.5% was observed for commercial oriented batch applications.

The performance of the reporting program depends mainly on the following factors:

- The time required to read the log data set. This time is related to the size of the log file and the number of records being selected for a requested report.
- The time to sort the different reports if this option was selected.
- The time required to print the reports.

The performance data shown above was for a selected set of workloads and is for information purposes only. There is no warranty or guaranty that the same performance characteristics will apply to the users and system configurations.

**DOCUMENTATION:** (available from Mechanicsburg)

*Licensed Program Design Objectives* (GH12-5045) ... *General Information Manual* (GH12-5130).



PROGRAM PRODUCTS

5746-XE8 - VSE/ADVANCED FUNCTIONS R1

PURPOSE

VSE/Advanced Functions provides all functions of Advanced Functions DOS/VS and significant new facilities: 7 Partitions for all SYSRES DASD types ... support of 3310 and 3370 in S/370 Compatibility Mode under VMLE ... implicit link ... area for job-to-job communication ... multiple label areas on SYSRES ... retain message with outstanding reply ... elimination of LBLTYP statement ... automated system initialization ... dump improvements ... fast B- and C-transient fetch ... fast OPEN of hard-copy file ... high-level SDL search ... multiple extent page data set ... JCL option for fast CCW translate ... VMLE enhancements.

HIGHLIGHTS

Additional Hardware Support

7 Partitions for all SYSRES DASD types: DOS/VSE now supports 7 partitions for all SYSRES DASD types, including 3340 DASD.

3310 and 3370 support in S/370 mode under VMLE: Provides 3310 and 3370 native mode support in S/370 mode. This allows a system running under VM/370 to access a 3310 device. This is accomplished by specifying the parameter VM=YES at Supervisor generation time.

Usability Improvements

Implicit Link: This ease-of-use function reduces the number of Job Control statements that are required for an application programmer for program compilation and testing. By specifying a "GO" parameter on the EXEC Job Control statement for the compiler step, the user may specify that the linkage editor and the compiled program are to be invoked automatically. Only the source program data and any additional data for the go step are required after the compiler step. If a serious error is encountered in either the compiler or link-edit step, the input stream is flushed to end of job (/ &).

Area for job to job communication: To enable the user to do job to job communication, a new area in the system GETVIS space is provided. Through the use of a JOBCOM macro the user is able to store up to 256 bytes of information. This information is not destroyed between jobs and can be retrieved in another program through the use of the corresponding parameters in the JOBCOM macro.

Multiple label areas on the SYSRES Volume: Currently, the label area has a fixed size and is defined as part of the SYSRES file. This new support allows the user to define label areas of varying size. During system start-up time, the user may select from the following options:

- Use the standard SYSRES label area.
- Define a label area via the DLA command.

This function facilitates SYSRES sharing across processors, and with multiple DOS/VSE guest systems in a VM environment.

Retain Message with Outstanding Reply: When asynchronous operator communication is utilized, sometimes the message disappears from the screen before the operator can reply. Now the message is retained on the screen until it is replied to, or until the operator deletes the message.

Elimination of LBLTYP Statement: The LBLTYP statement is no longer required as a linkage editor control statement to reserve space for labels. The LBLTYP statement was used to define the amount of storage to be reserved in the user's partition for processing of tape and nonsequential disk file labels for nonVSAM files. The elimination is possible through an ease-of-use feature which provides for dynamic storage allocation at OPEN time for the amount of storage required. This allows the user to eliminate the LBLTYP statement. If present, it is ignored.

Automated System Initialization: Automated System Initialization (ASI) reduces the operator's work normally required for system IPL and starting of subsystems in various partitions. All necessary information is cataloged in procedures which are executed automatically and bring up the system; VSE/POWER, VSE/ICCF, ACF/VTAM, etc. without operator intervention. The user may interrupt the IPL process, specify another procedure set or choose to do the interactive IPL as before. User supplied procedures can be included in ASI.

Dump Improvements: A high speed system dump can be taken each time a partition abends. The dump is written onto a new Symbolic Unit called SYSDMP. The dump data set may consist of two parts which are used alternatively in order to allow receiving and printing of dump data concurrently. Moreover a phase load list is set up and maintained which contains the phase names, begin addresses and end addresses of all phases most recently loaded into the partition. This provides the capability - after a program check - to determine the phase name of the phase in error.

Performance Improvements

Fast B- and C-transient fetch: This feature allows for fetching of highly used B- or C-transients from the SVA rather than from the core image library. The appropriate transients are loaded into the SVA at IPL time or by JCL. When a transient is to be used, instead of fetching it from the core image library, it is simply moved from the SVA into the

transient area. This increases the performance when heavy processing is being done in the core image library and reduces the B-transient area contention problem.

Fast OPEN of hard-copy file: At IPL, the amount of time required to search for the end of the hard-copy console log is reduced. This speeds up the IPL process significantly, especially if the file is large.

High-level SDL search: The SDL (System Directory List) is the directory of the SVA. In addition it may contain entries for load modules which have to be fetched from the CIL disk but for which the disk directory accesses should be avoided. The SDL is implemented as an incore list which is searched using the binary search technique. As the list resides in virtual storage, this technique might result in several page faults if the list is long (60 entries fit on one 2K page). The high-level SDL search uses a second level directory residing in fixed Supervisor storage which restricts the binary SDL search to just one page; only page boundary crossing entries need two pages. This feature increases the performance by reducing the number of page faults.

Multiple Extent Page Data Set: Allows the user to split his Page Data Set across several extents and/or volumes. This can increase the performance by allowing the user to place a high activity portion of his Page Data Set under the fixed head portion of the DASD device. Even without fixed heads, the user can use this facility to balance his I/O activity across different devices. The maximum number of extents is 15 (3 on one volume). The volumes must be either all of the type fixed block mode or all of the type CKD. The 2311 DASD is not supported.

JCL Option for Fast CCW Translate: Specification of "NOFASTTR" in the OPTION control statement causes the fast CCW translation to be switched off for the corresponding job. This option is meaningful for jobs for which it is unlikely that the same I/O areas and I/O control blocks will be reused. The option is temporary and valid for one job.

VMLE Enhancements: VMLE provides the following enhancements:

- CP commands SET PAGEX and SETRUN ON are issued automatically at IPL of DOS/VSE.
- BUFSIZE default is set to 5 for VMLE initialization.
- Speed of IPL of DOS/VSE on VM/370 is improved due to obtaining clear pages from VM.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

VSE/Advanced Functions is designed to execute on the same IBM machines as DOS/VSE, that is IBM S/370 115-158, 3031 Single Processor, and 4300 Processors. The minimum memory size supported is 160K bytes.

SOFTWARE REQUIREMENTS

VSE/Advanced Functions is designed to operate with DOS/VSE.

VM environment ... A DOS/VSE supervisor generated with Linkage Enhancements support can only be utilized in a VM/370 operating environment on an IBM S/370 or on an IBM 4300 Processor in S/370 mode. A supervisor generated without the Linkage Enhancements facility can operate directly on an IBM S/370, on an IBM 4300 Processor System in S/370 mode or in a virtual machine under VM/370. When utilizing the linkage enhancements support of VSE/Advanced Functions, the system requirements are:

- VM/370 release 4 or later release.
- A real machine with a processor storage size of at least the minimum for VM/370.
- A virtual machine size of at least the VSIZE specifications for the DOS/VSE supervisor being used + 200K, and less than 16 megabytes.

COMPATIBILITY

VSE/Advanced Functions is designed to run on DOS/VSE. The compatibility statement for DOS/VSE applies here as well.

PERFORMANCE CONSIDERATIONS

The performance improvements described below are stated for specific functions of the VSE/Advanced Functions Release 1.

1. For selected environments the following throughput improvements were observed on the S/370 mdl 145 with 3277 Display Station and 3330 DASD with 4 batch partitions and VSE/POWER:

Fast B-transient Fetch with approximately 2 B-transient calls per second, up to 15%. The measurement was done with applications such as COBOL Compile and Link and Payroll with ISAM-access method.

Fast C-transient Fetch (Display operator console usability improvement) with 25 screen lines/minute, up to 12%.

MULTIPLE Extent Page Data Set with an average Page I/O-rate of 10 pages/second, up to 8%, when the most used part of the Page Data Set resided on the fixed head portions of 3350

**VSE/Advanced Functions R1 (cont'd)**

DASDs. In the comparison measurement without this function only a small portion of the page data set resided on a single fixed head section of a 3350 DASD.

**2. Other potential performance improvements items:**

- JCL Option for Fast CCW Translate.

This function will selectively switch off the fast CCW-translate option for jobs which are unlikely to re-use the same I/O-areas and I/O control blocks. By this function processor overhead can be reduced (for example in DB/DC applications).

- 7 partitions for 3340 DASD.
- High level SDL Search.
- Fast open of hardcopy file at IPL-time.

For a measured workload which is considered to be representative, an overall system throughput improvement of 7% has been observed on the S/370 mdl 145 if VSE/Advanced Functions Release 1 is compared to Advanced Functions - DOS/VS.

DOS/VSE in ECPS:VSE mode improves the path length of the SVC 0 (CCB-macro) for DASD requests with normal CCW-translate up to 15% compared to DOS/VSE in S/370 mode. If the access method (VSAM) provides a list of pages to be fixed (IORB-macro), the effective path length of the SVC 0 is reduced by up to 25%. The SVC 0 path length is one part of the total path length of an application. Therefore the above stated improvement will show up as a smaller percentage on the complete application path length.

Because of the complexity of configurations and varied application of systems, customer by customer, there can be no guarantee that an individual user will achieve these same results. It is the customers responsibility to determine how these product improvements will affect his own operations.

**DOCUMENTATION**  
(available from Mechanicsburg)

Licensed Program Specifications	GC33-6105
General Information Manual	GC33-6106
System Information	SC33-6107

PROGRAM PRODUCTS

5746-XE8 - VSE/ADVANCED FUNCTIONS R2

PURPOSE

VSE/Advanced Functions Release 2 provides all functions of VSE/Advanced Functions Release 1 and significant new facilities: 3262 Line Printer Support ... listlog utility ... additional DLBL information ... SYSLNK in VSAM managed space ... extended Volume command ... support of Volume mount requests ... DASD sharing across processors ... library sharing across processors ... assembler language macros to use DASD sharing services ... 208 tasks/12 partitions ... extended label area support ... system tailoring at IPL ... library sharing across partitions ... library concatenation ... online system generation ... DASD device independence for SAM/DAM Files ... B-transient area contention removal ... VSE-VM/370 linkage enhancements in an ECPS:VSE mode supervisor ... list VTOC improvements ... removal of certain hardwaits ... extended problem determination functions ... MSHP support of local APAR fixes ... reduced SYSGEN options.

RELEASE 2 HIGHLIGHTS

**3262 Line Printer Support:** The new 3262 Line Printer is supported as a System Printer of the PRT1 class. Since the error signaling differs from the currently supported Line Printers, user written error recovery procedures need to be adjusted.

**Listlog Utility:** This utility points out all job related SYSLOG messages on SYSLIST at End-of-Job time whenever a job is cancelled. It can also be invoked explicitly by specifying '//EXEC LISTLOG.'

**Additional DLBL Information:** New parameters that are required for the VSE/VSAM Space Management for SAM Feature are introduced in the DLBL statement.

**SYSLNK in VSE/VSAM Managed Space:** The SYSLNK processing by Job Control is extended to handle data in CI format not only on fixed block mode devices but also on CKD DASDs only in managed space. This is required for VSE/VSAM Space Management for SAM Feature. The workfiles for the linkage editor are now dynamically allocated and de-allocated in VSE/VSAM space.

**Extended VOLUME Command:** The displayed message for the VOLUME command for one specific device is extended by a parameter which prevents automatic assignments to this device. This function is needed for VSE/VSAM Space Management for SAM Feature. A new FREE command is added which enables the operator to reset a reserved status.

**Support of VOLUME Mount Requests:** Currently, OPEN expects the correct volume to be mounted on a drive determined by the SYSnumber and the corresponding ASSGN statement. If the drive is not ready, the "INTERVENTION REQUIRED" message will be issued when trying to access the VTOC.

If a pack is mounted with the wrong VOLID, OPEN will issue the message "WRONG PACK, MOUNT nnnnnn" and the operator can either honor the request by changing the pack, or he has to cancel the job. In any case, OPEN is waiting for a reply (NEWPAC, CANCEL or EOB).

Space management, however, will find out before issuing the OPEN, whether the requested VOLID is available and on what disk drive. If it is already available, the dynamic device assign service is used to obtain a LUB, and OPEN can continue.

If the needed VOLID is not online, then space management will find out via a new system service, if there is a disk drive available, which is currently not in use by the system. If such a "free" drive is found, the open service will prompt the operator to mount the requested disk pack there. If the system does not find a "free" or unused drive, the operator has to decide how to honor the pack mount request.

OPEN will then wait for the operator reply. Then it determines where the requested VOLID is mounted, assigns a logical unit to this disk drive (via the dynamic device assign) and continues.

A new system service and new VOLUME command options will assist the operator in this pack mounting activity.

**DASD Sharing across Processors:** This supervisor service extends the symbolic gating facility of LOCK/UNLOCK for inter-processor usage. The user gets one interface for internal and external gating with an additional parameter to specify the scope. If the external DASD sharing feature is not generated, then all requests are handled as internal ones. Thus the user need not be concerned about the current sharing situation.

**208 User Tasks:** Provides a total of 208 user subtasks that can be active concurrently in the system. Within one partition a maximum of 32 concurrent active tasks are allowed.

**Twelve Partitions:** VSE/Advanced Functions Release 2 supports up to twelve partitions.

**Extended label area support:** Extensions are provided in three areas:

- A user-defined label area may now be placed on any DASD device except 2311, and need not reside on the SYSRES disk.

- The permanent labels for FG partitions may now be loaded from the BG partition. This eliminates the need to start the respective FG partition for FG label loading.
- Labels may now be added or deleted by means of the new "Label ADD" and "Label DELETE" functions.

**System Tailoring at IPL:** Device specification at supervisor generation time is no longer required. The system determines at IPL time how many and which devices are attached and for which DASDs file protection is required.

**Improved Librarian Functions:** The following three functions are designed for ease-of-use and ease-of-installation.

- Multiple Procedure Libraries.  
VSE/Advanced Functions Release 2 supports multiple procedure libraries.

- Shared Libraries across Partitions.

A library may be assigned to and accessed by more than one partition at the same time. Functions are provided which prevent multiple updates at the same time. All types of libraries may be shared. All libraries may reside on disk devices different from SYSRES. The support includes current disk devices and 3310 and 3370. Device types may be mixed.

- Concatenated Libraries.

This function provides concatenation of up to 30 libraries, 15 temporary and 15 permanent, within one job step. The various libraries may reside on fixed block mode or CKD devices which may be used intermixed. For compatibility reasons, the current system of private libraries is maintained so that existing jobstreams need not be changed, should the user elect not to use concatenated libraries. The library concatenation can be temporary or permanent.

**Online System Generation:** The capability is provided, to install and tailor a new VSE/Advanced Functions system under control of a running DOS/VSE system. The user can do this system generation in any DOS/VSE partition.

**DASD Device independence for SAM/DAM files:** This new support will be DASD device independent in the sense that the user's DTF will be dynamically initialized to reflect the type of DASD the data set resides on, no matter what device type the DTF was assembled with. In addition the user's program will always be changed to utilize a SAM or DAM logic module, residing in the SVA, so the user will always have the proper support required to access the actual DASD device.

**B-Transient Area Contention Removal:** Currently, DOS/VS has one B-transient area in the Supervisor and schedules this resource on a first-come, first-served basis. As the number of batch partitions increases, this resource can at times inhibit the performance of a system.

The most frequently used, or long running system services (OPEN, End-of-Job, Attention routines) are now repackaged into SVA-resident code, which will reduce the contention for the B-transient area significantly. Other important transients which communicate with the operator or initiate long lasting tape operations free up the transient area when communicating with the operator, or during the tape operation.

**VSE-VM/370 Linkage Enhancements in ECPS:VSE Mode:** When specifying VM=YES and MODE=E at the VSE Supervisor generation the DAT-bit will be set off, thereby improving performance for a VSE supervisor when running under VM/370.

**List VTOC Improvements:** The entries in the VTOC will now be listed in alphabetic sequence, and information about unused disk space is provided.

**Removal of Certain Hardwaits:** If SYSRES, the Page Data Set, SYSCLB or concatenated libraries reside on a device which is not ready, the System enters wait state. If the operator makes the device ready and presses the restart key, the System will now continue operation.

**Extended Problem Determination Functions:** On top of those problem determination functions offered with VSE/Advanced Functions Release 1, Release 2 provides additional support to get all job related messages in the SYSDMP file at the end of the related virtual storage dump.

**MSHP Support for Local APAR Fixes:** A new MSHP command, CORRECT, has been implemented to apply local APAR fixes with a recording of the event into the System History File.

**Reduced SYSGEN Options:** The supervisor generation macros CONFIG, PLOCS and VSTAB have been deleted. The underlying functions have either been made standard, deleted, moved to another macro or the specification is being made at IPL time. Several parameters in the three remaining macros SUPVR, FOPT and IOTAB have been deleted, as the corresponding functions are now standard (i.e., ICCF and RMS support), or the function has been deleted (the support for mixed parity tape processing on the 14XX emulator).

## PROGRAM PRODUCTS

## VSE Advanced Function R2 (cont'd)

## SPECIFIED OPERATING ENVIRONMENT

## HARDWARE REQUIREMENTS

VSE/Advanced Functions Release 2 is designed to execute on the same machines as DOS/VSE, that is IBM S/370 115-158, 3031, and 4300. The minimum memory size supported is 160K bytes.

All prerequisites for installation and operation of VSE/Advanced Functions are the same as for DOS/VSE.

The minimum hardware requirement for VSE/Advanced Functions Release 2 are:

- (1) A VSE-supported central processor i.e., IBM S/370 115-158, 3031 Single Processor, and 4300 Processors. VSE/Advanced Functions Release 2 requires the clock comparator and the CPU-timer (standard on all S/370 models except 135 and 145, and also standard on 4300 processors) and the floating point feature (not standard on S/370 115, 125, 135, 145 and 155).
- (2) Either of the following:
  - A card reader.
  - A diskette unit.
- (3) A VSE supported system printer.
- (4) One of the following:
  - Two disk drives, one of which must accommodate a removable disk pack.
  - Two fixed media disk drives and one magnetic tape drive.
  - One disk drive and two magnetic tape drives.

The IBM 2311 DASD is not supported as a system residence device.

For more information on the specific device types supported by DOS/VSE, see the *Introduction to DOS/VSE* (GC33-5370), Appendix A.

## SOFTWARE REQUIREMENTS

VSE/Advanced Functions Release 2 is designed to operate with the related DOS/VSE SCP (Program Number 5745-030).

VM Environment: A supervisor generated without the linkage enhancements facility can also operate in a virtual machine under VM/370. When utilizing the linkage enhancements support of VSE/Advanced Functions, the system requirements are:

- VM/370 Release 6 or a later release.
- A real machine with a processor storage size of at least the minimum for VM/370.
- A virtual machine size of at least the VSIZE specifications for the DOS/VSE supervisor being used +200K, and less than 16 megabytes.

## COMPATIBILITY

All application programs that execute on DOS/VSE with VSE/Advanced Functions Release 1 installed are object code compatible with VSE/Advanced Functions Release 2. For those customers converting from DOS/VS Release 34 the compatibility statement of DOS/VSE applies.

## MIGRATION/COEXISTENCE

Data sets and external interfaces are fully compatible with previous releases except for the following:

- SAM and DAM OPEN will always link the users DTF to an IBM supplied logic module which resides in the SVA.  
  
This precludes the use of existing logic modules for DASD files generated through the use of the CPMOD, DAMOD, DIMOD or SDMOD macros. It also precludes the use of user-written modules for DAM and SAM files
- Each DASD volume mounted on the system should have a unique VOLID in order for the system to enqueue just on the resource intended to be locked.
- The PRTY parameter that could previously be given at SYSGEN-time to change the default partition priorities has been deleted. Instead the PRTY command can be used to change those priorities at ASI (Automated System Initialization) time, just after IPL.
- Levels as listed are required for the following Program Products to run with VSE/Advanced Functions Release 2:
  - VSE/POWER Release 2
  - VSE/ICCF Release 2
  - VSE/VSAM Release 2
  - VSE/IPCS Release 2
  - VSE/DITTO with PTF UD 17431 (Put tape U5008)
  - DL/I DOS/VS Version 1 Release 5 with PTF 503

- CICS/DOS/VS Version 1 Release 4 Modification 1 with fixes for APAR number 86045
- DOS PL/I Resident Library Release 5 Modification 1
- DOS PL/I Transient Library Release 5 Modification 1
- DOS FORTRAN IV Library Option 1 Release 3
- VS APL Release 3 with PTF PP84931
- DOS/VS Sort/Merge Version 2 Release 3
- VSE/Access Control-Logging and Reporting with PTF UP14937, APAR PP86475

- Fetch protection of sensitive supervisor areas has been implemented so that programs in "problem" state (as opposed to supervisor state) cannot access these areas any more.

The following areas have been excluded:

- Low core including tables known to be used by programs in problem state.
- The tables/areas dynamically added at IPL time.
- User TCBs, if VTAM is supported.
- The pageable part of the supervisor if previously paged out (370-mode only).
- The new macro, EXTRACT, has been introduced to enable access to I/O control blocks. To use the new macro, and at the same time, retain the old code for execution on DOS/VS or DOS/VSE Advanced Functions Release 1 the macro SUBSID should be used.
- The COPYSERV program does not support the library improvements in VSE/Advanced Functions Release 2 i.e., does not support LIBDEF statements, Library Sharing or private procedure libraries. It is therefore recommended to use the COPYx-NEW function instead.
- The user may not issue imperative macros from an error exit for DTFSD or DTFDI (DASD) to the same DTF that caused the error exit to be invoked and ERREXT = omitted error exit interface will no longer be supported since ERREXT = YES is always assumed by the DTFSD logic modules.
- The Fastcopy functions are only available with the separate Program Product 5746-AM4

## PERFORMANCE CONSIDERATIONS

A throughput increase as a result of extended multiprogramming support depends highly on the user's system usage. Main performance bottlenecks have been removed. Transient functions were moved from the transient area to the SVA.

VSE-VM/370 Linkage Enhancements in an ECPS:VSE mode supervisor will reduce VM control program overhead by eliminating VM Shadow Table creations and maintenance.

DOCUMENTATION  
(available from Mechanicsburg)

VSE/Advanced Functions Release 2  
General Information Manual (GC33-6093)

## 5746-XE8 - VSE/ADVANCED FUNCTIONS R3

### PURPOSE

VSE/Advanced Functions Release 3 provides all functions of VSE/Advanced Functions Release 2 and significant new facilities.

### RELEASE 3 HIGHLIGHTS

#### New Hardware Support:

**Support of 4331 Model Group 2:** The 4331 Model Group 2 processor will be fully supported.

**Support of the 3033 Processor Complex:** The 3033 Processor Model Groups S and N and the Model U (Single Processor) will be supported

#### Performance Improvement

**Fast CCW translation for I/O requests with IORB:** This service is an extension of the CCW translate support for I/O requests with IORB. This support is analogous to the previous CCW translation for I/O requests with CCB in ECPS:VSE mode. This is applicable to I/O requests that repeatedly use the same areas for I/O.

#### Usability Improvement

**Simplifications of supervisor generation:** System generation is simplified by reducing the number of supervisor generation parameters.

Support of ACF/VTAM and ACF/VTAME is now standard.

#### Availability Improvement

**Job Information Block (JIB) table removal:** Previous JIB Limitations have been removed by deletion of the JIB table. If assignments of logical units to actual I/O devices need be saved, the required information is written into an extendable table.

**Reduction of the number of cancel conditions:** A new way of handling I/O errors helps avoid cancel situations.

**Improved handling of missing device interrupts:** Soft waits caused by missing device interrupts are detected and corrective action is initiated. A soft wait state no longer goes undetected for an extended period of time.

#### Serviceability Improvement

**Extension of the Maintain System History Program:** MSHP is extended to improve the installation of IBM supplied fixes. A new function indicates whether a library member needs to be reassembled and relinked for installation of a fix.

#### Additional subsystem support for

**Cross partition communication:** This new facility allows one subsystem to communicate, across partition boundaries, with another subsystem or with an application program. The facility does not allow the communicating subsystem or application program to access areas in the other partition. The facility can be used for the exchange of both program control information and data.

**The VSE/Operator Communication Control Facility:** Whenever VSE/OCCF is active, the supervisor passes all I/O requests to or from the operator console to VSE/OCCF.

**The VSE/Interactive Problem Control System:** The stand-alone dump program retrieves, from the hard-copy file, the most recent 200 console messages and adds these messages to the dump output.

**VM/VCNA under VM/SP:** The Virtual Machine/VTAM Communications Network Application (VM/VCNA) program product allows VM/CMS systems to be full participants in a SNA network. VM/VCNA, in its own partition, executes in conjunction with the ACF/VTAME or ACF/VTAM partition on VSE/Advanced Functions Release 3 to provide SNA/BSC/local virtual machine console support for VM/SP.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

The minimum hardware requirements for VSE/Advanced Functions Release 3 are:

- (1) An IBM processor supported by DOS/VSE, i.e., S/370 mdl 115-158, 3031 Single Processor, and 4300 Processors, with a processor storage of at least 160KB. DOS/VSE/Advanced Functions Release 3 also supports the 3033 single processors. Recommended minimum processor storage is 256KB. See also under "Compatibility" below. VSE/Advanced Functions Release 3 requires the clock comparator and the CPU-timer feature (standard on all S/370 models except 135 and 145, and also standard on 4300 processors) and the floating point feature (not standard on S/370 mdls 115-155).
- (2) A VSE-supported console.
- (3) Either of the following:
  - A VSE supported card reader.
  - A VSE supported diskette I/O unit.
- (4) A VSE supported system printer.

(5) A VSE supported magnetic tape drive.

(6) Either of the following:

- One VSE supported disk drive with a volume capacity of 120 megabytes or more of disk storage.
- Two or more VSE supported disk drives with removable disk packs if the volume capacity is less than 120 megabytes of disk storage. The total capacity of the volumes on the available disk drives must be at least 120 megabytes of disk storage.

The IBM 2311 DASD is not supported as a system residence device.

If data on DASD is to be shared using the available share control facility, this data must reside on a DASD other than 23XX or 3310.

### SOFTWARE REQUIREMENTS

VSE/Advanced Functions Release 3 is designed to operate with the related DOS/VSE SCP, Program Number 5745-030 Release 3, and also when VSE/Advanced Functions is operating on a virtual machine under control of VM/370, VM/Basic System Extensions or VM/System Extensions program products or under VM/System Product, on IBM processors for which VSE guest support has been announced.

### COMPATIBILITY

Minimum supervisor sizes are:

- For Mode=370, 112KB thereof 24KB pageable.
- For Mode=E, 106KB thereof 26KB pageable.

Users of S/370 processors with a processing storage less than 256KB should note that the Device Support Facilities (DSF) stand alone program, requires 256KB of real storage to execute successfully. These users should retain their previous standalone utilities provided with DOS/VS releases and with DOS/VSE SCP 5745-020.

**For Users of DOS/VS or DOS:** For application programs that have been executed successfully under DOS/VS or DOS, the compatibility restrictions are the same as those given in *Introduction to the VSE System*, GC33-6108.

Any restrictions given below for users of previous releases of VSE/Advanced Functions apply also to users of DOS/VS or DOS.

**For Users of Previous Releases of VSE/Advanced Functions:** An application program that has been executed successfully in the specified operating environment of VSE/Advanced Functions Release 2 will be executed successfully also in the specified operating environment of Release 3 if this application program interfaces with the operating system through IBM provided macros or through high-level language statements of supported compilers.

An application program that has been executed successfully under the DOS/VSE SCP with VSE/Advanced Functions Release 1 will be executed successfully also in the specified operating environment of Release 3 if this application program:

- Interfaces with the operating system through IBM provided macros or through high-level language statements of supported compilers.
- Does not alter its DASD SAM or DAM DTF blocks.

Also, a definition of processing priority for partitions via the PRTY parameter at the time of system generation is no longer valid. This processing priority may be defined during partition start-up within an automated system initialization procedure.

FORTRAN programs must be relinked with DOS/FORTRAN Library Option 1 Release 3 installed.

### MIGRATION/COEXISTENCE

Levels as listed below are required for the following Program Products to run with VSE/Advanced Functions Release 3:

- VSE/POWER Release 2.
- VSE/POWER Version 2.
- VSE/VSAM Release 2.
- VSE/IPCS Release 3.
- VSE/DITTO Release 2.
- DL/I DOS/VS Version 1 Release 5.
- CICS DOS/VS Version 1 Release 5.
- DOS/VS COBOL Release 2 Modification 5 with APAR fix PP88903.
- DOS PL/I Resident Library Release 5 Modification 1.
- DOS PL/I Transient Library Release 5 Modification 1.
- DOS FORTRAN IV Library Option 1 Release 3.
- VS APL Release 3 with APAR fix PP84921.
- ACF/VTAM Version 1 Release 2 or Release 3
- ACF/VTAM Version 2

### DATA SECURITY

Data Security and Auditability functions available in previous releases of DOS/VS and DOS/VSE are still available with VSE/Advanced Functions Release 3. However, the two program products, the



PROGRAM PRODUCTS

**VSE/Advanced Functions R3 (cont'd)**

VSE/Interactive Computing and Control Facility and the VSE/Access Control-Logging and Reporting Program have significant control and audit trail functions that augment DOS/VSE.

**PERFORMANCE CONSIDERATIONS**

Fast CCW translation for I/O requests with IORB: If CCW translation recognizes an IORB for a DASD I/O request with a fixlist already valid in the same form, then the pathlength for translation and retranslation is reduced. If the complete SVC 0 and interrupt processing is considered, this will result in an overall path length reduction of up to 20%.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Introduction to the VSE System (GC33-6108) ... Program Summary (GC33-6116) ... VSE System Data Management Concepts (GC24-5209) ... VSE/Advanced Functions Macro User's Guide (SC24-5210) ... VSE/Advanced Functions Macro Reference (SC24-5211) ... VSE/Advanced Functions Tape Labels (SC24-5212) ... VSE/Advanced Functions DASD Labels (SC24-5213) ... Data Security Under the VSE System (GC33-6077) ... VSE/Advanced Functions System Management Guide (SC33-6094) ... VSE/Advanced Functions System Control Statements (SC33-6095) ... VSE/Advanced Functions System Generation (SC33-6096) ... VSE/Advanced Functions Operating Procedures (SC33-6097) ... VSE/Advanced Functions Messages (SC33-6098) ... VSE/Advanced Functions Serviceability Aids and Debugging Procedures (SC33-6099) ... VSE/Advanced Functions System Utilities (SC33-6100) ... VSE/Advanced Functions Maintain System History Program User's Guide (SC33-6101) ... VSE/Advanced Functions Diagnosis Guide (SC33-6112).*

RPQs ACCEPTED: No

PROGRAM PRODUCTS

5746-XE8 - VSE/ADVANCED FUNCTIONS V1.3.5

PURPOSE

VSE/Advanced Functions 1.3.5 (VSE/AF 1.3.5) provides support for the 3430 Tape Unit, the 3262-5, and 4245 Line Printers and incorporates functional enhancements (hardware support) previously announced and shipped as Small Programming Enhancements (SPEs) after VSE/AF 1.3.0 availability. Ease-of-use, availability and reliability of VSE/Advanced Functions are improved.

DESCRIPTION

HARDWARE SUPPORT

**3430:** A tape I/O device supported as a 3410-compatible tape unit. The support allows taking advantage of the 6,250 bpi read/write density of the 3430.

**3262 Mdl 5, and 4245:** New channel-attached printers that are supported as line printers of type PRT1.

**FBA Disk Support also in S/370 Mode:** The FBA disk support previously available only in ECPS:VSE mode is now also available in S/370 mode.

**More Virtual Storage in S/370 Mode:** In S/370 mode, up to 16MB of virtual address space can now be specified, regardless of the real memory size, like in ECPS:VSE mode. However, the 16MB of virtual address space is reduced by the supervisor size and the sum of the real partition sizes specified.

**SIOF (START I/O FAST) Support:** The SIOF instruction is used by the VSE/AF supervisor.

Along with the support of the SIOF instruction, the extended I/O architecture for improved I/O busy handling (SIO Queued) will be supported. The supervisor will process 'delayed I/O interrupts'. This support will be used by processors which can exploit this SIOF instruction. It can improve performance in environments with heavy I/O activities. The use of SIOF allows VM a better guest dispatching in case of I/O operations.

The support for the following machines and I/O devices has been announced and shipped as SPEs after the availability of VSE/AF Release 1.3.0 and is now incorporated in VSE/AF 1.3.5:

- 3033 and 4321 Processing Units
- 3279 mdl 2C Color Console
- 3375 CKD Disk Storage Device
- 3200 Printing Subsystem
- 4341 Mdl Groups 9 - 12

**3033:** A processing unit; it is supported by VSE/Advanced Functions in S/370 mode only for operation in single processor mode.

**4321:** A processing unit of the 4300 series; it operates in ECPS:VSE and S/370 mode.

**3375:** A CKD disk storage device.

**3279 Mdl 2C:** A color display operator console for attachment to a 4300 Processor. VSE/Advanced Functions includes support for color display on this console device.

**4341 Mdl Groups 9 - 12:** Mdl groups 9 - 12 of the 4341 Processor are supported in ECPS:VSE and S/370 mode.

AVAILABILITY/RELIABILITY IMPROVEMENT

**End-of-task and error-exit handling:** The task-to-supervisor linkage control allows a task to do its own error handling. The ABEND exit routine has been extended to be invoked for any type of termination (normal and abnormal) and, for a main task, before propagating the termination to its subtasks. This allows the task which is abended to keep control and to do controlled termination actions like invocation of VSAM automatic close, completion of pending I/O requests, free all locks etc. Using this function will more often leave a functioning system after an ABEND, and thus make recovery/restart much easier or avoid recovery at all.

USABILITY IMPROVEMENTS

**Defining system files by volume identifier:** During system start-up, system files such as the page data set or the VSAM master catalog may be defined by volume identifier instead of device address. This extension allows specification of volume serial number instead of device address in the IPL commands DEF, DLA, DLF and DPD.

**Activating access control during system start-up:** With the access control support being an IPL option, there is no longer a need for different supervisors, one with and one without this support.

**Upper/lower case option:** An option is available for controlling the output to SYSLSST of the utilities PRINTLOG and LISTLOG. This output may be all upper case or as presented by the program that writes to this device.

**Turn off fast CCW translation for all partitions:** The option can be useful if, for example, programs not gaining performance by fast CCW translation are scheduled to run from one system start-up to the next.

**ISPF Support:** This support allows using ISPF as dialog and panel manager in a VSE system with dialog and panel compatibility of other systems running ISPF. ISPF executes in an ICCF interactive partition.

**Reduction of Supervisor generation parameters:** The SEC (Security) supervisor generation parameter has been eliminated. This should make the system generation task easier and further improves ease-of-use.

**REMOVED SUPPORT:** The following system utilities are removed from VSE/AF 1.3.5:

- ALTBK (Assign Alternate Block)
- INTDK (Initialize Disk FBA)
- SURFANAL (Surface Analysis for FBA)

The services of these utilities are available through Device Support Facilities, a corequisite SCP support for VSE/Advanced Functions.

- OLTEP (OnLine Test Executive Program)
- EREP (Environmental Recording, Editing & Printing)

These functions are now available as separate SCP-class 2 programs.

**EREP 2.2.0** is available for VSE/AF and VSE/SP 1.1.0. EREP 2.2.0 support for the VSE system environments is available concurrent with VSE/AF 1.3.5 and VSE/SP 1.1.0.

**EREP 2.2.0** provides a new function called System Exception Report. This will strengthen and extend the analytic/diagnostic capabilities of EREP in VSE environments, enabling a more rapid identification of significant component failures within a system and each of its major subsystems.

The EREP, OLTEP and Device Support Facilities SCPs are automatically shipped with VSE/AF 1.3.5 for an IBM CPU registration.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

VSE/Advanced Functions 1.3.5 has the same machine requirements as VSE/Advanced Functions Release 3. (See Announcement Letter P80-207.

**Note:** VSE/AF 1.3.5 is the last release which supports the IBM processors S/370 mdls 115 and 125.

SOFTWARE REQUIREMENTS

**Programming Corequisites:**

- VSE/OLTEP 1.1.0 SCP (5656-092)
- EREP 2.2.0 SCP (5656-093)
- Device Support Facility 1.6.0 SCP (5747-DS2)

These System Control Programs are automatically delivered together with VSE/Advanced Functions 1.3.5 for a user with an IBM CPU registration.

COMPATIBILITY

VSE/AF 1.3.5 is fully compatible with VSE/AF 1.3.0.

Device support functions ALTERNATE BLOCK ASSIGN, SURFACE ANALYSIS FBA and CLEAR DISK FBA have been removed from VSE/AF 1.3.5. These functions are available through the Device Support Facility (DSF) program, which has to be ordered separately.

The Environmental Recording, Editing & Printing (EREP) functions have been dropped from VSE/AF 1.3.5. These functions are available through EREP Version 2, Release 2, Modification Level 0 program, which has to be ordered separately.

The OnLine Test Execution Program functions have also been removed. These functions are available through the OnLine Test Execution program, which has to be ordered separately.

VSE/ICCF 1.3.5 is required if VSE/ICCF is to be used in a VSE environment based on VSE/AF 1.3.5.

DOCUMENTATION

(available from Mechanicsburg)

- VSE/Advanced Functions System Management Guide (SC33-6094) ...
- VSE/Advanced Functions System Control Statements (SC33-6095) ...
- VSE/Advanced Functions Installation and Planning (SC33-6096) ...
- VSE/Advanced Functions Operation (SC33-6097) ...
- VSE/Advanced Functions Messages and Codes (SC33-6098) ...
- VSE/Advanced Functions Diagnosis: Service Aids (SC33-6099) ...
- VSE/Advanced Functions System Utilities (SC33-6100) ...
- VSE/Advanced Functions Maintain System History Program Reference (SC33-6101) ...
- VSE/Advanced Functions Application Programming: Macro User's Guide (SC24-5210) ...
- VSE/Advanced Functions Application Programming: Macro Reference (SC24-5211) ...
- VSE/Advanced Functions Tape Labels (SC24-5212) ...
- VSE/Advanced Functions Disk, Diskette and Tape Labels (SC24-5213) ...
- VSE/Advanced Functions Licensed Program Specifications (GC33-6102) ...
- VSE/Advanced Functions Diagnosis: Guide (SC33-6112).

RPOs ACCEPTED: Yes



PROGRAM PRODUCTS

**STORAGE and INFORMATION RETRIEVAL SYSTEM/  
DISK OPERATING SYSTEM with VIRTUAL STORAGE  
STAIRS/DOS/VS (5746-XR4)**

**PURPOSE**

The conventional method used for indexing documents in a specialized information system or library is tiring and cumbersome work for specialists. Now, documents, articles from periodicals and magazines, patent texts, as well as their abstracts, can be converted into machine-readable form for entry into a computer system. Once entered, the material can be used during subsequent searches, using the language of the technical area involved, to retrieve the desired information. The full texts, or associated bibliographic identifiers (such as title, author, publisher and source), make up a dynamically growing file of data which can be searched by specialists in law, engineering, medicine, sales, marketing, management and others seeking material of interest pertaining to their own spheres.

**DESCRIPTION**

The Storage and Information Retrieval System/Disk Operating System with Virtual Storage (STAIRS/DOS/VS) is a conversion of the OS Program Product STAIRS/VS (5740-XR1, Release 2.1), operating in the DOS/VS environment. Except for online data base creation, STAIRS/DOS/VS provides all the functions and capabilities of STAIRS/VS Release 2.1.

STAIRS/DOS/VS is a terminal-oriented, multiple-user, dialog system for the storage and retrieval of information, which also allows for batch processing. It offers the user a variety of resources for data base creation and maintenance and, especially, for data base searching, displaying and/or printing of documents containing either, or both, unformatted text and formatted data.

The data is retrieved as the result of an online dialog between the user and the system in which the user formulates queries by means of Boolean or extended Boolean logic, or by the use of relational operators for the contents of formatted fields. Both types of queries can be combined.

The documents presented as answers by the system can then be ranked, in descending order of probable relevance, by one of five ranking algorithms based on information value, or sorted according to the contents of a formatted field.

Device-dependent message-formatting routines are provided by STAIRS/DOS/VS for the 3270 Information Display System (3275 mdl 2 and 3277 mdl 2 Display Units, 3284 and 3286 Printers), and for the 2740 and 2741 Communication Terminals.

**HIGHLIGHTS**

STAIRS/DOS/VS provides a highly flexible form of dialog which allows previous queries to be extended or referred to. Query formulation varies from everyday language to mathematical formulation in terms of extended Boolean logic. Query formulations can be saved for current or later use, a feature which serves as a current awareness profile capability. There are two modes of saving queries: In a reserved area accessible only to the user who had saved the queries, or in a common pool accessible to any user of the installation.

Documents presented on 3270 display terminals can be paged forward and backward and the keywords of a query, appearing in the text, can be displayed with double intensity. Search and display can be restricted to a subset of paragraphs of the documents. Retrieved documents, or pages (when using a display terminal), can be immediately copied to a terminal printer (for example, the 3284), or they can be transmitted for later printing on a high-speed printer.

It is possible to add user-written exit routines (in Assembler language only) for additional processing of:

- A SEARCH query prior to processing by STAIRS/DOS/VS, and/or
- The document list resulting from a retrieval step.

The contents of the formatted fields of the documents can be modified online. The modified fields are immediately available for the SELECT function. The number of data bases that can be handled online is limited only by the installation's resources and logical device assignments in the STAIRS/DOS/VS partition.

Up to sixteen different data bases of identical structure can be concatenated and searched as if they were a single data base, as well as for each subset of the sixteen data bases, thus providing the capability of retrospective search and current information selection.

Up to four data bases of identical structure can be merged to a single data base. This provides a possibility of reorganization for a (logical) data base consisting of concatenated (physical) data bases.

A previously interrupted retrieval dialog can be continued after the system has been restarted, at any other terminal, by means of the STAIRS/DOS/VS warm-start function.

**CUSTOMER RESPONSIBILITIES**

An individual who is thoroughly trained in STAIRS/DOS/VS and has considerable experience in CICS/DOS/VS is required to install STAIRS/DOS/VS.

The customer is responsible for ordering and installing all the communications equipment required.

STAIRS/DOS/VS has been designed so that customer-written application programs may be readily added. Special programs may be written by a system programmer in Assembler language according to STAIRS/DOS/VS programming rules.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum machine configuration required to execute STAIRS/DOS/VS corresponds to the minimum machine configuration required for CICS/DOS/VS. For the minimum machine configuration for CICS/DOS/VS refer to the *Customer Information Control System (CICS/VS), General Information Manual*, (GH20-1280).

For compilation and/or execution of STAIRS/DOS/VS, the following minimum configuration is required:

- Processor: IBM S/370 mdl 135, 145, 155-II or 158 with minimum main storage capacity of 240K bytes.
- For the data bases and other STAIRS/DOS/VS files: IBM 3330, 3340 or 2314 Disk Storage facility.
- One console printer keyboard.
- One card reader and one printer.
- One IBM 3270, 2740 or 2741 terminal.
- For installation and support: One nine-track tape drive and associated control unit.  
Note: STAIRS/DOS/VS supports mdl 11 of the IBM 3330. For physical device support, Programming RQP EF4346 (5799-WHZ) must be installed on DOS/VS.
- The Communicating Magnetic Card Selectric® Typewriter mdl 6610 is supported as a 2741 terminal via switched lines by STAIRS/DOS/VS.
- The IBM 2740 (without the station control feature) and the IBM 2741 are supported by STAIRS/DOS/VS.

For batch data base creation and maintenance, partition address space requirements range from 40K to 220K bytes depending on the functions being done. The *STAIRS/DOS/VS Operations Guide* includes the requirements for individual batch program execution.

The online address space requirements for STAIRS/DOS/VS may vary widely, according to the number of active terminals. A minimum installation might require address space of about 200K bytes for the combined CICS-STAIRS partition.

STAIRS/DOS/VS capabilities can be expanded by the addition of:

- Multiple 3330 Disk Storage facilities.
- Multiple 3340 Disk Storage facilities.
- Multiple 2314 Direct Access Storage Facilities.
- Multiple 2741 Communications Terminals and associated control units.
- Multiple Communicating Magnetic Card Selectric® Typewriters and associated control units.
- Multiple 3270 Information Display System components.
- A Card Read/Punch unit.
- Magnetic tape units with associated control units supported by CICS/DOS/VS.
- A high-speed printer producing at least a 132-character print line. If uppercase and lowercase high-speed printing is desired, a 3211 Printer with T11-5 Print train, a 1403 Printer mdl 2, 3, or N1, equipped with the Universal Character Set feature and the TN print train or a 4245 Printer with TN21 print band must be installed.

**SOFTWARE REQUIREMENTS**

STAIRS/DOS/VS operates on S/370 configurations in virtual mode under CICS/DOS/VS Version 1.1.1 and 1.2 (5746-XX3) in a DOS/VS Release 32 environment. STAIRS/DOS/VS will also operate with subsequent releases of these products unless otherwise stated in a future announcement.

## PROGRAM PRODUCTS

**STAIRS/DOS/VS (cont'd)**

Most STAIRS/DOS/VS program modules are written in S/370 Assembler language, some batch utilities are written in PL/I. All modules are distributed in both source and load module form. Thus, for the execution of the PL/I modules, only the PL/I Transient Library program product (5736-LM5) is required. If a STAIRS/DOS/VS module written in PL/I is to be compiled (for APAR corrections or program modifications), the PL/I Optimizing Compiler program product (5736-PL1) and the PL/I Resident Library program product (5736-LM4) are also required. (For both execution and maintenance of STAIRS/DOS/VS, the PL/I Optimizing Compiler and Libraries (5736-PL3) may be used). For data base creation, STAIRS/DOS/VS uses the DOS/VS Sort/Merge program product (5746-SM1).

All data management facilities and input/output operations for STAIRS/DOS/VS are handled by CICS/DOS/VS or the SAM, DAM and ISAM DOS/VS access methods.

The minimum DOS/VS Assembler and Linkage Editor are required for installation and maintenance of the STAIRS/DOS/VS system. The DOS tape deblocking utility program is required to process the STAIRS/DOS/VS tape as received from PID for installation.

For further information relative to the CICS/DOS/VS programming system, see the CICS/VS pages and documentation.

**DATA SECURITY**

Facilities to help maintain the privacy and security of data bases are incorporated into the system. Security of data can be enhanced at data base, document, paragraph and field levels by means of registered user names, passwords and privacy codes.

DOS/VS level	Protection through TERMINAL IDENTIFICATION
CICS/DOS/VS level	Protection through USER NAME and PASSWORD
Data Base level	Protection through DATA BASE NAME and DATA BASE PASSWORD
Document level	Protection through DOCUMENT PRIVACY CODE
Paragraph Class level	Protection through PARAGRAPH PRIVACY VALUE
Field level	Protection through FORMATTED FIELD PRIVACY VALUE

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual (GH20-1832).*

PROGRAM PRODUCTS

**CICS/DOS/VS EXTM (5746-XXB)**

[NO LONGER AVAILABLE, effective May, 1983.]

**PURPOSE**

The basic function of the Extended Telecommunications Modules (EXTM) feature of CICS/DOS/VS is to establish and support data flow between a CICS/DOS/VS application and a corresponding user application for IBM advanced communication subsystems and preSNA terminals. Services required to support the necessary data flow (System Services Control Point, Session Control, etc.) are an integral part of EXTM. EXTM uses the functional capability of the 3704/3705 Network Control Program/VS (NCP/VS) for controlling terminal operations. Support utilities for the IBM advanced communication subsystems and utility services such as load and dump for 3704/3705 are included. A preprocessor is provided to aid the user during system generation. Normal CICS/DOS/VS functions are supported when using this program. EXTM has been designed to share and take advantage of the functions of CICS/DOS/VS in order to optimize attachment of SNA terminals to a CICS/DOS/VS system and can co-exist in the same partition with BTAM.

**DESCRIPTION**

EXTM provides support for the IBM advanced communication subsystems with CICS/DOS/VS on smaller mdls of S/370 processors (160K) as well as larger systems interested in an SNA interface tailored to the CICS/DOS/VS environment. The functions performed by EXTM are provided by the following facilities:

**Application Program Interface:** This module is an interface between the EXTM I/O Module and DFHZCP (which provides CICS/DOS/VS support for SNA terminals) and allows DFHZCP to operate as it does with VTAM. This interface supports the subset of VTAM macros used by CICS/DOS/VS and performs equivalent functions for CICS/DOS/VS. CICS/DOS/VS will continue to use the same control blocks with EXTM as with VTAM.

**I/O Module:** The I/O Module controls the transfer of data between the host computer and the 3704/3705. This includes blocking/ deblocking of I/O, constructing of channel programs, maintaining physical control of the 3704/3705 NCP/VS and initiating 3704/3705 control functions (activation/deactivation of lines, etc.). The I/O Module also provides an interface to the 3704/3705 load and dump services.

**Linkage Module:** The Linkage Module acts as an interface between the I/O Module and the CICS/DOS/VS user applications, for preSNA terminals, performing such functions as message synchronization and handling of read/write requests.

**Master Terminal Functions:** The EXTM Master Terminal Programs provide dynamic user control of the system for EXTM supported terminals. The EXTM master terminal operator can change the status and values of parameters used by CICS/DOS/VS and EXTM and thereby alter the operation of the system.

**System Services Control Point:** The function of the System Services Control Point (SSCP) is to establish and maintain sessions between the host computer and all nodes in the network. The SSCP will perform network initialization and dynamic node activation/deactivation requested through the EXTM master terminal commands.

**Support Service Utilities:** Utilities are provided for loading and dumping the 3704/3705. The utilities run under CICS/DOS/VS. These services can be invoked automatically and through EXTM master terminal commands.

**Access to Subsystem Support Services batch created files** is provided by EXTM for online transmission of subsystem data to the SNA terminal system controllers. This access can be invoked by the EXTM Master Terminal Facility. EXTM master terminal commands may be used to transmit subsystem data to the 3600, 3650 and 3790. Dumping of the 3600 is initiated by the 3600 user application program. EXTM recognizes the request and invokes a DUMP program, routing the 3600 system dump to a user-specified data set.

**RAS Functions:** Message integrity is achieved through the sequence number facilities inherent in SNA transmission services.

**System/Network integrity** is provided by serviceability aids which include:

- Path Information Unit (PIU) Trace
- Channel End Appendage Trace
- Miscellaneous Data Record (3704/3705) Statistics Recording
- 3704/3705 Formatted Dump Facility
- CICS/DOS/VS System Trace (a CICS/DOS/VS facility)
- 3704/3705 Line Trace
- Application Program Interface (API) Trace
- Concurrent Online Telecommunication Test

**Concurrent Online Telecommunication Test:** The EXTM Concurrent Online Telecommunications Test Program is the interface between the online test (OLT) programs and the Extended Telecommunications Modules (EXTM). It controls the selection and execution of the OLTs used for testing the teleprocessing terminals supported by EXTM. COLTT programs can be used to perform preventive maintenance, perform

problem determination, diagnose I/O errors and verify device repairs and engineering changes.

COLTT can be initiated from any alphanumeric terminal with input and output capability that is supported by CICS/VS and has sufficient output message size capacity.

**Preprocessor:** The Extended Telecommunications Modules Preprocessor is an installation aid whose output provides input for the generation of an NCP/VS, EXTM, and CICS/DOS/VS system generation including required CICS/DOS/VS tables. Users may select various levels of output from the preprocessor and save time in generating the job stream to install their systems. The preprocessor will generate a sample system based on device types specified, and will have additional cross-checking of parameters between CICS/DOS/VS, EXTM, and NCP/VS generations.

**CUSTOMER RESPONSIBILITIES**

The specific installation requirements must be determined by customers based on their need and available resources. Customer responsibilities for installing CICS/DOS/VS are detailed in the *CICS/VS General Information Manual* GH20-1280. For CICS/DOS/VS with the Extended Telecommunications Modules Feature the customer should:

- Order and install communications equipment based on processing needs.
- Train system analysts, programmers and operators in the use of DOS/VS, CICS/DOS/VS with Extended Telecommunications Modules, 3704/3705, NCP/VS, and subsystem design and programming language.
- Install the NCP/VS in the 3704/3705.
- Develop, write and test the subsystem application programs and/or customized images as required.
- Have installed the prerequisite versions of DOS/VS and CICS/DOS/VS.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum configuration supported is:

- 3115 mdl GE (160K). IBM S/370 processor mdls and the IBM 3031 Processor supported by DOS/VS are supported by EXTM.
- IBM I/O devices to support a Virtual Storage Operating System (DOS/VS and CICS/DOS/VS).
- IBM 3704/3705 II Communications Controller with required channel prerequisites or, if appropriate, an IBM 3790 with LCA and required channel prerequisites.
- A minimum of one EXTM supported terminal.

**Note 1:** Only the standard IBM S/370 instruction set is used by EXTM. The CICS/VS instruction set requirement for preSNA support with EXTM is the same as with BTAM. The CICS/VS instruction set requirement for SNA support with EXTM is the same as with VTAM.

**Note 3:** See *EXTM General Information Manual* (GH20-1702) for EXTM configuration guidelines. The EXTM storage configuration aid, called STOREXTM, is available on HONE.

**Note 4:** The sizes of the CICS/DOS/VS partition and the DOS/VS supervisor are dependent upon the functions and parameters chosen. Appropriate SRLs should be used to configure these products.

**Communication Device Support**

**Communications Controller Support:** EXTM supports the IBM 3704 and 3705 Communications Controllers in either NCP/VS mode or NCP/VS with PEP. The emulation of PEP may be utilized by CICS/DOS/VS - BTAM or another partition. EXTM does not support the dynamic switching of lines between the emulation partition and NCP/VS when operating with PEP. Multiple IBM 3704s and 3705s may be attached to an EXTM system. Remote IBM 3704/3705 facilities, available under NCP/VS control, are supported by EXTM. The IBM terminals supported by the remote controller are the same IBM terminals supported by EXTM on a local controller.

3704 Communications Controller, mdls A3 and A4  
 3705-I Communications Controller, mdls A2 - D8  
 3705-II Communications Controller, mdls E2 - H8

**Communication Systems and Terminals Supported**

**Start/Stop Transmission Terminals**

- 2740 Communication Terminal mdl 1 with, optionally, Record Checking (#6114) Station Control (#7479)
- 2740 Communication Terminal mdl 2 with, optionally, Record Checking (#6114)

PROGRAM PRODUCTS

EXTM (cont'd)

Buffer Receive (#1499)  
 2741 Communication Terminal with, optionally,  
 Receive Interrupt (#4708)  
 3767 Communication Terminal with Start/Stop Feature (#7111, #7112 or #7113) (supported as compatible version of appropriately featured 2740/2741)

Binary Synchronous Communications Terminals

2770 Data Communication System  
 2772 Multipurpose Control Unit, with optionally,  
 EBCDIC Transparency (#3650)  
 WACK Response (#9936)  
 Buffer Expansion (#1490)  
 Conversational Mode (#1910)  
 Multipoint Data Link Control (#5010)  
 0545 Output Punch  
 1053 Printer or  
 2213 Printer  
 2265 Display Station  
 2502 Card Reader  
 3270 Information Display System  
 3271 Control Unit mdl 1 or 2, with EBCDIC Transmission Code (#9761) or ASCII Transmission Code (#9762), and  
 3277 Display Station mdl 1 or 2, and, optionally  
 3284 Printer mdl 1 or 2  
 3286 Printer mdl 1 or 2  
 3288 Printer mdl 2  
 Copy (#1550 for 3271 Control Unit)  
 3275 Display Station mdl 1 or 2 with EBCDIC Transmission Code (#9761) or ASCII Transmission Code (#9762), and optionally  
 3284 Printer mdl 3  
 3780 Data Communication Terminal with EBCDIC Transparency (#3601), WACK Response (#9936)  
 Multipoint Data Link Control (#5010)  
 3781 Card Punch with Component Selection (#1601) on 3780  
 3770 Data Communication System with BCS feature (#1460 or #1461) (supported as compatible version of appropriately featured 2770)

Synchronous Data Link Control Terminals

3600 Finance Communication System  
 3601 Finance Communication System Controller mdls 1, 2A, 2B, 3A and 3B with SDLC Communication Feature (#4501, #4502, #6301 or #6302)  
 3602 Finance Communication System Controller mdls 1A and 1B with SDLC Communication Feature (#4501, #4502, #6301 or #6302)  
 3604 Keyboard Display mdls 1, 2, 3, 4, 5 and 6  
 3606 Financial Services Terminal mdls 1 and 2  
 3608 Printing Financial Services Terminal mdls 1 and 2  
 3610 Document Printer mdls 1, 2, 3 and 4  
 3611 Passbook Printer (supported as a 3612) mdls 1 and 2  
 3612 Passbook and Document Printer mdls 1, 2 and 3  
 3614 Consumer Transaction Facility mdls 1, 2, 11 and 12  
 3618 Administrative Line Printer mdl 1  
 3624 Consumer Transaction Facility mdls 1, 2, 11 and 12  
 3630 Plant Communication System  
 3631 Communication System Controller mdls 1A and 1B with SDLC Communication feature (#4502, #6301 and #6302)  
 3632 Plant Communication System Controller mdls 1A and 1B with SDLC Communication feature (#4502, #6301 and #6302) (3600 Compatible)  
 3650 Retail Store System  
 3651 Store Controller mdls A50 and B50  
 3653 Point of Sale Terminal mdl 1  
 3275 Display Station mdl 3  
 3284 Printer mdl 3  
 3790 Communication System  
 3791 Controller mdls 1A, 1B, 2A and 2B with

SDLC Communication feature (#6301, #6302 or #6303) and Configuration Support #9165 and  
 3792 Auxiliary Control Unit  
 3793 Keyboard Printer mdl 1  
 3277 Display Station  
 3284 Printer mdls 1 and 2  
 3286 Printer mdls 1 and 2  
 3288 Printer mdl 2  
 3767 Communication Terminal mdls 1, 2 and 3 with Vertical Forms Control feature (#8731) (optional)  
 3770 Data Communication System with SDLC Communication feature (#1460 or #1470)  
 3771 Data Communication Terminal mdls 1, 2 and 3  
 3773 Data Communication Terminal mdls 1, 2 and 3 Programmable mdls P1, P2 and P3  
 3774 Data Communication Terminal mdls 1 and 2 Programmable mdls P1 and P2  
 3775 Data Communication Terminal mdl 1 Programmable mdl P1  
 3776 Data Communication Terminal mdls 1 and 2  
 3777 Data Communication Terminal  
 3270 Information Display System  
 3271 Control Unit mdls 11 or 12 with Copy (#1550)  
 3277 Display Station mdls 1 or 2, and, optionally  
 3284 Printer mdls 1 or 2  
 3286 Printer mdls 1 or 2  
 3288 Printer mdls 2  
 3775 Display Station mdl 11 or 12 with  
 3284 Printer mdl 3

Terminals Connected Via Local Attachment

3790 Communication System  
 3791 Controller mdls 1A, 1B, 2A and 2B with Local Channel Attachment (#1515) and Configuration Support #9165 and  
 3792 Auxiliary Control Unit  
 3277 Display Station  
 3793 Keyboard Printer  
 3284 Printer mdls 1 and 2  
 3286 Printer mdls 1 and 2  
 3288 Printer mdl 2

The following table illustrates EXTM support of IBM SDLC devices on nonswitched or dial communicating facilities:

SDLC Device	Non-switched	Dial-in	Dial-out
3270	X		
3600	X	X	X
3614	X		
3624	X		
3630	X	X	X
3650	X		X
3767	X	X	X
3770	X	X	X
3790	X	X	X

Equivalent Terminals: Terminals that are functionally equivalent to those specifically supported by EXTM may also function satisfactorily with EXTM; the customer is responsible for establishing equivalency.

SOFTWARE REQUIREMENTS

The Extended Telecommunications Modules Feature is coded using S/370 Assembler Language.

EXTM operates in the following environment:

	EXTM V2 Rel. 0	EXTM V3 Rel. 0	EXTM V3 Rel. 1
DOS/VS Release	31 or 32	32 or 33	33 or *
NCP/VS Version	4.1 or 5.0	4.1 or 5.0	5.0 or **
CICS/DOS/VS Version	1.1.1 or 1.2	1.2 or 1.3	1.3 or *

\* Currently available version at the time of EXTM V3.1 availability.

\*\* ACF/NCP/VS support will be available at the availability of ACF/NCP/VS.

The support utilities for the subsystem controllers use CICS/DOS/VS VSAM which requires the Relocating Loader.

CICS/DOS/VS support of BTAM terminals remains unchanged. BTAM can coexist with EXTM in the CICS/DOS/VS partition. When supporting terminals via BTAM, they must interface to CICS/DOS/VS-BTAM via a separate control unit or via an IBM 3704/3705 in emulation mode or by using the Partitioned Emulator Program (PEP). VTAM can coexist with Extended Telecommunications Modules in the system but

**EXTM (cont'd)**

not in the same CICS/DOS/VS partition. Each system, VTAM and EXTM, must have its own 3704/3705.

**EXTM/VTAM Selection Criteria:** In selecting whether EXTM or VTAM should be used in a DOS/VS environment with CICS/DOS/VS, careful consideration should be given to the availability of the necessary minimum system configuration and to the functions required in the system.

**PERFORMANCE CONSIDERATIONS**

The performance of EXTM in a virtual storage environment is highly dependent on the system resources available, on any programs that operate concurrently and their relative priorities, on system and application data file placement, on system timing, etc. Performance also depends on the paging characteristics and storage reference patterns of CICS/DOS/VS and its application programs, on the allocation of data files to particular devices, and on the particular data being processed.

For specific online performance and response time requirements, careful attention should be given to ensure that adequate real resources (main storage, processor computing capability, channels, disk file arms, etc.) are available. To verify specific performance, benchmarking EXTM with CICS/DOS/VS and DOS/VS may be appropriate.

## PROGRAM PRODUCTS

**COMMUNICATION ORIENTED MESSAGE SYSTEM  
CORMES Release 1 Modification Level 0 (5746-XXM)****PURPOSE**

The Communication Oriented Message System (CORMES) is designed to build the central "paperless" message exchange system in an organization connecting terminal users and application programs of different functions. It provides communication links:

- For the exchange of information between terminal users (action messages).
- For the interaction between online application programs and terminal users (action messages).
- For triggering the execution of application programs based on the occurrence of prespecified events (trigger messages).

**DESCRIPTION**

CORMES operates under the IBM Disk Operating System/Virtual Storage (DOS/VS) Release 33 or subsequent releases unless otherwise identified.

For data base management, the system uses the data base facilities of the IBM S/370 Data Language/I Disk Operating System/Virtual Storage (DL/I DOS/VS) Version 1, program number 5746-XX1, Release 1, or subsequent releases unless otherwise identified.

For data communication, CORMES uses the facilities of the IBM S/370 Customer Information Control System/Virtual Storage (CICS/DOS/VS) Version 1, program number 5746-XX3, Release 2, or subsequent releases unless otherwise identified.

**HIGHLIGHTS****Terminal user services:**

- Easy to use terminal functions to create, display, modify, and distribute action messages.
- Routing of action messages from one user to another.
- Linkage to online application programs to process a user-selected action message.

**Application program services:**

- User macros to simplify the creation of action and trigger messages in user-written programs and their transfer to the central message files.
- Triggering of application program execution according to prespecified events: A point in time, a time interval or a queue length.
- CORMES as a frame for the implementation of interactive application programs.

**System services:**

- Monitoring of the individual message queue of each terminal user by due date and priority of the received messages.

**CUSTOMER RESPONSIBILITIES**

This section briefly discusses the activities the user has to perform to make CORMES operational. It gives a rough guide for assessing the total installation effort. The assumption is that a system running under DOS/VS with DL/I DOS/VS and CICS/DOS/VS has already been installed.

The installation procedure allows an easy installation of the CORMES system including the sample by use of object code facility. The distributed source code will be used for the final adaptation to the existing system environment.

The major implementation steps are:

- Installation of the CORMES system according to the distribution tape and installation description.
- Execution of the supplied sample to verify the installation. This sample can also be used as a tool for training terminal users.
- Optionally, assembly of all CORMES online programs to include customer requirements.
- Modification and reassembly of existing programs for CORMES communication (according to the rules defined by CORMES) by use of macros and examples provided.
- Exchange of the sample files and tables by files and tables that describe the customer system.

The required changes within existing customer programs have been reduced to a minimum. In addition, macros are provided to simplify the program interactions. Support is provided for Assembler, PL/I and COBOL programs.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

For compilation and/or execution of CORMES, an IBM S/370 with the minimum main storage capacity for CICS/DOS/VS operation is required.

For CORMES, additional storage is required. For the first terminal 16,500 bytes and for each additional terminal 3,000 bytes; for the first application program 11,800 bytes and for each additional program 1,200 bytes.

For the data bases, and files the same devices are used as for the basic software of DOS/VS, CICS/DOS/VS and DL/I DOS/VS.

At least an IBM 3277 Display Station mdl 2 with a 66-key keyboard must be available. The Selector Light-pen (#6530) and program function keys are supported optionally. The IBM 3274 and 3276 are supported in compatibility mode.

The online address space requirements for CORMES may vary widely, according to the number of active terminals. A minimum installation might require address space of about 384K bytes for the combined CICS/VS and DL/I DOS/VS user task partition.

**SOFTWARE REQUIREMENTS**

CORMES is written in Assembler language and uses the macro language facility.

CORMES is designed for an online DOS/VS environment and requires the following programs:

- DOS/VS Release 33 and subsequent releases). \*
- CICS/DOS/VS Version 1, program number 5746-XX3, Release 2 and subsequent releases). \*
- DL/I DOS/VS Version 1, Program Number 5746-XX1, Release 1 and subsequent releases). \*

\* Unless otherwise identified in a future revision of this document.

Note: CORMES executes, and is supported by IBM, on S/370 virtual storage configurations running under DOS/VS in virtual mode, and DOS/VS under VM/370 in virtual machine mode.

**DOCUMENTATION:** (available only from the European Publications Center)

*Licensed Program Specifications* (GH12-5238) ... *General Information Manual* (GH12-5127).

PROGRAM PRODUCTS

**ENTRY LEVEL INTERACTIVE APPLICATION SYSTEM-ONE  
VERSION 1 - RELEASE 1 (ELIAS-I)  
5746-XXV**

**PURPOSE**

ELIAS-I is an interactive program which uses the facilities of the Interactive Productivity Facility (Program Number 5748-MS1). When correctly installed in its Specified Operating Environment (SOE) ELIAS-I is designed to provide a system which will facilitate the design, development and implementation of DB and or DB/DC programs with CICS/DOS/VSE and/or DL/I DOS/VSE using COBOL or PL/I and, optionally, DMS/CICS/VSE-DOS.

**DESCRIPTION**

ELIAS-I presents, via its optional documentation and with supporting education, a design methodology for DB/DC applications which has been specially tailored to the user who is not experienced in DB/DC implementation and who has limited in-house skill. Hints and tips are provided to help facilitate the use of Improved Programming Techniques in the smaller system environment.

ELIAS-I interactive procedures are designed to provide assistance with DB/DC program implementation by providing a dialogue capability for the programmer. ELIAS-I bricks are also included in the product. These bricks are designed to be included in DB/DC application programs and to provide assistance in utilizing standard CICS/DOS/VSE and DL/I facilities.

Procedures and bricks are provided for the following main functional areas:

- Assistance with DL/I data base definition. Procedures to generate DL/I nucleus, DBDs, PSBs, SSAs and the associated VSAM files, together with the associated COBOL or PL/I maps, and error recovery code.
- Assistance with DL/I data base maintenance. A procedure for loading, reorganization and backup/recovery of DL/I data bases.
- Assistance with CICS/DOS/VSE screen map generation using Basic Mapping Support. Interactive definition of application screens to ELIAS-I design standards, together with maps in COBOL or PL/I and error recovery code.
- Assistance with program creation in COBOL or PL/I. Provision of skeleton programs with DL/I and CICS/DOS/VSE maps, data areas and linkages, and error recovery code. "Fetch a brick" capability for CICS/DOS/VSE and DL/I calls. Simple use of full screen editor to enter user source statements and test the resulting program.
- Assistance with writing COBOL or PL/I user exits for DMS/CICS/VSE-DOS (Program Number 5746-XC4). For those customers who have DMS installed, a user exit capability similar to the above described program creation routines is available.

ELIAS-I, when installed in conjunction with the DOS/VSE System IPO-E, is designed to provide a comprehensive system for the design, development, programming, debugging, testing and operation of a DB/DC system using, in the main, interactive tools to accomplish the above tasks. Sample programs - working models of various DB/DC functions - are designed to illustrate, "how to do it", for the user new to DB/DC implementation. ELIAS-I also provides assistance for the experienced programmer whose productivity can be improved via the interactive program generation procedures.

ELIAS-I can be used in the following ways:

- Use with any DOS/VSE System IPO/E base to generate source code in COBOL or PL/I for:
  - Batch data base programs.
  - Online programs using CICS/DOS/VSE or DMS/CICS/VSE-DOS.
  - DB/DC programs using DL/I, CICS/DOS/VSE and/or DMS/CICS/VSE-DOS.

These source code programs can be tested and run on other DOS/VSE systems which contain the appropriate compilers and DC or DB components.

- Use with the DC version of any DOS/VSE System IPO/E base, together with COBOL or PL/I, to generate, test and put into production batch or DC programs which use CICS/DOS/VSE and, optionally, DMS/CICS/VSE-DOS.
- Use with the DB/DC version of any DOS/VSE System IPO/E base to generate, test and put into production batch, DB, DC or DB/DC programs which use CICS and/or DL/I, either COBOL or PL/I and, optionally, DMS/CICS/VSE-DOS.

ELIAS-I has been designed to provide the maximum productivity benefits in the last case above; that is, when used in a full DB/DC environment together with CICS and DL/I, either COBOL or PL/I and, optionally, DMS/CICS/VSE-DOS.

**HIGHLIGHTS**

- Interactive interface for definition of DL/I DOS/VSE Data Bases.

- Interactive interface for definition of CICS/DOS/VSE screens (using Basic Mapping Support or DMS/CICS/VSE-DOS).
- Interactive program build facility for batch or online programs in COBOL or PL/I.
- Interactive facilities to enhance DMS/CICS/VSE-DOS user exit programming.
- Comprehensive Data Base recovery and reorganization routines.
- Task oriented documentation.
- Sample programs to illustrate how DB/DC programs should be built.
- Designed to provide ease of use to DB/DC programming.
- Explain and Help facilities.
- Standard program design and error recovery routines designed to provide easier and reduced maintenance.

**CUSTOMER RESPONSIBILITIES**

See above. The customer should ensure that the functions of ELIAS-I match their application requirements and that they have sufficient terminals to realize the benefits of an online programming environment.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

ELIAS-I (5746-XXV) is designed to operate on the IBM S/370, 4300 and 303X processors supported by the DOS/VSE operating system.

- A typical DOS/VSE environment to support ELIAS-I might be:
  - IBM 4331 Processor - 1.0 megabyte storage; DASD - 5 Spindles 3310\*; Console - 1 3278-2A; Printer - 1 3205-5\*; 1 Card or Diskette Reader; Tape Drive - 1 8809\*; Terminal - 1 3278-2 or 3277-2.
  - IBM S/370 - 1.0 megabytes storage; DASD - 5 Spindles 3340\*; 1 Line Printer; 1 Tape Drive; Terminals - 1 3277-2 or 3278-2; 1 Card or Diskette Reader.

\* = or equivalent devices supported by the Operating System.

**SOFTWARE REQUIREMENTS**

ELIAS-I is designed to operate with the specified releases of the following programs. The Interactive Productivity Facility (5748-MS1) is a prerequisite for using ELIAS-I.

		Release
DOS/VSE	5475-030	-
VSE/Advanced Functions	5746-XE8	2
VSE/ICCF	5746-TS1	2
VSE/POWER	5746-XE3	2
VSE/VSAM	5746-AM2	2
Interactive Productivity Facility	5748-MS1	2
CICS/DOS/VSE	5746-XX3	1.4.1
DL/I DOS/VSE	5746-XX1	1.5
DMS/CICS/VSE-DOS	5746-XC4	2
COBOL/VSE	5746-CB1	2.5
PL/I OPT. LIBS	5736-PL3	5.1
PL/I OPT.	5736-PL1	5.1
PL/I RES. LIB	5736-LM4	5.1
PL/I TRANS. LIB	5736-LM5	5.1
SORT/VSE	5746-SM2	3
DB/DC Data Dictionary		
DOS/VSE	5746-XXC	3
* ELIAS-I is transparent to the teleprocessing access method. Release 1 of the DOS/VSE System IPO/E supports only BTAM-ES.		

**COMPATIBILITY**

Programs written using ELIAS-I in conjunction with CICS/DOS/VSE, DL/I DOS/VSE, DMS/CICS/VSE-DOS, COBOL or PL/I are designed to be able to run on any DOS/VSE System IPO/E which has installed the appropriate selection of the above mentioned component programs.

**Ordering Instructions:** ELIAS-I can be ordered separately from the System IPO/E. The customer will receive all necessary instructions for installing ELIAS-I on top of an installed system which contains the Interactive Productivity Facility and the other prerequisite programs described under "Programming Requirements".

A separate license is required under the terms and conditions of the Agreement for IBM Licensed Program.

PROGRAM PRODUCTS

**ENTRY LEVEL INTERACTIVE APPLICATION SYSTEM-ONE  
RELEASE 2  
ELIAS-I (5746-XXV)**

**PURPOSE**

ELIAS-I is an interactive program which runs under the control of the Interactive Productivity Facility, Program Number 5748-MS1. When correctly installed in its Specified Operating Environment (SOE), ELIAS-I is designed to provide a system which will facilitate the design, development and implementation of VSAM, DB, DC and/or DB/DC programs with CICS/DOS/VS, DL/I DOS/VS, and/or VSE/VSAM using COBOL or PL/I and, optionally, DMS/CICS/VS DOS.

ELIAS-I presents, via its optional documentation and with supporting education, a design methodology, especially oriented towards DB/DC applications, tailored to the user who is not experienced in DB/DC implementation and who has limited in-house skill. Hints and tips are provided to help facilitate the use of improved programming techniques in the smaller system environment.

ELIAS-I interactive procedures are designed to provide assistance with VSAM, DB, DC, and/or DB/DC program implementation by providing a dialog capability for the programmer. ELIAS-I bricks are also included in the product. These bricks are designed to be included in VSAM, DB, DC, and/or DB/DC application programs and to provide assistance in utilizing standard CICS/DOS/VS, DL/I DOS/VS and VSE/VSAM facilities.

**DESCRIPTION**

Procedures and bricks are provided for the following main functional areas:

- Assistance with DL/I data base definition. Procedures to generate DL/I nucleus, DBDs, PSBs, SSAs and the associated VSAM files, together with the associated COBOL or PL/I structures. A procedure to transport ELIAS-I defined DL/I control blocks and COBOL or PL/I structures into the DB/DC Data Dictionary DOS, Program Number 5746-XYC, is provided.
- Assistance with PSE import. A procedure to make available to ELIAS-I program generation procedure PSBs which have been defined without making use of ELIAS-I facilities.
- Assistance with DL/I data base maintenance. A procedure for loading, reorganization and backup/recovery of DL/I data bases.
- Assistance with CICS/DOS/VS screen map generation using Basic Mapping Support. Interactive definition of application screens to ELIAS-I design standards. These maps can be defined for use either with COBOL or PL/I application programs.
- Assistance with batch and online program creation and maintenance in COBOL or PL/I. Provision of skeleton programs with data areas, screen maps, linkage and error recovery code for DL/I (CALL or High Level Programming Interface), VSE/VSAM and CICS/DOS/VS.
- "Fetch a brick" capability for service requests related to DL/I (CALL or HLP interfaces), VSE/VSAM and CICS/DOS/VS either in batch or online programs written in COBOL or PL/I. Simple use of full screen editor to enter user source statements and test the resulting program.
- Assistance for writing COBOL or PL/I user exits for DMS/CICS/VS DOS, Program Number 5746-XC4. For those customers who have DMS installed, ELIAS-I provides support for writing user exits in either COBOL or PL/I, offering productivity improvements made available to the developers of traditional COBOL or PL/I programs.
- Assistance with "compile and link" jobstream creation. A procedure to generate a fully tailored jobstream in order to submit to batch for compiling and linking batch and/or online programs, as well as CICS/DOS/VS screen maps.

ELIAS-I, especially when installed in conjunction with the VSE System IPO-E DB/DC, Program Number 5750-AAA, is designed to provide a comprehensive system for the design, development, programming, debugging, testing and operation of a DB/DC system using, in the main, interactive tools to accomplish the above tasks. Sample programs - working models of various DB/DC functions - are designed to illustrate "how to do it" for the user new to DB/DC implementation. ELIAS-I also provides assistance for the experienced programmer whose productivity can be improved via the interactive program generation procedures.

**HIGHLIGHTS**

ELIAS-I provides:

- Interactive interface for definition of DL/I DOS/VS Data Bases.
- Interactive interface for definition of CICS/DOS/VS screens (using Basic Mapping Support or DMS/CICS/VS DOS).
- Interactive program build facility for batch or online programs in COBOL or PL/I.

- Interactive facilities to enhance DMS/CICS/VS DOS user exit programming.
- Data Base recovery and reorganization routines.
- Task-oriented documentation.
- Sample programs to illustrate how DB/DC programs may be structured.
- Ease of use for DB/DC programming.
- Dialogs and help functions available in the following languages: French, German, Italian, Katakana, Portuguese and Spanish in addition to English.
- Standard program design and error recovery routines designed to provide easier and reduced maintenance.

**CUSTOMER RESPONSIBILITIES**

See above. The customer should ensure that the functions of ELIAS-I match their application requirements and that they have sufficient terminals and machine power to realize the benefits of an online programming environment.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

ELIAS-I is designed to operate on any IBM S/370, 303X and 4300 processors supported by the VSE/Advanced Functions.

Elias-I runs under control of Interactive Productivity Facility, in a VSE/ICCF pseudo-partition with at least 768K bytes of virtual storage allocated.

The following space is required in the VSE libraries:

	CIL	BL	SSL
Installation/Serviceing	1051 (31)	4030 (61)	31620 (2022)
Execution	1051 (31)		

A typical minimum VSE DB/DC where ELIAS-I can be installed to support application programming development might be:

- IBM 4331 Processor - 1 megabyte of storage ... 3 spindles 3370 DASD ... 1 Console 3278-2A ... 1 Printer 3211, 4245 or 3203-5\* ... 1 Card or Diskette Reader ... 1 Tape Drive ... 1 Terminal 3277-2 or 3278-2.
- IBM S/370: 1 megabyte of storage ... 8 Spindles of 3340 DASD\* ... 1 Line Printer ... 1 Card or Diskette Reader ... 1 Tape Drive ... 1 Terminal 3277-2 or 3278-2.

\* = or equivalent devices supported by the Operating System.

**SOFTWARE REQUIREMENTS**

This licensed program requires the functions provided by the Interactive Productivity Facility Release 3, Program Number 5748-MS1, running in conjunction with the following programs:

		Release
DOS/VSE	5475-030	-
VSE/Advanced Functions	5746-XE8	2.0
VSE/ICCF	5746-TS1	2.0
VSE/POWER	5746-XE3	2.0

The set of macros and application programs generated by ELIAS-I may interface with the following programs:

		Release
CICS/VS	5746-XX3	1.5
DL/I DOS/VS	5746-XX1	1.5 ICR 2
DOS/VS		
VSE/VSAM	5746-AM2	2.0
DMS/CICS/VS DOS	5746-XC4	2.0
DOS/VS COBOL	5746-CB1	2.5
PL/I Optimizing Compiler and Libraries	5736-PL3	5.1
DB/DC Data Dictionary	5746-XXC	3.0

and any teleprocessing access method supported by VSE/AF Release 2.0, Program Number 5746-XE8.

**MIGRATION FROM ELIAS-I RELEASE 1:** ELIAS-I Release 1 is upward compatible with ELIAS-I Release 2:

- Tables created by ELIAS-I Release 1 can be used directly by ELIAS-I Release 2 dialogs.
- Program skeletons generated using ELIAS-I Release 1 facilities can be accessed by ELIAS-I Release 2 editors.

**ELIAS-I R2 (cont'd)**

- ELIAS-I Release 2 bricks providing functions already existing in ELIAS-I Release 1 can be included in any ELIAS-I, Release 1 generated programs, without regeneration of the framework.

**Restriction:**

- ELIAS-I Release 2 editors can only use ELIAS-I, Release 2 bricks.

**DOCUMENTATION**  
(available from Mechanicsburg)

The following documents will be available at ELIAS-I availability time:

**Entry Level Interactive System One**

Licensed Program Specifications	GH19-6219
Licensed Program Design Objectives	GH19-6204
General Information Manual *	GH19-6218
Application Design Guide	SH19-6220
COBOL Application Programmer's Guide	SH19-6222
PL/I Application Programmer's Guide	SH19-6223
System Administrator's Guide	SH19-6221
COBOL Samples Handbook	SH19-6224
PL/I Samples Handbook	SH19-6225
Program Logic Manual	LY19-6214
Reference Card	

\* will be available at announcement time.

**Ordering Instructions:** ELIAS-I is ordered separately from the VSE System IPO/E Release 2.1. The customer will receive all necessary instructions for installing ELIAS-I on top of an installed system which contains the Interactive Productivity Facility Release 3.0 and the other prerequisite programs described under "Programming Requirements".

A separate license is required under the terms and conditions of the Agreement for IBM Licensed Program.

**RPQs ACCEPTED:** No



PROGRAM PRODUCTS

**DATA LANGUAGE/I-ENTRY DOS/VS  
DL/I-Entry DOS/VS (5746-XX7)**

**PURPOSE**

DL/I-Entry DOS/VS is a data base management system developed to improve the user's ability to implement data base processing applications. It provides data organization methods conducive to the creation, interrelation and support of large common data bases. DL/I-Entry DOS/VS executes as an application program in a virtual storage environment under DOS/VS.

**DESCRIPTION**

DL/I-Entry DOS/VS executes in either batch or online mode. The online capability is made possible through use of the Customer Information Control System/DOS/VS (CICS/DOS/VS), Program Product 5746-XX3, with which DL/I-Entry DOS/VS interfaces as a normal message processing program. An evolution from batch to teleprocessing applications is thus possible.

Application programs call upon the data base management services through DL/I-Entry DOS/VS. DL/I-Entry DOS/VS provides the application programs with a level of interface to the data base management services which is independent of data storage considerations. Through installation management tools provided by DL/I-Entry DOS/VS, data storage may be manipulated independent of application programs. Installation management can approach the problem of optimizing productivity for the total community of applications and users without affecting the functional capabilities of any of the members of that community. Existing DL/I-Entry DOS/VS application programs can be insensitive to reorganization of stored data, addition of new applications or data, changes in access methods, organization, or access strategy, and the introduction of new storage devices.

The data base management services of DL/I-Entry DOS/VS assist the user in:

- Description of data base structures.
- Creation of data bases.
- Access to retrieve or update data.

Using utilities supplied with the system, the user describes the structure of the data base from two viewpoints: The stored data structure as seen by the system, and the logical data structure as seen by the application. Only one description of the stored data exists. However, multiple descriptions of logical data may exist. These data base descriptions are external to application programs. They exist as stored data and are referenced by the system when it is processing access requests for the application programs.

Data base descriptions define the hierarchical relationships of segments making up a data base, the attributes of these segments, the access strategy and the storage device. To access or update stored data, the application program generates a functional *GET/PUT* level request for data base management services. As part of the functional request, the application program supplies symbolic names which identify the data to be processed.

Data bases are stored in the hierarchical sequential organization, and the access strategy may be sequential, indexed sequential or direct. Relationships can be established between segments in different hierarchical structures stored within the same or different data bases.

**HIGHLIGHTS**

- Application programs may process data bases independent of physical organization or storage device used.
- Users may write application programs in COBOL, PL/I or RPG II. Assembler Language may be used for customer programming.
- Data management services are provided by the DOS/VS virtual storage access method (VSAM) for hierarchical indexed sequential and for hierarchical direct data bases.
- Data bases may be defined which permit relationships to be established between segments in different hierarchical structures stored within the same or different data bases.
- Secondary indexing provides indexed access to root segments within a data base.
- Backup and reload utility programs assist in reorganizing data bases, and provide statistics for tuning the data bases.
- DL/I-Entry DOS/VS is an application source program compatible subset of DL/I DOS/VS, Program Product 5746-XX1, and is also upward compatible from VANDL-1, (PRPQ 5799-AEY).
- A utility is provided to convert VANDL-1 data bases to DL/I-Entry data bases. DL/I-Entry HSAM data bases can be processed by DL/I DOS/VS.
- Application programs using the Customer Information Control System/DOS/VS (CICS/DOS/VS) may issue calls to process DL/I-Entry DOS/VS data bases.
- Application programs can use the low-level code/continuity check feature to generate, check and update low-level codes. These are

useful in identifying the components or materials which make up a finished product. The feature is intended mainly for manufacturing applications, but not limited to them. Application programs which use the feature are upward source program compatible with DL/I DOS/VS Version 1.1 (5746-XX1) and subsequent releases.

- A trace feature which dumps DL/I-Entry control blocks and information about DL/I-Entry calls during application program execution. The feature is an option intended primarily for use by IBM programming service representatives, and degrades application program performance.
- Batch and online interfaces are provided to support application programs written in RPG II Release 2.0 using data base access requests. These application programs are upward compatible to DL/I DOS/VS. The existing batch interface has been retained for RPG II users with application programs already written in default or explicit mode.
- A new online scheduling call has been added to assure that upward compatibility to DL/I DOS/VS is retained for online applications.

The following chart illustrates the major features available for DL/I-Entry DOS/VS and DL/I DOS/VS.

Feature	DL/I-Entry DOS/VS V2.1.1	DL/I DOS/VS V1.4
Batch processing	X	X
Online processing	X	X
Data base recovery facility	X	X
DBD generation utility	X	X
PSB generation utility	X	X
Preformatted control blocks	X	X
Low-level code/continuity check feature	X	X
<b>Data Base Support</b>		
Hierarchical sequential access method (HSAM)	X	X
Hierarchical indexed sequential access method (HISAM)	X	X
Hierarchical direct access method (HDAM)	X	X
Hierarchical indexed direct access method (HIDAM)		X
<b>Application Program Data Management Support</b>		
VSAM	X	X
SAM	X	X
<b>Application Program Language Support</b>		
PL/I	X	X
COBOL	X	X
RPG II	X	X
Assembler	X	X
<b>Data Base Structures and Processing</b>		
Physical data bases	X	X
Logical data bases	HISAM or HDAM only	HISAM or HDAM only
Hierarchical levels	15	15
Different segment types	63	255
Maximum segment size (bytes)	512	4K
Maximum key length (bytes)	250	255
Fields per segment	*1	255
Multiple segment search arguments	X	X
Secondary indexing	HISAM or HIDAM only	HIDAM or HDAM only
<b>Shared source segment for multiple secondary indexes</b>		
PCBs per PSB	20	20

\*Note: Only one field is identifiable to DL/I-Entry; however, the data portion of the segment may be subdivided into user data fields.

Use: The DL/I-Entry DOS/VS system is distributed as a set of preassembled modules and a set of macros.

The separately assembled modules are in object form and contain the executable code necessary to operate DL/I-Entry DOS/VS. The user must link-edit these modules into the core image library.

Additionally, the user must catalog the supplied macros into the source statement library. These macros permit the user to describe the characteristics of the application programs, data bases, transactions, and, optionally, the environment used in conjunction with the Customer Information Control System/DOS/VS (CICS/DOS/VS). These options reflecting the user's requirements are assembled and then link-edited into the core image library.

PROGRAM PRODUCTS

DL/I-Entry DOS/VS (cont'd)

CUSTOMER RESPONSIBILITIES

A customer installing DL/I-Entry DOS/VS must:

- Meet the system requirements (paragraph below).
- See to it that appropriate DOS/VS and S/370 training (direct access storage education) be given to system analysts, application programmers, system programmers and system operators.
- Have DOS/VS successfully installed (no customer should attempt to implement DL/I-Entry DOS/VS until the installation has achieved proficiency in the use of DOS/VS).
- Have personnel schooled in DL/I-Entry DOS/VS (a thorough knowledge and understanding of data base concepts and DL/I-Entry DOS/VS before installation are essential).
- Provide adequate protection against accidental loss or misuse of data.
- Have DOS/VS personnel trained in COBOL, PL/I, RPG II or Assembler Language.
- Specify and implement application programs.
- Perform DOS/VS support or service associated with the installation of DL/I-Entry DOS/VS.

In addition to the above, additional time considerations should be given if the user wishes to process in an online environment in conjunction with CICS/DOS/VS. Refer to the CICS/DOS/VS pages for details.

A customer who has already installed DL/I-Entry DOS/VS Version 1.0, 1.1 or 2.0 must recompile and link edit the DFHSIT macro with SIMODS = (A1, B1, C1, D1, E1, F1, G1, H1, DE, I1, J1) before executing under DL/I DOS/VS Version 2.1.1 to include the modified DL/I - Entry Phase (DE).

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The minimum machine requirements for DL/I-Entry DOS/VS are the same as those needed for conventional operation of DOS/VS. The minimum machine configuration is an IBM S/370 mdl 115 or larger. For DL/I-Entry batch processing, add approximately 12K bytes of real storage (36K bytes of virtual storage) to VSAM or SAM storage requirements - for DL/I-Entry DOS/VS online processing add approximately 14K bytes of real storage (40K bytes of virtual storage) to VSAM and CICS/DOS/VS storage requirements. DL/I-Entry uses the CICS/DOS/VS I/O handling capability and buffer areas from CICS Dynamic Storage -- consult the CICS/DOS/VS pages and *General Information Manual* (GH20-1280) for latest information. For I/O, one IBM 2560 Card Reader/Punch (or equivalent) or one IBM 3540 Diskette I/O Unit; one IBM 3203 Printer (or equivalent); and (required for online processing only) any terminal device supported by CICS/DOS/VS.

Data base storage files may be on IBM 2314/2319 Direct Access Storage Facilities, IBM 3330/3333/3350 Disk Storage or IBM 3340/3344 Direct Access Storage.

SOFTWARE REQUIREMENTS

DL/I-Entry DOS/VS will run on S/370 under DOS/VS Release 34 and subsequent releases. DL/I-Entry will also run with DOS/VS under VM/370. DL/I-Entry DOS/VS is written in Assembler Language, and uses the Virtual Storage Access Method (VSAM) and Sequential Access Method (SAM) data management facilities.

The following components of the DOS/VS SCP (5745-010) are required:

- Control and service programs.
  - Initial program loader.
  - Supervisor.
  - Job control.
  - Linkage editor.
  - Relocating loader.
  - Libraries.
- Assembler.
- Data management.
  - Sequential Access Method.
  - Virtual Storage Access Method.

In addition to the above DOS/VS components, the user may require the following program products:

- DOS/VS COBOL Compiler and Library, 5746-CB1.
- Full ANS COBOL V3 Compiler, 5736-CB2, and Full ANS COBOL Library, 5736-LM2.
- PL/I Optimizing Compiler, 5736-PL1.
- PL/I Resident Library, 5736-LM4.
- PL/I Transient Library, 5736-LM5.

- DOS RPG II Compiler, 5736-RG1.
- DOS/VS RPG II Compiler 5746-RG1

For online processing, the Customer Information Control System/DOS/VS (CICS/DOS/VS Version 1.4 or a subsequent version), Program Product 5746-XX3, is required.

DOCUMENTATION  
(available from Mechanicsburg)

Title	Order Number
General Information Manual Version 2.1.1	GH12-5115
Program Product Specifications	GH12-5205

**5747-CC1 - DOS/VSE 3800 PRINTING SUBSYSTEM IR****PURPOSE**

Support for the 3800 Printing Subsystem consists of Support Code within DOS/VSE and this Independent Release (IR). Together, they provide the DOS/VSE user with the same 3800 Printing Subsystem support as previously announced for DOS/VS Release 34.

**HIGHLIGHTS**

The IR provides the following components, which are unique to the 3800 Printing Subsystem:

- SETPRT
- IEBIMAGE
- IBM-supplied PRINTER CONTROL PHASES

The remaining 3800 support code is contained in DOS/VSE.

**CUSTOMER RESPONSIBILITIES**

It will be the customer's responsibility to install the IR. Installation instructions are contained in the Program Directory.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The 3800 Printing Subsystem can be attached to the IBM 4331, 4341, 4361, 4381 Processors and IBM S/370 mdl 135\*, 138\*, 145, 148, 155II, 158 and the IBM 3031 Processor.

\*Via RPQ #S00338 which approves 3800 attachment to 3135 and 3138.

**SOFTWARE REQUIREMENTS**

**Prerequisite:** The prerequisite to the installation of the DOS/VSE IBM 3800 Printing Subsystem IR is DOS/VSE or any subsequent release of DOS/VSE unless otherwise indicated.

**COMPATIBILITY**

This IR is compatible with DOS/VSE.



PROGRAM PRODUCTS

**VS APL  
RELEASE 4.0 (5748-AP1)**

**PURPOSE**

VS APL is a program product that interprets statements written in APL. The APL language has a simple and uniform notation, tailored to interactive use at a terminal. The language was originated to define programs concisely using well-known symbols.

**SPECIAL SALES INFORMATION**

VS APL is designed for new and current users of APL. Users of other APL products may find that VS APL offers an alternative to their current product.

VS APL provides conversion aids to assist the user in converting APL functions and data defined under selected IBM APL products so that they can be used under VS APL. The conversion aids consist of batch programs and a workspace that provides for format and content conversion of APL/360 and APLSV workspaces.

The existence of a S/370 APL Assist feature in the system will not be functionally apparent to the terminal user. A performance improvement in interpreting APL statements may be obtained by utilizing the S/370 APL Assist feature.

**DESCRIPTION**

VS APL runs under the following systems:

- Customer Information Control System (CICS/VS),
- Time Sharing Option (TSO),
- Virtual Storage Personal Computing (VSPC), and
- VM/370 Conversational Monitor System (CMS).

VS APL provides a shared variable facility that allows APL users to communicate with non-APL programs called auxiliary processors, that operate outside the APL environment. Several auxiliary processors are distributed with VS APL. This auxiliary processor concept provides a method of extending the capability of the APL environment. Installation-supplied auxiliary processors can provide the customer with other specific capabilities. APL users under CICS/VS and VSPC can also communicate with other APL users via the shared variable facility.

VS APL consists of the following:

- VS APL Interpreter - interprets and executes APL statements.
- Executors - provide environment-dependent services for the interpreter, such as access to libraries and terminal input and output. One each is provided for CICS/VS, TSO, VM/370 CMS and VSPC.
- Auxiliary processors - provide functions outside of the APL workspace environment.
  - Under CICS/VS ten auxiliary processors are provided. Three auxiliary processors provide selected data management services for APL files, VSAM files, ISAM files and DL/I data bases. Other auxiliary processors allow a user to request a subset of CICS/VS services, display certain areas of main storage, read and write data in CICS/VS transient data destinations, and specify an APL command or statement that will be executed when evaluated terminal input is next requested. Two auxiliary processors provide the application control of the 3270 display facilities; one adds graphic data display capabilities, including color, programmed symbols and extended highlighting, by using the Graphical Data Display Manager (GDDM), program product 5748-XXH. Another auxiliary processor communicates with the VS APL session manager so that APL applications can issue commands to control the session and the screen.
  - Under TSO, nine auxiliary processors are provided. Auxiliary processors provide selected data management services for VSAM files, OS files supported by QSAM and unkeyed, relative record, fixed length files supported by BDAM. They also provide the capability for an APL application to specify an APL command or an APL statement that will be executed when terminal input is next requested, to issue TSO commands and to display alphanumeric and graphic data including color, programmed symbols, and extended highlighting, by using GDDM. Another auxiliary processor communicates with the VS APL session manager so that APL applications can issue commands to control the session and the screen. An auxiliary processor allows APL data to be written to auxiliary storage.
  - Under VM/370 CMS, eight auxiliary processors provide selected data management services for CMS files, VSAM files and OS files supported by QSAM. They also provide the capability for the APL application to specify the data to be accepted as terminal input when terminal input is next requested, to pass commands to CMS for execution, and to display alphanumeric and graphic data including color, programmed symbols and extended highlighting, by using GDDM. Another auxiliary processor communicates with the VS APL

session manager so that APL applications can issue commands to control the session and the screen. An auxiliary processor allows APL data to be written to auxiliary storage.

- Under VSPC, eight auxiliary processors provide selected data management services for VSPC library files and VSAM files maintained by the operating system, and two auxiliary processors provide for application control of the 3270 display facilities. One of the 3270 display control auxiliary processors adds graphic data display capabilities including color, programmed symbols and extended highlighting, by using GDDM; the operation of this auxiliary processor requires VSPC Version 2. They also provide the capability for the APL application to specify the data to be accepted as terminal input when terminal input is next requested, to pass commands to VSPC for execution and display certain areas of main storage.
- Shared Storage Manager - manages the communication between the interpreter and auxiliary processors. (For VS APL under VSPC, this is a component of VSPC.)
- Conversion Aids - facilitate migration of installations that wish to convert libraries and functions developed under certain other IBM APL products.
- Workspaces - contain various functions useful to installations. One workspace provides extensive graphics functions.

The VS TSIO auxiliary processor is available as program product (5740-XR9) for use with VSPC. VS TSIO accepts commands through shared variables and makes available to the APL application many of the data management facilities of the OS/VS operating system.

**HIGHLIGHTS**

- Offers interactive use of computers to enhance productivity in application development.
- Can be installed under CICS/VS, TSO, VM/370 CMS and VSPC.
- Utilizes the S/370 APL Assist feature when available.
- Supports the 3270 and 3767 APL features.
- Supports the 3232 APL functions.
- Supports ASCII terminals with APL special characters under VSPC, VM/CMS with VM System Product (Release 2), and under TSO with VTAM/NTO.
- Includes dynamic program control of error handling.
- Provides 3270 full screen management facilities.
- Provides access to VSAM files.
- Provides access to DL/I data bases (CICS/VS only).
- Allows for variable sized workspaces as required by the specific application.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

VS APL Release 4 is designed to operate on the following IBM processors:

- The System/370
- The 43XX processors
- The 30XX processors

The processor must have sufficient storage to meet the combined storage requirements of the host operating system, access methods, DB/DC or interactive subsystem, VS APL (including the installed auxiliary processors), and GDDM when used. The floating point feature is required for both GDDM and VS APL.

Terminal support for VS APL is provided by the host subsystem. The IBM 3767, IBM 3270 and IBM 8775, where supported, require the appropriate APL feature for terminal users who need to enter or display the APL special characters. Under VM/CMS, VS APL uses the virtual console of the CMS virtual machine as the terminal device.

Support for the 3232-11: Support for the 3232-11 attached to the 8100 Information System Processor is provided by DPPX/DSC.

For CICS/VS, only terminal services from VTAM, ACF/VTAM, or BTAM are supported. The supported terminals are IBM 3270 and 8775 displays (operating with at least an 80-character width) and printers attached to IBM 3270 control units or to IBM 3790 (displays as Logical Unit type 2 and printers as Logical Unit type 3). NOTE: The IBM 3790 does not support the APL or TEXT features. BTAM supports only non-SNA terminals.

For TSO, start/stop terminal support is through ACF/VTAM Version 1 or ACF/VTAM Version 2 and NTO.

**VS APL Rel 4.0 (cont'd)**

**SOFTWARE REQUIREMENTS**

VS APL is distributed in Assembler language (except the APL workspaces which are written in APL). The IBM proprietary language PL/S is used to produce the assembler source for some of the modules. VS APL operates under the following systems (minimum release is indicated):

- CICS/DOS/VS (5746-XX3) Version 1 Release 5 (VS APL under CICS/DOS/VS requires VSAM and VTAM, ACF/VTAM or BTAM. VS APL is not supported under either CICS/DOS/VS subset option or CICS/DOS/VS Entry Level System).
- CICS/OS/VS (VS1 and MVS) (5740-XX1) Version 1 Release 5 (VS APL under CICS/OS/VS requires VSAM and VTAM, ACF/VTAM Version 1 or ACF/VTAM Version 2 or BTAM).
- VM/System Product (5664-167) or VM/System Extensions Release 2 (5748-XE1) or VM/Basic System Extensions Release 2 (5748-XX8).
- VSPC-OS/VS1 Release 2 (5740-XR5) (note that the GDDM auxiliary processor and direct access to VSAM entry sequenced data sets is not supported in this environment).
- VSPC-OS/VS2 Release 2 (5740-XR6) (note that the GDDM auxiliary processor and direct access to VSAM entry sequenced data sets is not supported in this environment).
- VSPC Version 2 Release 1 (5665-283) (note that the GDDM Interactive Chart Utility, the Release 3 functions and some of the Release 2 functions are not available in this environment).
- TSO-MVS Release 3.8.

**Note:** Later versions, releases and modifications are supported, unless explicitly stated otherwise. Certain configurations may require a release later than the minimum release.

The Graphical Data Display Manager (GDDM) (5748-XXH) is required in order to use:

- The VS APL Session Manager under CMS or TSO
- The VS APL Session Manager Command auxiliary processor (AP 120) under CMS or TSO
- The GDDM auxiliary processor (AP 126)
- The GRAPHPAK workspace

Under VM/370 CMS, use of the auxiliary processor which interfaces to GDDM requires the VM/System Product (5664-167). GDDM is not supported by VM/System Extensions or by VM/Basic System Extensions.

Under VM/370 CMS, use of ASCII coded terminals requires the VM/System Product Release 2 (5664-167).

Use of GDDM Release 3 with TSO requires ACF/VTAM Version 1 Release 2 or Release 3 or ACF/VTAM Version 2 or ACF/VTAM Version 2 Release 4 or later releases. Use of the GDDM Interactive Chart Utility and the functions added with GDDM Releases 2 and 3 requires GDDM Release 3. Under VSPC, use of the GDDM auxiliary processor requires GDDM Release 2.

Use of NTO in the TSO environment requires ACF/VTAM Version 1 Release 2 or Release 3 or ACF/VTAM Version 2.

Use of the DL/I auxiliary processor (AP 125) under CICS/DOS/VS requires DL/I DOS/VS (5746-XX1).

**SYSTEM CONFIGURATION:** In a virtual storage environment, the amount of real storage required depends on the level of performance desired. For VS APL, the real storage requirements depend on a number of factors that include:

- S/370 processor model and operating system.
- Tuning parameters.
- Characteristics of device used for paging and library storage.
- Level and type of foreground and background activity.
- Size of VS APL workspaces.
- Shared Variable storage requirements.
- Number and level of activity of auxiliary processors.

If installed, the APL Assist feature for the S/370 mdls 135 and 145 requires additional control storage.

Terminals that are functionally equivalent to those specifically supported may also function satisfactorily. The customer is responsible for establishing equivalency. IBM assumes no responsibility for the impact that any changes to the IBM-supplied programs or products may have on such terminals. **Note:** The auxiliary processors provided with the CICS/VS environment do not support the Intersystem Communication facility of CICS/VS Version 1 Release 4.

**STORAGE REQUIREMENTS:** The main storage requirements to install VS APL depend on the method of installation, and the method of installation depends on the operating system.

Under OS/VS operating systems, the System Modification Program (SMP) Release 4 is used to install VS APL. See the *OS/VS System Modification Program (SMP) System Programmer's Guide (GC28-0673)* for more information on SMP. The auxiliary storage estimates for SMP data sets are in the following section. Auxiliary storage is required during installation and maintenance.

Under the DOS/VSE operating system, the Maintain System History Program (MSHP) is used. See the *VSE/Advanced Functions Maintain System History Program User's Guide (SC33-6101)* for more information.

Under VM/370 (CMS), the Program Level Change (PLC) procedure is used to install VS APL.

When installation is completed, permanent files containing the VS APL load modules, tables, and the VS APL library (or libraries) remain in auxiliary storage. The requirements for these files are discussed in the following section.

The amount of space required on storage devices for the load modules, tables, and the VS APL library (or libraries) depends on the devices and access methods used and the size and number of workspaces and files in the library. The following table provides an estimate of the number of bytes required by VS APL. The size given for the VS APL library includes only those workspaces provided with VS APL.

	CICS/VS	TSO	VSPC	CMS
Load modules and tables	700K	1,000K	220K	1000K
VS APL library	1000K	1000K	1000K	1000K
SMP data sets	1200K	1000K	1000K	NA

The storage estimates presented in this section are those to run VS APL with the VS APL Session Manager active, (except VSPC), one user having a workspace size of 96K bytes, and all the auxiliary processors provided with VS APL available, but not being used. Use of the auxiliary processors increases these estimates depending on which auxiliary processors are used and how they are used. For example, using the APL Data File auxiliary processor in CMS requires additional virtual storage for each record processed; the amount of additional virtual storage depends on the size of the APL object.

Not included in these estimates is storage required by operating systems, subsystems, other programs used in the course of processing VS APL requests, or other programs used by VS APL (such as the Graphical Data Display Manager).

**CICS:** Under CICS/VS, the virtual storage required to install and run VS APL consists of the VS APL specific requirements. VS APL requires 256K bytes of virtual storage for installation, and 350K bytes of virtual storage to operate. Each user who signs on requires approximately an additional 50K bytes of virtual storage (assuming no auxiliary processors are used) plus the workspace size (a multiple of 32K bytes). VS APL for CICS/VS under DOS also requires 2K bytes of fixed real storage. Virtual storage requirements for the auxiliary processors depend on the number of users of an auxiliary processor, and the buffer sizes used for passing data and control information. The shared storage manager, when active, requires a minimum of 20K bytes of virtual storage. These VS APL storage requirements are in addition to the virtual storage required by CICS/VS and GDDM, if used.

**VSPC:** Under VSPC, the virtual storage required to install and run VS APL consists of the VS APL specific requirements, the GDDM requirements, and the VSPC requirements. VS APL requires 256K bytes of virtual storage for installation and 212K bytes of virtual storage to operate. This VS APL requirement is in addition to the VSPC interactive environment requirements. In OS/VS2, 212K bytes per VSPC dependent address space is required for operation. If VS APL is placed in the system link pack area, only 212K bytes are required for operation.

**CMS and TSO:** Under CMS and TSO, VS APL can be installed so that the VS APL load modules can be shared between users of the same subsystem. The virtual storage requirements can be reduced if this is done. The virtual storage estimates that follow assume VS APL has been installed without shared VS APL load modules.

VS APL under CMS - 1,000K bytes  
VS APL under TSO - 1,000K bytes

The additional virtual storage required by each additional user who signs on to VS APL is summarized in the following table:

TSO and CMS	
Load Modules shared	Shared module size is 400K. Virtual storage for one user minus the number of bytes of the shared load modules, plus/minus the difference in workspace size from 96K bytes.
Load Modules not shared	Virtual storage as for one user, plus/minus differences in workspace size from 96K bytes.



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PP 5748-AP1.3  
Nov 83

PROGRAM PRODUCTS

**VS APL Rel 4.0 (cont'd)**

**DOCUMENTATION**  
(available from Mechanicsburg)

*VS APL General Information (GH20-9064) ... VS APL Program Product Specifications (GH20-9086) ... APL Language (GC26-3847).*

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No



## PROGRAM PRODUCTS

**3650 PROGRAMMABLE STORE SYSTEM  
POS APPLICATION/RETAIL ENVIRONMENT PROGRAM  
VERSION 1, RELEASE 2.1  
5748-D14****PURPOSE**

The IBM 3650 Programmable Store System POS Application/Retail Environment program product provides basic controller and POS terminal application programs necessary to perform sales and nonsales functions for the retail environment.

The IBM Programmable Store System POS Application/Retail Environment programs are written in IBM Subsystem Program Preparation Support II (SPPS-II) giving the user flexibility to make program alterations. All options provided are selected by specifying choices and altering data values. If the IBM provided functions do not completely satisfy the user's particular needs, the programming capabilities of SPPS-II may be used to further customize the program.

This program will execute on the IBM 3651 controller mdls A25, B25, A75, B75, C75, D75 and the IBM 3653 Point-of-Sale Terminal mdl 1P and/or the IBM 3683 Point-of-Sale Terminal attached to the 3651 Controller. This program product is licensed at the IBM 3650 Store Controller and is assembled on a host system which can run under DOS/VSE, OS/VS1, or OS/VS2. The assembled program is then transmitted to the IBM 3650 Programmable Store System where all program execution takes place. A prerequisite is the IBM subsystem Program Preparation Support II (SPPS II) program product (5735-D16).

**HIGHLIGHTS**

- Retail sales functions for entries from the point-of-sale Terminal keyboard and/or wands.
- Multiple item pricing in any merchandise or modify-ticket entry.
- Accumulation of totals for a sales transaction and a sales period including:
  - Gross Plus
  - Gross minus
  - Net cash
  - Net non-cash
  - Transaction count (the Totals Retention Feature is required).
- Printed output at the point-of-sale terminal on the receipt tape, journal tape and/or document insert station.
- Facilities for controlling the sign on to selected functions by authorized personnel.
- Use of data files including:
  - Item Record
  - Check Verification
  - Operator/Terminal Accounting Totals
  - Department Totals
  - Item Movement (flash item totals)
  - Operator Authorization
  - Credit
- Use of a transaction log file for recording selected events.
- Nonsales facilities for recording in the accounting totals the monetary exchanges external to sales, transaction corrections, and procedures for assisting the operator in reconciling the tender in the tills.
- An in-store common data maintenance facility that provides access to the data files in the store controller to add, change, or delete records such as item records, credit, authorization records, and other user defined keyed files.
- In-store facility for changing selected program options, values, and descriptors without host processor intervention.
- In-store facility for accessing and/or clearing the item movement data.
- Set time and date facility.
- Support for off-line operation of the POS terminal.
- Support for selective initial program loads, which allows each terminal to be personalized to perform specialized retail store functions.
- Support for system control functions such as terminal status inquiries, system quiesce, and three types of totals readout and/or reset.
- Additional optional functions are described in such a manner that the user can incorporate these functions into a retail store system using SPPS-II programming.

**CUSTOMER RESPONSIBILITIES**

- Install the IBM 3650 Programmable Store System Host Support to:
  - Define and maintain the subsystem library (SLIB) and the data sets necessary to support the programmable store system.
  - Create the operational environment that will control the functions of the store controller and the terminals.
  - Provide communications between the host and the store controller to load the application programs and to recover application program dumps.
- Install the IBM Subsystem Program Preparation Support II (SPPS-II) program product.
- Place the IBM 3650 Programmable Store System POS Application/Retail Environment program release into a predefined data base.
- Select IBM extended functions.
- Customize source code as desired by providing user-written code.
- Assemble and link edit the IBM 3650 Programmable Store System POS Application/Retail Environment Program.
- Perform application definition.
  - Use the Programmable Store System Host Support to:
    - Create Application Definition Records.
    - Create Application Load Lists(s) (terminal).
    - Create Load initial tables to associate a load to a terminal address.
  - Assemble macro statements.
- Generate user files as required. For example:
  - Item Record
  - Check Verification
  - Operator Authorization
- Load the Store Controller.
  - Via IBM 3650 Programmable Store System Host Support:
    - Application Definition Record
    - IBM 3650 Programmable Store System POS Application/Retail Environment programs
  - Via user-provided transmission program:
    - Initialize user files

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The IBM 3650 Programmable Store System POS Application/Retail Environment program product is designed to operate with the following store system configuration as a minimum:

Controller: IBM 3651 mdl A25, A75, B25, B75, C75, D75 with 60K storage.

Terminal: One IBM 3653-1P Point-of-Sale Terminal with 36K storage and/or one IBM 3683-1 Point-of-Sale Terminal with 40K storage.

Host Communication: One IBM 3872 or equivalent modem

Additional storage capacity may be required in the store controller and/or terminal depending on the extended functions and options selected, the configuration, and the combinations of nonsales functions. Typical user terminal orders will reflect 44K storage for 3653 POSTs and 48K for 3683 POSTs dependent on application requirements. Storage requirements must be evaluated at the Systems Assurance Review.

**SOFTWARE REQUIREMENTS**

**Host Requirements:** This program product is licensed at the IBM 3651 Store controller and is assembled on a host system which can run under DOS/VSE, OS/VS1 or OS/VS2. The assembled program is then transmitted to the IBM 3650 Programmable Store System where all program execution takes place. The IBM Programmable Store System Host Support, BTAM for binary synchronous and VTAM or ACF/VTAM for SDLC are also required.

**Programming Language:** The IBM 3650 Programmable Store System POS Application/Retail Environment Program is written in the IBM Subsystem Program Preparation Support, II (SPPS-II) language a prerequisite program product (5735-D16).

**Controller Environment:** The IBM 3650 Programmable Store System POS Application/Retail Environment Program will support the IBM 3651 and 3653 and/or 3683 engineering change levels supported by



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PP 5748-D14.2

Nov 83

PROGRAM PRODUCTS

**3650 Prog. Store Sys. POS Appl./Retail (cont'd)**

the latest current level of the IBM 3650 Programmable Store System Host Support and SPPS-II programs.

**DOCUMENTATION**  
(available from Mechanicsburg)

*The IBM 3650 Programmable Store System POS Application/Retail General Information (GC30-3056) ... Licensed Program Specifications (GC20-5276) ... User's Guide (SA27-3212) ... Programmer's Reference and Operations Guide (SA30-3126) ... Data Base Reference (SH20-5537) ... Logic Manual (LY30-3056).*

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**3650 PROGRAMMABLE STORE SYSTEM POINT OF SALE  
APPLICATION/REPORT CUSTOMIZER PROGRAM  
VERSION 1 RELEASE 2  
5748-D15**

**PURPOSE**

The IBM 3650 Programmable Store System POS Application/Report Customizer Program Product provides the user with the capability to prepare customized reports from data accumulated at the IBM Store Controller. Reports may be customized by:

- Specifying the means of selecting what data is to be reported:
  - by controlling which data records are to be read.
  - by the logical testing of data from specified fields within records.
  - by the use of controlled, reiterative processing.
  - by requesting input data from the terminal operator.
- Specifying the format of print images:
  - by indicating constant data.
  - by indicating data field print locations.
  - by controlling line spacing.
- Specifying output locations:
  - by controlling at which stations the output should be printed on the IBM 3663P or 3683 Supermarket Terminal.
  - or by specifying to which file the output should be spooled for later use.

This program will execute on the 3651 Controller (mdl A25, B25, A75, B75, and on the 3663 Terminal (mdl 1P, 3P), and/or 3683 Terminal (mdl 1, 1A, 2, 2A, 3, 3A).

**HIGHLIGHTS**

The program product may be used to produce reports such as:

- Cash Reports.
- Department Analysis Reports.
- Operator Performance Reports.
- Miscellaneous Transaction Recap Reports.

Two user-created Store Controller files are required. Report printing is operator initiated at the terminal.

**CUSTOMER RESPONSIBILITIES**

Assuming an operational 3650 PSS supermarket application system:

- Place the IBM 3650 Programmable Store System POS Application/ Report Customizer Program release into a predefined data base.
- Assemble and link edit the IBM 3650 Programmable Store System POS Application/Report Customizer Program.
- Construct a Report Specification File.
  - Name and describe each report.
- Construct a Print Format File.
  - Describe each report's output.
- Load the Store Controller.
  - Via IBM 3650 Programmable Store Systems Host Support
    - IBM 3650 Programmable Store System POS Application/Report Customizer Program
  - Via user-provided transmission program
    - Report Specification File
    - Print Format File
  - Initiate reports at terminal
    - Use IBM-provided operator guidance

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 3650 Programmable Store System POS Application/Report Customizer Program Product in a supermarket store environment is designed to operate with the following store system configuration as a minimum:

- Controller:** IBM 3651 mdl A25, B25, A75, B75, C75, D75; with 60K storage.
- Terminal:** One IBM 3683 mdl 1 Point of Sale Terminal with 32K bytes of storage and journal printer or 3683 mdl 1A, 2, 2A, 3, or 3A Point of Sale Terminal with 56K bytes of storage and journal

printer; or one IBM 3663-1P Supermarket Terminal or IBM 3663-3P Supermarket Terminal with an attached IBM 3663-2 Supermarket Terminal attached to the mdl 3P with 36K bytes of storage.

**Host Communication:** For IBM Controllers: 3651 mdl A25, B25, A75, B75, C75, D75. One IBM 3872 or equivalent modem over a switched or leased line. One 3669 Store Communications unit with the 3669 attachment feature over a switched line.

**Backup:** For IBM controllers: 3651 mdl A75, B75, C75, D75 with a 3669 attachment feature. One IBM 3669 Store Communications Unit (per store).

Additional storage capacity may be required in the Store Controller and/or terminal, depending upon the application programs and/or terminal configuration.

The IBM 3650 Programmable Store System PSS Application/Report Customizer Programmer's Guide, available with the IBM 3650 Programmable Store System POS Application/Report Customizer Program, may be used to estimate the real main storage requirements of the IBM 3650 Programmable Store System POS Application/Report Customizer Program for each customer system.

**SOFTWARE REQUIREMENTS**

**Host Requirement:** This program product is designed to be assembled on a System/370 or 4300 host processor with storage sufficient to accommodate DOS/VSE, OS/VS1 or OS/VS2 (MVS). Also used is the IBM 3650 Programmable Store System Host Support System Control Program which utilizes VSAM and, for transmission of this program product to and from the IBM 3650 Programmable Store System, BTAM for binary synchronous and VTAM or ACF VTAM for SDLC. All execution of this program product code takes place on the IBM 3650 Programmable Store System.

**Programming Language:** The IBM 3650 Programmable Store System POS Application/Report Customizer Program is written in the IBM subsystem Program Preparation Support II (SPPS-II) Program Product language, a co-requisite Program Product.

**Controller Environment:** The IBM 3650 Programmable Store System POS Application/Report Customizer Program will support the IBM 3651, 3663P and 3683 PSS engineering change levels supported by the latest current level of the IBM 3650 Programmable Store System Host Support and SPPS-II programs.

**DOCUMENTATION**  
(available from Mechanicsburg)

Title	Order Number
IBM 3650 Programmable Store System POS Application/Report Customizer General Information	GC30-3054
Licensed Program Specifications	GH20-5328
Programmer's and Operations Guide	SC30-3148
Logic Manual	LY30-3048

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**3650 PROGRAMMABLE STORE SYSTEM  
POINT OF SALE APPLICATION/  
SUPERMARKET ENVIRONMENT PROGRAM  
VERSION 1 RELEASE 2  
5748-D21**

**PURPOSE**

The 3650 Programmable Store System POS Application/Supermarket Environment program product provides the basic controller and supermarket terminal application programs necessary to perform the checkout and accounting functions for the supermarket store environment similar to those provided in the 3660 Supermarket Scanning and Key Entry Systems.

The 3650 Programmable Store System POS application/Supermarket Environment program product is written in the Subsystem Program Preparation Support II (SPSS II) program product language, allowing the user to select options and make additions and deletions to functions. Options are selected by specifying choices. Extended Functions require program alterations as described by IBM as part of the documentation that accompanies this application program product, or require user programming in order to be implemented. If the IBM provided options and Extended Functions do not completely satisfy the user's particular needs, the programming capabilities of SPSS II may be used to further customize the program.

This program will execute on the 3651 Controller (mdl B25, A75, B75, C75, D75) and on the 3663 Terminal (mdl 1P, 3P), and/or the 3683 Terminal (mdl 1, 1A, 2, 2A, 3, 3A).

**HIGHLIGHTS**

A partial list of the functions provided by this program product are described below. Individual capabilities are implemented as combinations of the base program and Extended Function(s), unless specifically identified as base program only or Extended Function only.

- Customer checkout sales functions for scanned and/or keyed input at the supermarket terminals.
- Facility for controlling the sign-on to selected functions by authorized personnel only.
- Use of data files for item record lookup, check verification, check list, operator/terminal and store accounting totals, miscellaneous transactions, operator performance data, department totals, department totals by operator, item movement, and operator authorization.
- Use of a Transaction Log File for recording selected events for further processing.
- An accounting package that provides facilities for recording in the accounting totals the monetary exchanges external to sales, for closing accounting periods, and for assisting the operators in reconciling the tender in the tills for the accounting period.
- An in-store common data maintenance facility that provides access to the data files in the store controller to add, change, or delete records such as: item records, check verification records, operator authorization records, and other user defined files.
- In-store facility for changing selected program options, values, and descriptors without host processor intervention.
- In-store facility for accessing and/or clearing item movement data.
- Station monitoring for training and security uses. (Extended Function only)
- Shelf label preparation. (Base program only)
- Set date and time facility.
- Training mode for operator training.
- Facilities to help ensure the availability of the customer functions:
  - transfer from one terminal to another
  - Transfer checkout scanning and key entry functions, including backup reconciliation and item record lookup, via telephone communication, to the companion controller at another store. (Base program only)
  - Utilize terminal standalone mode (Extended Function only)
- Support for selective initial program loads, which allows each terminal to be personalized to perform specialized supermarket functions. (Base program only)
- Support for system control functions, such as terminal status inquiries and system quiescence. (Base program only)
- Additional Extended Functions described in the program documentation can be selected by the user to incorporate these functions into his supermarket system.

**CUSTOMER RESPONSIBILITIES**

- Install the IBM 3650 Programmable Store System Host Support to:
  - Define and maintain the subsystem library (SLIB) and the data sets necessary to support the supermarket store subsystem.
  - Create the "operational environment" that will control the functions of the store controller and the terminals.
  - Provide communications between the host and the store controller to recover application program dumps.
- Install the IBM Subsystem Program Preparation Support II (SPSS II) Program Product.
- Place the IBM 3650 Programmable Store System POS Application/ Supermarket Environment Program release into a predefined data base.
- Modify and customize the base application, as desired.
  - Insert and delete source code via IBM Extended Functions and/or user-written modules.
- Assemble and link edit the IBM 3650 Programmable Store System POS Application/Supermarket Environment Program.
- Perform application definition.
  - Use the Programmable Store System Host Support to:
    - Create an Application Definition record.
    - Create Application load list (terminals).
    - Create load ID table to associate a load to a terminal address.
  - Assemble macro statements.
- Generate user files as required (examples):
  - Item Record
  - Check Verification
  - Operator Authorization
- Load the Store Controller
  - Via IBM 3650 Programmable Store Systems Host Support
    - Application Definition Record
    - IBM 3650 Programmable Store System POS Application/Supermarket Environment Program
  - Via user-provided transmission program
    - Initialize user files

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM 3650 Programmable Store System POS Application/Supermarket Environment Program Product is designed to operate with the following store system configuration as a minimum:

- Controller:** IBM 3651 mdl A75, B25, B75, C75, D75; with 60K storage.
- Terminal:** One IBM 3663-1P Supermarket Terminal with 42K bytes of storage or one IBM 3663-3P Supermarket Terminal with 42K bytes of storage with an IBM 3663-2 Supermarket Terminal attached to the mdl 3P. If scanning is to be performed, one IBM 3667 checkout scanner is also required, (applies only to the mdl 1P), or one IBM 3683 mdl 1, 2 or 3 Terminal with 56K bytes of storage and journal printer, or one IBM 3683 mdl 1A, 2A, or 3A Terminal with 56K bytes of storage and journal printer and one IBM 3687 checkout scanner if scanning is desired.
- Host Communications:** For IBM Controllers: 3651 mdl B25, A75, B75, C75, D75. One IBM 3872 or equivalent modem over a switched or leased line. One 3669 store communications unit with the 3669 attachment feature over a switched line.
- Backup:** For IBM Controllers: 3651 mdl A75, B75, C75, D75 with a 3669 attachment feature. One IBM 3669 Store Communications Unit (per store).

Additional storage capacity may be required in the store controller and/or terminal, depending on the extended functions and options

## PROGRAM PRODUCTS

**Supermarket Environment Program (cont'd)**

selected, the configuration, and the existence of user application programs.

The *IBM 3650 Programmable Store System POS Application/Supermarket Environment Programmer's Guide*, may be used to estimate the real main storage requirements of the IBM 3650 Programmable Store System POS Application/Supermarket Environment Program for each specific customer system.

**SOFTWARE REQUIREMENTS**

**Host Requirement:** This program product is designed to be assembled on a System/370 or 4300 host processor using DOS/VSE, OS/VS1, or OS/VS2 (MVS) Operating Systems. Also used will be the IBM 3650 Programmable Store System Host Support System Control Program which utilizes VSAM and, for transmission of this program product to and from the IBM 3650 Programmable Store System, BTAM for binary synchronous and VTAM or ACF VTAM for SDLC. All execution of this program product code will take place on the IBM 3650 Programmable Store System.

**Programming Language:** The IBM 3650 Programmable Store System POS Application/Supermarket Environment Program is written in the IBM Subsystem Program Preparation Support II (SPPS-II) Program Product Language, a corequisite Program Product.

**Controller Environment:** The IBM 3650 Programmable Store System POS Application/Supermarket Environment Program will support the IBM 3651, 3683 and 3663P PSS engineering change levels supported by the latest engineering change levels supported by the latest current level of the IBM of the 3650 Programmable Store System Host Support and SPPS-II programs.

**DOCUMENTATION**  
(available from Mechanicsburg)

Title	Order Number
The IBM 3650 Programmable Store System POS Application/Supermarket Environment General Information	GC30-3055
Licensed Program Specifications	GH20-5330
User's Guide	SH20-5535
Program Reference and Operations Guide	SH20-5536
Program Logic Manual	LY30-3048
Application Installation Guide	SH20-5538
Application Macro Reference	SH20-5539

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

3650 PROGRAMMABLE STORE SYSTEM
POINT OF SALE APPLICATION/
STORE DATA MANAGEMENT
VERSION 1 RELEASE 3
5748-D22

PURPOSE

The IBM 3650 Programmable Store System Point of Sale Application/Store Data Management Program is a store controller Program Product which aids in the building and maintenance of user files in the store controllers.

The IBM 3650 Programmable Store System POS Application/Store Data Management Program complements the present host command processor capabilities. The ability is provided to have a delayed file maintenance procedure, as opposed to an immediate file change upon transmission from a host processor to a store controller. Also included is the capability to execute a data transmission function that synchronizes the files in a primary and a companion store controller.

This Program will execute on the 3651 Controller, (mdls A25, B25, A75, B75, C75, D75) and on the 3663 Terminal (mdls 1P, 3P) and/or 3653 Terminal (mdl 1P) and/or 3683 Terminal (mdl 1, 1A, 2, 2A, 3, 3A) attached to the 3651 Controller. The Program is designed to be assembled on a S/370 or 4300 host processor operating under DOS/VSE, OS/VS1 or OS/VS2 (MVS). A prerequisite is the IBM Subsystem Program Preparation Support II Program Product, 5735-D16, the language in which this program is written.

HIGHLIGHTS

- Provides extensions to Host Command Process Capabilities:
- Read records in a sequential file.
- Read a group of records based on a search argument.
- Modify fields within records.
- Generate report data from records and reset reported fields or records.
- Report item movement by item code.
Provides Delayed File Maintenance:
- Via system time of day and hour.
- Via system time recurrence daily at a specified hour or weekly at a specified day and hour.
- Operator controlled maintenance.
Provides Data Synchronization with a Companion Store Controller:
- Creation of synchronous file from file maintenance procedure.
- Capture of in-store item record changes.
- Transmission to and from companion store files.

CUSTOMER RESPONSIBILITIES

Assuming an operational 3650 PSS supermarket application system:

- Place the IBM 3650 Programmable Store System POS Application/Store Data Management Program release into a predefined host data base.
Assemble and link edit the IBM 3650 Programmable Store System POS Application/Store Data Management Program.
Load the Store Controller.
- Via IBM 3650 Programmable Store System Host Support IBM 3650 Programmable Store System POS Application/Store Data Management Program.
Via user-provided transmission program:
- Create Process Request Block(s),
- Create source files (with necessary change file data) the format is dictated by the type of file process,
- Create report data request files,
- Modify the Data Set Name Table to include the above three file types,
- Send the source files to the store controller and add the Process Request Block for the applicable source files.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The IBM 3650 Programmable Store System POS Application/Store Data Management Program Product is designed to operate with the following store system configuration as a minimum supermarket environment:

- Controller IBM 3651 mdl A25, B25, A75, B75, C75, D75; with 60K storage.
Terminal One IBM 3683 mdl 1 Point of Sale Terminal with 32K bytes of storage or IBM 3683 mdl 1A, 2, 2A, 3, or 3A Point of Sale Terminal with 56K bytes of storage or one IBM 3663-3P Supermarket Terminal with an attached IBM 3663-2 Supermarket Terminal attached to the mdl 3P; with 36K bytes of storage.
Host Communications For IBM Controllers: 3651 mdl A25, B25, A75, B75, C75, D75. One IBM 3872 or equivalent modem over a switched or leased line. One 3669 Store Communications unit with the 3669 attachment feature over a switched line.
Backup For IBM Controllers: 3651 mdl A75, B75, C75, D75 with 3669 attachment feature. One IBM 3669 Store Communications Unit (per store).

The following store system configuration is the minimum for a retail environment:

- Controller IBM 3651 mdl A25, A75, B25, B75, C75, D75; with 60K storage.
Terminal One IBM 3683 mdl 1 Point of Sale Terminal with 32K bytes of storage, or IBM 3653 mdl 1P Point of Sale Terminal with 36k bytes of storage.
Host Communication One IBM 3872 or equivalent modem.

Additional Storage capacity may be required in the store controller and/or terminal, depending on the options, configuration and combination of other functions and applications selected.

SOFTWARE REQUIREMENTS

Host Requirement: This program product is designed to be assembled on a S/370 or 4300 host processor with storage sufficient to accommodate DOS/VSE, OS/VS1 or OS/VS2 (MVS) operating systems. Also used is the IBM 3650 Programmable Store System Host Support System Control Program which utilizes VSAM and, for transmission of this program product to and from the IBM 3650 Programmable Store System, BTAM for binary synchronous and VTAM or ACF/VTAM for SDLC. All execution of this program product code takes place in the IBM 3650 Programmable Store System.

Programming Language: The IBM 3650 Programmable Store System POS Application/Store Data Management Program is written in the IBM Subsystem Program Preparation Support II (SPPS-II) program product language, a prerequisite program product.

Controller Environment: The IBM 3650 Programmable Store System POS Application/Store Data Management Program will support the IBM 3651, 3683, 3653 and 3663 PSS engineering change levels supported by the latest current level of the IBM 3650 Programmable Store System Host Support and SPPS-II programs.

This program product utilizes interfaces which are provided by the IBM 3650 Programmable Store System POS Application/ Supermarket Environment Program Product, the IBM 3650 Programmable Store System POS Application/Retail Environment Program Product or by a customer-written application.

DOCUMENTATION

(available from Mechanicsburg)

Table with 2 columns: Title, Order Number. Rows include: The IBM 3650 Programmable Store System POS Application/Store Data Management General Information (GH20-2150), Licensed Program Specifications (GH20-5329), Programmer's and Operations Guide (SH20-2408), Logic Manual (LY20-2479).

TERMS and CONDITIONS: See PP Index

## PROGRAM PRODUCTS

**VSPC FORTRAN  
5748-FO2****DESCRIPTION**

The VSPC FORTRAN processor is a one-pass, reenterable compiler that includes its own library of mathematical, input/output, and service routines. It runs under VSPC (Virtual Storage Personal Computing) under OS/VS1, OS/VS2 (MVS) and DOS/VS. VSPC FORTRAN is a terminal oriented compiler, with performance and ease-of-use as important considerations.

**HIGHLIGHTS**

- **Terminal entry:** Each user who signs on (logon process) to VSPC is presented his personal workspace in which he can build, manipulate and execute programs. Source programs are entered line-by-line, and errors can be corrected using the versatile commands of the VSPC editing facility. Resulting source programs can be compiled from the workspace in which they were created through the VSPC STORE or RUN commands. If the RUN command is chosen, the program will start execution after compilation.
- **Flexibility:** Simplicity of use makes VSPC FORTRAN suitable for the FORTRAN problem solver. Concerns with system functions are reduced, thereby allowing the user to keep his full attention on the applications and source programs needed to do his job.
- **The LINK Processor** provides the user with the capability to combine previously compiled object routines from the VSPC FORTRAN library.

In addition, OS object modules may be IMPORTED using the VSPC Service Program after being processed by the utility provided as part of the VSPC FORTRAN LINK processor.

IMPORTED modules are subject to restrictions as described in *VSPC FORTRAN General Information Manual* (GH20-9061).

- The language level of VSPC FORTRAN is that described in *IBM System/360 and System/370 FORTRAN IV Language*, GC28-6515, except that the Debug Facility, the DUMP and PDUMP service subroutines, and extended precision data types are not supported.
- Data exchange with other facilities under VSPC is supported with certain restrictions.

**Additional Capabilities Include:**

- List-directed input/output, which allows the issuance of READ and WRITE statements without a FORMAT statement.
- Free-form source input, which removes column restrictions and concern with tab settings and margin stops when entering FORTRAN source programs from a terminal. Standard fixed-form source is also accepted by the VSPC FORTRAN compiler; thus many existing FORTRAN programs can be compiled and executed under VSPC without change.
- A system subroutine, OPSYS, provides a means for associating a named VSPC file with a FORTRAN data set reference number and to specify or change the file processing mode. This same subroutine permits one VSPC FORTRAN program to invoke the execution of a second, completely separate, program and allows the second program to retrieve a parameter being passed to it. In addition, the "OPSYS" subroutine allows the FORTRAN program to suspend execution for a specified time interval, to execute any command from a large subset of the VSPC command language, and to invoke the GDDM, PGF, and/or VSPC Full Screen Manager to perform screen-oriented applications on terminals of the 3270 Information Display System.

**CUSTOMER RESPONSIBILITIES**

Each customer installing, operating or supporting VSPC FORTRAN must have a working knowledge of VSPC and OS/VS1, OS/VS2 (MVS) or DOS/VS. No customer should attempt to install VSPC FORTRAN until the installation has achieved proficiency in the use of the operating system.

The customer is responsible for providing adequate protection against accidental loss or misuse of his data. This includes an adequate review of the system's security provisions by the user.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VSPC FORTRAN operates in the environment provided by VSPC, and has no hardware dependencies in addition to those of VSPC. VSPC FORTRAN has no fixed storage requirement; the real storage required is a function of the performance required.

The virtual storage required to run VSPC FORTRAN consists of the IBM VSPC FORTRAN specific requirements and the VSPC requirements. IBM VSPC FORTRAN requires 132K bytes in addition to the VSPC interactive environment requirements. In OS/VS2 (MVS), 132K bytes per VSPC dependent address space is required. If VSPC FORTRAN is placed in the system link pack area, only 132K bytes are required. See

*VS Personal Computing (VSPC) for OS/VS and DOS/VS: General Information* (GH20-9070) for a discussion of the configurations of systems that include VSPC.

**SOFTWARE REQUIREMENTS**

VSPC FORTRAN, which is written in Assembler Language, operates under Virtual Storage Personal Computing (VSPC) in the OS/VS1, OS/VS2 (MVS) and DOS/VS environments. The LINK processor of VSPC FORTRAN is not supported in the DOS/VS environment of VSPC.

**DOCUMENTATION:** (available from Mechanicsburg)

*VSPC FORTRAN General Information* (GH20-9061) ... *VSPC FORTRAN Program Product Specifications* (GH20-9104).

**TERMS and CONDITIONS:** See PP Index



PROGRAM PRODUCTS

**VS FORTRAN RELEASE 3.0  
COMPILER and LIBRARY (5748-FO3)  
LIBRARY only (5748-LM3)**

**PURPOSE**

VS FORTRAN includes and extends most of the features of the current IBM OS/DOS FORTRAN products (i.e., H Extended, G1, F and their Libraries), it supports the new Standards language for FORTRAN (ANSI X3.9-1978 and ISO 1539-1980) and it provides IBM enhancements designed to improve the usability of this new FORTRAN offering. It is a single product usable in multiple operating systems. It compiles on and its object code runs on the then current release of each supported operating system at the time of availability of VS FORTRAN. Ease of migration is provided by source and object level compatibility with current IBM OS/DOS FORTRAN compilers (i.e., OS FORTRAN G1, OS FORTRAN H Extended and DOS FORTRAN F).

**HIGHLIGHTS**

- Support of the Standards language for FORTRAN (ANSI X3.9-1978 and ISO 1539-1980).
- Support for the American Standard FORTRAN, X3.9-1966.
- Support of the ANSI/ISA-S61.1-1976 Bit String Manipulation Functions.
- Support for the 31-bit addressing capabilities of MVS/XA.
- Major IBM extensions of current IBM OS/DOS FORTRAN compilers (i.e., OS FORTRAN G1, OS FORTRAN H Extended, the OS FORTRAN Mod II Library, DOS FORTRAN F and the DOS FORTRAN Option 1 Library).
- Support for VSAM ESDS and RRDS data sets and access to SAM Files in VSAM space via Basic Access Method.
- VM/370, DOS/VSE, SSX/VSE, MVS (with or without TSO), MVS/XA (with or without TSO/E), and VS1 support in a single product.
- Batch DEBUG.
- Symbolic batch dump.
- Cross compilation (VM/370, DOS/VSE, MVS and VS1).
- Free form source.
- Source code flagging for conformance to the Full or to the Subset new Standards language for FORTRAN (ANSI X3.9-1978 and ISO 1539-1980).
- Support of top-down programming by providing nested INCLUDE of source code.
- Source and object code compatibility with current IBM OS/DOS FORTRAN compilers: OS FORTRAN G1 (5734-FO2), OS FORTRAN H Extended (5734-FO3) and DOS FORTRAN F (360N-FO-479).
- Compiler and some Library routines are reentrant.
- Optimization levels 1, 2 and 3.
- Interactive Debug support is provided for VS FORTRAN with FORTRAN Interactive Debug (5734-FO5) Release 2.2.

**INDUSTRY STANDARDS**

VS FORTRAN is designed according to the specifications of the following industry standards as understood and interpreted by IBM as of April 1983:

- American Standard FORTRAN, X3.9-1966.
- International Organization for Standardization ISO R, 1539-1972 Programming Languages-FORTRAN.
- American National Standard Programming Language FORTRAN, ANSI X3.9-1978.
- International Organization for Standardization ISO, 1539-1980 Programming Languages - FORTRAN.
- ANSI/ISA-S61.1 1976 Bit String Manipulation Functions.

**SPECIAL CUSTOMER INFORMATION**

Support for the 1966 standard language will be provided until at least two years after initial shipment and may be discontinued by IBM upon twelve months' written notice. After discontinuance, only the new Standards language for FORTRAN (ANSI X3.9-1978 and ISO 1539-1980) and IBM extensions will be supported, and subsequent releases of the compiler may not offer the 1966 option.

**CUSTOMER RESPONSIBILITIES**

To install VS FORTRAN, the user:

- Chooses the default system parameters VS FORTRAN will use.
- Chooses the default compiler parameters for use during each problem program compilation.

- Defines VS FORTRAN libraries to the Operating System being used.
- Sets up and executes SMP4 (for MVS or VS1) or MSHP [for DOS/VSE or SSX/VSE (which uses installation prompters)] or VM/CMS EXECs provided (for VM/370) for compiler and library.
- Uses the sample program provided to test for successful installation.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The VS FORTRAN Compiler, Library and generated object modules are designed to operate on all models of the IBM S/370, IBM 30XX Processors and IBM 43XX Processors where supported by the operating systems listed in the "Software Requirements" section.

Under MVS and OS/VS1, IBM devices supported by access methods (BSAM, BDAM and VSAM) can be used by object modules produced by the VS FORTRAN Compiler when used in conjunction with the VS FORTRAN Library.

Under DOS/VSE with Advanced Functions, the VS FORTRAN device-independent interface supports IBM devices that are transparent through the VSAM interface, the SAM interfaces for non-DASD devices and the SAM/DAM device-independent interface provided by the Basic Access Method. For device and access method support in SSX/VSE, refer to SSX/VSE publications.

Not all features of every device are supported.

As a result of continuing enhancements, the VS FORTRAN Release 3.0 Compiler requires 980K of virtual storage (below the 16MB line) to handle a typical 100-statement FORTRAN source program; because the compiler is reentrant, a single copy can be used by multiple users. This 980K is for the compiler and its work areas only and does not include space for operating system overhead or other programs. Since VS FORTRAN does no page fixing, the minimum real storage for initiating a job is the only real storage requirement. No auxiliary storage is required as there are no work files used.

**SOFTWARE REQUIREMENTS**

The VS FORTRAN Compiler, Library and generated object modules run the current versions of VM/370 Release 6 (with or without VM/SP), VS1 Release 7, DOS/VSE with Advanced Function Release 3, SSX/VSE Release 2, MVS Release 3.8 (with or without TSO), MVS/SP Version 1 (with or without TSO), and MVS/XA (with or without TSO/E).

SMP4 (for MVS and VS1) or MSHP (for DOS/VSE) are required for installation. NOTE: VM/370 EXECs for installation are provided as part of VS FORTRAN for VM/370 users.

If VSAM sequential or relative record files are processed, one of the following programs is required:

1. Under VM/CMS - program number 5746-AM2
2. Under OS/MVS - program number 5752-VS2
3. Under OS/VS1 - program number 5652-VS1
4. Under DOS/VSE with Advanced Functions - program number 5746-AM2

If the VSE/VSAM feature for managed SAM space is used, then VSE/VSAM feature #6073 (for 1600 bpi) or #6074 (for 6250 bpi) is required.

**COMPATIBILITY**

Valid source statements written for current IBM OS/DOS FORTRAN compilers (i.e., G1, H Extended and F) are compiled correctly by VS FORTRAN using the 1966 level option. However, programs which use extended precision constants may not compile on DOS/VSE when using hardware without extended precision arithmetic.

Users may choose to compile existing source programs on either the 1966 language level or on the new language level. Language constructs that are supported only with the 1966 level do not compile using the new level option. Also, the new language provides different semantic meaning for some 1966 language constructs. The *Application Programming Language Reference* is supplied to define the incompatibilities between old language and new.

VS FORTRAN's 1966 language level was designed to adhere to the 1966 Standard. OS FORTRAN G1 and H Extended and DOS FORTRAN F are more forgiving of Standards violations. As a result, some invalid programs that run on OS G1, OS H Extended or F may not run on VS FORTRAN.

Current IBM OS/DOS FORTRAN customers may obtain the functions of the existing IBM OS/DOS FORTRAN compilers (i.e., OS FORTRAN G1, OS FORTRAN H Extended, the OS FORTRAN Mod II Library, DOS

## PROGRAM PRODUCTS

## VS FORTRAN R3 (cont'd)

FORTRAN F and the DOS FORTRAN Option 1 Library), except the following, by using the 1966 level option:

- The TSO "FORTRAN" command, which invokes the TSO FORTRAN Prompter in order to use FORTRAN G1, is not usable with VS FORTRAN. However, VS FORTRAN does run under TSO.
- The functions for bit handling, which are accepted (but not supported) by the FORTRAN H and FORTRAN H Extended compilers when the 'XL' compiler option is selected, are not allowed by VS FORTRAN.
- The automatic precision increase option, supported by FORTRAN H Extended, is not supported by the VS FORTRAN Compiler.

Upward compatibility of object modules generated from valid source programs is provided (i.e., such existing object modules can be link-edited together for execution with object modules produced by VS FORTRAN, and such object modules or new object modules can be executed with the new VS FORTRAN Library). In some cases, additional linkage editor control statements may be required (see *Application Programming Guide*). Processor options of current OS and DOS FORTRAN compilers have been consolidated wherever possible. Where two different option key words are used in OS and DOS for the same option, one common key word is used by the VS FORTRAN compiler. The following options are not supported by VS FORTRAN:

- BCD/EBCDIC - EBCDIC is assumed
- ANSF/NOANSF
- AUTODBL
- ALC/NOALC
- FORMAT/NOFORMAT
- XL

Differences exist between IBM FORTRAN H Extended bit functions and the ISA bit functions in VS FORTRAN. The FORTRAN H Extended bit functions work on logical and integer expressions of various lengths. The ISA functions work only on 4-byte integer expressions. The numbering mechanism for the bits for H Extended is such that bit 0 is the leftmost bit. For the ISA functions, bit 0 is the rightmost bit.

The subject of compatibility between releases of VS FORTRAN covers three aspects: Source programs are compiled into object modules, which when link-edited with the VS FORTRAN Library become VS FORTRAN load modules.

Valid source programs which compiled correctly on prior releases of VS FORTRAN will also do so on Release 3.0.

Existing object modules generated by previous releases of VS FORTRAN are compatible with object modules generated by Release 3.0 but must be link-edited together with the Release 3.0 library. Programs which have been compiled on previous releases of VS FORTRAN and which will be communicating with Release 3.0-compiled programs through CHARACTER arguments must be recompiled on Release 3.0 because of the change in parameter list format when CHARACTER arguments are being passed. Because of this change in passing arguments when CHARACTER data is involved, the SC compiler option will no longer be needed and will not be available.

Existing load modules which take advantage of the reentrant I/O library load module at a Release 2.0 level are compatible with the Release 3.0 reentrant I/O library load module. Those load modules using reentrant I/O modules at a level prior to Release 2.0 must be relinked with the Release 3.0 library.

**CONVERSION**

No conversion aids or other support are being provided to assist installations moving from current IBM OS/DOS FORTRAN products (i.e., OS FORTRAN G1, OS FORTRAN H Extended and DOS FORTRAN F) to VS FORTRAN due to the following:

- 1966 language option and new Standards language option.
- Source and object module compatibility.

**DOCUMENTATION**  
(available from Mechanicsburg)**VS FORTRAN:**

*Compiler and Library: General Information (GC26-3983) ... Program Directories ... Compiler and Library: Licensed Program Specifications (GC26-3984) ... Installation and Customization (SC26-3987) ... Application Programming Language Reference (GC26-3986) ... Application Programming Source-time Reference Summary (SX26-3731) ... Application Programming: Guide (SC26-3985) ... Application Programming: Library Reference (SC26-3989) ... Application Programming: System Services Reference Supplement (SC26-3988) ... Compiler and Library: Diagnosis (SC26-3980) ... IBM S/360 and S/370 FORTRAN IV Language (X3.9-1966) (GC26-6515) ... VS FORTRAN Enhancement Features (SR20-4722) ... VS FORTRAN Publications Master Index (SC26-4072).*

**MVS SYSTEM INTEGRITY:** Yes

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

## ELECTRONIC PAYMENT SYSTEMS SUPPORT/ CHECK REPORTS 5748-F13

### PURPOSE

Check Reports Release 1, Modification level 0 is a new tool for timely management decision making in a bank's check processing operation. The program generates a wide range of statistics, and computes a number of ratios, at a user-controlled frequency.

It is the intent of Check Reports to aid check processing management in its ongoing effort to improve personnel productivity, funds availability and machine utilization. A significant degree of automation in check processing has already been accomplished by two other IBM program products, and Check Reports carries this automation a step further. Either of the two program products serves as the base for Check Reports, depending on the user's operating system. These base program products are:

5734-F11 CPCS/3890: Check Processing Control System with the 3890 Feature, for OS/VS users;

5746-F12 DOSCHECK: Check Processing - DOS/VS, for DOS/VS users.

### DESCRIPTION

Utilizing the advanced functional capabilities of the IBM 3890 Document Processor, the base product controls the flow of checks and related documents through each day's full operating cycle. The cycle starts with the initial pass ("prime pass") through the 3890 which captures, sequence-numbers, microfilms and sorts the documents. The cycle ends with the creation of complete files, containing a record for each item processed. These files are known as the ICRE (Input Create) and MCRE (Master Create) files.

Check Reports, operating in batch mode, reads the ICRE and MCRE files at the completion of each day's processing, creates a data base and generates a set of reports.

Check Reports expands its data base with each day's processing until data for a user specified number of days has been recorded. Thereafter, the user can purge the data no longer required. This method of data management enables the user to request, in addition to his regular daily reports, special reports as needed, for any dates or periods (weeks or months) within the past year.

User exit interfaces in Check Reports facilitate the addition of user-supplied function, such as assignment of availability (float), and application split-out. A sample user-exit program is provided for the latter.

### HIGHLIGHTS

Check Reports include the following:

**Prime Pass Reject Analysis:** Rejects are related to total incoming volume, by data and source. Separate statistics are kept for on-us items. Rejects are summarized in seven error categories. Relative frequency of reject types is highlighted by percentages.

**Prime Pass Reject Reason Detail:** Based on user provided identification, reject counts and percentages can be generated in up to 50 reject reason categories. Examples: Missing amount field, P/C field invalid, account number unreadable. This report is the suggested tool for separating *physical* and *logical* rejects.

**Incoming Work and Funds Availability Analysis:** Item counts and dollar totals are tallied by date and time within source. Separate totals are provided for High Dollar Items, Credited Dollars and Reject Dollars. Float is summed, based on user input, in seven availability categories.

**Endpoint and Funds Availability Analysis:** Separate reports summarize item, bundle, dollar and availability totals by *cash letter*, and by *ABA number*. The latter gives the user the facility to scrutinize statistics for up to 12 ABA numbers or ABA groups associated with each endpoint. High Dollar and Low Dollar totals are individually summed.

**3890 Document Processor Performance:** Separate reports provide statistics on physical units, and their operators. The following is computed for each 3890: Hours in use, total documents, documents per hour, number of jams and jam time.

**OLRR Operator and Inscrber Operator Productivity:** Separate reports offer production statistics on the work of *OLRR* and *Inscrber* operators, with individual statistics for each operator.

Check Reports supplements the reporting function with two additional features:

**History Creation:** Each day's summary data remains accessible until purged by the user.

**Application Split-Out:** A user exit interface gives the application programs of the user the opportunity to create specialized subsets of the data, for the concurrent or subsequent processing of such applications as *DDA*, *Savings*, *General Ledger* and *Christmas Club*.

Check Reports includes a sample program to facilitate this process; the program creates a sample *Daily Balance Recap*.

Check Reports is responsive to unique user requirements, in that it provides several key options to the user:

**Source Specification and Grouping:** Sources may be *internal*, such as given branches, or teller stations, or inscribers or reader/sorters. They may be *external*, such as selected accounts, or commercial customers, or correspondents or other banks. They may be *grouped*, as well. For example, a *work unit* might be created which includes only a certain set of branch offices or correspondents, because statistics on these sources, viewed as a set, or group, are especially meaningful to the user.

**ABA Selection for Endpoint Analysis:** Check Reports will generate individual statistics for each specified ABA, immediately following the associated endpoint. ABAs may be grouped to permit a breakout by Federal Reserve district. Groups and individual ABAs may be mixed.

**Frequency Control:** User supplied control cards determine the frequency of each report. In addition to daily reports, the user can specify any given span of days for any given report, within the past year.

**High Dollar, Low Dollar Control:** To call *high* dollar items to special attention in both incoming work and endpoint analysis, and to further enhance endpoint analysis with *low* dollar statistics, the user can set his own thresholds for these controls, which can be instrumental in rescheduling work for optimal funds availability.

**Summary or Detail Option:** The user can elect either or both options with most reports. Summary reports combine data over the period specified. Detail reports furnish data at the lowest level of detail, which varies from report to report. A line item on a detail report may be, for example, an individual cash letter, an individual ABA number and associated statistics for a single day or reject analysis data for one source for one day.

### CUSTOMER RESPONSIBILITIES

To obtain full value from Check Reports, it is recommended that the user perform all of the following tasks, including those designated optional:

Write routines which provide the number of days availability (float) for each item, to the *Incoming Work Analysis* and *Endpoint Analysis* report programs. These routines are optional, but in their absence no float information will appear on these reports.

Modify the 3890 stacker select routine, to include the assignment of a specific reason code to each rejected document. This task is optional, but if the user wishes to expand general error *categories* (such as account number error) into specific *error types* (such as account number missing, invalid or unreadable), the task is necessary.

### Check Reports:

- Source names and identification codes for Reject Analysis and Incoming Work Analysis
- Titles for Reject Reason Codes
- Endpoint names and codes for Endpoint Analysis
- ABA Numbers and/or Groups for Endpoint Analysis
- High and Low Dollar Thresholds

Encode inscriber operator and machine identification into batch control documents.

Create and maintain the control deck for daily, and/or other periodic initiation of Check Reports. This is the vehicle for specifying all desired reports at the required frequency.

### SPECIFIED OPERATING ENVIRONMENT

A customer currently using CPCS/3890 or DOSCHECK, will already have met the system requirements for Check Reports.

### HARDWARE REQUIREMENTS

**Minimum Configuration:** Check Reports will operate on an IBM S/370 115 mdl G or larger, in a DOSCHECK environment, and on an IBM S/370 135 mdl HF or larger in a CPCS environment. In addition to the resource requirements of the operating system used, the following input/output device requirements apply:

Adequate DASD storage to contain the data files, work files and libraries used to install, maintain and operate Check Reports.

Two magnetic tape units for program installation and maintenance. A single tape unit is required for program execution.

A card reader for program installation and maintenance, and for program startup.

A 132-print-position line printer for installation and execution of Check Reports. The program supports one dedicated printer, or, if

## PROGRAM PRODUCTS

**Electronic Payment Systems Support/  
Check Reports (cont'd)**

operating under OS/VS or POWER/VS, the printer can be shared with jobs in other partitions.

The appropriate system configuration for each user is highly dependent on user volumes, processing techniques, and performance requirements. This configuration information is intended only as a guide. The IBM marketing representative can assist in detailed configuration planning.

**SOFTWARE REQUIREMENTS**

Check Reports is designed to work with either of these two program products:

5734-F11 CPCS/3890: Check Processing Control System with the 3890 Feature.

5746-F12 DOSCHECK: Check Processing - DOS/VS.

Check Reports, at any given time, will be compatible with the same operating system releases as CPCS/3890 and DOSCHECK. See the CPCS/3890 and DOSCHECK pages.

A customer currently using CPCS/3890 or DOSCHECK will have already met most of the Programming Systems requirements for Check Reports. Only these additional requirements remain to be met:

Virtual Storage Access Method (VSAM)  
Access Method Services  
OS/VS COBOL and OS/VS COBOL Library, for CPCS/3890  
DOS/VS COBOL and DOS/VS COBOL Library, for DOS CHECK

Languages used in Check Reports are COBOL and Assembler. The program is distributed in source form. SCP, data management and support programs, and access methods used are as follows:

In a CPCS/3890 environment:

OS/VS Assembler  
OS/VS Linkage Editor  
OS/VS COBOL  
OS/VS COBOL Library  
Virtual Storage Access Method (VSAM)  
Access Method Services  
Sequential Access Method (SAM)

In a DOSCHECK environment:

DOS/VS Assembler  
DOS/VS Linkage Editor  
DOS/VS COBOL  
DOS/VS COBOL Library  
Virtual Storage Access Method (VSAM)  
Access Method Services  
Sequential Access Method (SAM)

**COMPATIBILITY**

See "Software Requirements" for a discussion of CPCS/3890 and DOSCHECK compatibility.

**CONVERSION**

In preparation for conversion, the customer should perform all tasks as described under "Customer Responsibilities".

**PERFORMANCE CONSIDERATIONS**

The performance of Check Reports is dependent upon many factors, all of which are basically under the user's control.

The performance of VS operating systems in virtual mode is dependent upon such factors as the system resources available, the programs running concurrently and their priorities, the system and application data set placement, the system timing and the DASD devices.

Individual program performance is dependent on the user controlled retention period for the daily summary data saved by Check Reports, and the frequency of user-specified reports which require the access of a large portion of the retained data.

VSAM performance will vary with the processing options selected and the type of processing that occurs. All of these considerations should be given careful attention by the systems programmer at the user installation.

**DATA SECURITY**

Data security is the responsibility of the user. Users may want to restrict access to the check reports data base. VSAM provides password protection of files against unauthorized use of data. The passwords are specified when the file or catalog is defined.

MVS users may use VSAM password protection, or the Resource Access Control Facility (RACF).

## PROGRAM PRODUCTS

**CHECK PROCESSING EXECUTIVE/3694  
 CHX/3694 (5748-F53)**
**PURPOSE**

Check Processing Executive/3694 (CHX/3694) provides the application and device control functions for the 3694 Document Processor transport and operator interfaces.

**HIGHLIGHTS**

**PROOF OF DEPOSIT/INSCRIBING FUNCTION:** Provides for the proving (zero-balancing) and adjustment of deposits and Magnetic Ink Character Recognition (MICR) inscribing of items. Items are distributed to stackers under sort pattern control and optionally listed on distribution list printers. An audit trail for each item processed on the 3694 is printed on the 3694 Master List Printer. Data from the MICR code line and keyed data are captured on the 3694 diskette for later transmission to a Check Processing Executive/Virtual Storage (CHX/VS) program running on a host processor. (See Run Transmission Function.)

**DEFERRED DISTRIBUTION LIST FUNCTION:** Items previously captured on diskette can be listed on command using this function. The program reads items from the diskette and prints them on the assigned distribution list printer.

**MACHINE CLOSEOUT:** Provides information about the status of the machine (diskette) on the master list printer. Run summary information includes all machine counters (these show debit, credit and item transmission totals). A hard copy audit trail shows that the machine totals are in balance.

**RUN TRANSMISSION:** Provides for the transmission of the captured item data periodically during the day. Transmission frequency will be determined by the volume of items captured and by scheduling of transmission times at the CHX/VS location.

**FINE SORT:** Is used to sequence items into ascending sequence by key where the key is determined from the MICR codeline directly or by table lookup using the codeline data. Two sorting techniques are supported under fine sort: Digit-by-digit sorting (where one item pass is required per digit), and number conversion (where the key is examined as a whole, converted to a different base and a table is used to eliminate the effect of unused or unallocated numbers).

**MICROFILMING:** Optionally, full-function path and sorter-path items can be recorded on microfilm in duplex format. Frame marks ('Blips') are exposed on film, and the 12-digit item sequence number is also exposed on film.

**'PAID' STAMPING:** Any sorter-path run can be designated for face-cancelling items as 'PAID'.

**RUN DEFINITION:** Provides for end-user creation and maintenance of information pertaining to a machine run. Such information may include:

- Machine features to be active, such as
  - Sorter path/full-function path.
  - Item numbering.
  - Inscribing.
  - Microfilming.
  - 'PAID' Stamping.
- Application features
  - Pocket closeout thresholds.
  - Machine closeout counters.
  - Endpoint number assignment.
  - Identification of the user-written document validation exit routine to be used for on-us item editing.

**PRE-ENCODED CAPTURE FUNCTION:** Uses the 3694 sorter path, or full function path with inline corrections, to capture and process items that have been inscribed with MICR data. Inclearings can be processed using this function. Inclearings usually consist of fully inscribed debits that have been processed at other banks but which are drawn on-us.

**CORRECTIONS PROCESSING:** Complements the sorter path pre-encoded capture function by allowing rejected items to be entered into the system so that reconciliation can be performed. Non-readable rejects are rekeyed and re-edited. Captured data is inspected to determine which batches are out of balance. Exception master lists may be printed for each batch whose control amount still does not zero-balance to the captured item total. The operator can then locate errors and enter corrections for each error item.

**CYCLE SORT/EXCEPTION SPLIT:** Provides for document distribution under the control of a table supplied by the host. This function facilitates cycle sorting/bulk filing and enables the bank to separate stop-pay suspects and other exceptions identified by the host applications for manual review.

**STATEMENT PREPARATION SORT:** Provides for the fine sorting of items whose statement cycle has been selected. This function is used in

conjunction with Cycle Sort/Exception Split to facilitate bulk filing of items. Using a table of accounts for which statements have been prepared at the host system, the items corresponding to these statements are arranged in statement sequence.

In addition, when CHX/3694 is operating in a workstation which has a direct communication link to a host processor (as opposed to being attached to another 3694 or 3602 cluster coordinator), the following functions may be performed:

- 3262/3287 Printing - CHX/3694 supports either one 3287 printer or one 3262 mdl 3 or 13 line printer on a 3694 or 3602 communicating directly with an IBM System. Print line images sent from the host processor via OS/VS2 JES2 or JES3 or DOS/VSE VSE/POWER can be printed under operator control. This support is applicable to remote printing of various demand deposit accounting (and other host application) reports.
- Cycle Sort/Fine Sort Preparation - Cycle Sort/Fine Sort Preparation provides for the receipt of table data from the host for use in statement preparation fine sort.

When CHX/3694 operates as a cluster coordinator (3694 or 3602), it provides the following cluster control functions:

- Concentrated Data Transmission - manages the interface between the 3602 and up to eighteen attached 3694s, or between a 3694 and up to four additional attached 3694s. Using this function, data from clustered 3694 workstations can be transmitted through the cluster coordinator to the CHX/VS program in the host processor.
- Department (Cluster) Closeout - is analogous, at a cluster level, to Machine (Diskette) Closeout on a workstation level. Department closeout summarizes various data at the cluster level, including item counts, total debit/credit position and selected operational statistics. Individual machine closeouts must have been completed before the department closeout function can be performed.
- 3262/3287 Printing - CHX/3694 supports either one 3287 printer or one 3262 mdl 3 or 13 line printer on a 3694 or 3602 communicating directly with an IBM System. Print line images sent from the host processor via OS/VS2 JES2 or JES3, or DOS/VSE VSE/POWER can be printed under operator control. This support is applicable to remote printing of various demand deposit accounting (and other host application) reports.
- Cycle Sort/Fine Sort Table Distribution - Allows the cluster coordinator to route the table information to 3694s in the cluster. On demand, the table data is sent to the 3694 performing the sort function.

**CUSTOMER RESPONSIBILITIES**

To incorporate user-written document validation exit routines into CHX/3694, the user must have access to a system capable of assembling a program using the IBM 3694 Application MACRO Expansions program product; and 2) running the CHX/VS program product that processes the assembly output and transmits the result to CHX/3694.

Assembly of the CHX/3694 source programs (not required for creation of an operational diskette), requires a knowledge of the 3600 Finance Control Language (FCL) in addition to the preceding requirements.

For operation of CHX/3694, customers should follow procedures for program product initialization as specified in the *Program Reference Manual*. Users must supply appropriate parameters to tailor items such as the sort pattern to individual customer requirements. To operate CHX/3694, proof department personnel should be thoroughly familiar with the *3694 Operator's Handbook*.

**SPECIFIED OPERATING ENVIRONMENT**
**HARDWARE REQUIREMENTS**

CHX/3694 is designed to run in conjunction with Check Processing Executive/Virtual Storage (CHX/VS) (5748-F54).

To install and maintain CHX/3694, the following hardware is required:

- An IBM 3694

To execute CHX/3694, the following hardware is required:

- An IBM 3694
- An IBM 3705, or equivalent integrated communications adapter (only required for communicating to a host computer)

For optional host machine readable material the following hardware is required:

- An IBM processor supporting operation of DOS/VSE, OS/VS1, OS/VS2 (MVS) and the 3600 FCS Host Support program.
- Sufficient direct access storage for the Subsystem Support Services (SSS) libraries to contain the CHX/3694 object modules and 3694 controller data.

PROGRAM PRODUCTS

CHX/3694 (cont'd)

- One magnetic tape drive unit for installation of the program product.
- One IBM 3694 or 3602 capable of creating an operational diskette image.
- IBM 3705 Communications Controller, or equivalent integrated communications adapter, with storage and features capable of supporting the 3600 Host Support Services diskette creation function.

CHX/3694 supports four levels of operational diskette, three for use on an IBM 3694 and one for use on an IBM 3602. The following chart specifies the four levels and the models supported, required features, optional features, user storage required and control storage required.

Operational Diskette Level	Models Supported	Required Features	Optional Features	Req'd. Addnl. User Storage	Req'd. Addnl. Control Storage
Standalone	All	None	Up to 9 DLPs; Aux. Diskt; DCA; 3262/37; Microfilm; 'PAID' stamp*	None	None
Basic	All	None	Up to 9 DLPs; SDLC Com.; Aux. Diskt; DCA; 3267/87; Microfilm; 'PAID' stamp*	None	None
Cluster	All	SDLC Com.; DCA; CAF; Aux. Dskt; 3262/3287	Up to 9 DLPs; Microfilm; 'PAID' stamp*	1 Incr.	1 Incr.
3602	1A, 1B	SDLC Com.; DCA; Aux. Diskt; FCA; 3262/87	None	3 Incr.	3 Incr.

\* 'PAID' Stamp available only on 3684 mdl 2s, and requires Microfilm feature as a prerequisite.

Figure 1. Operational Diskette Levels Supported

Notes:

- 1-Incr. = Increment of Storage. For the 3694 Feature #1007 (Specify #9601 for Control Storage, #9602 for User Storage). For the 3602, storage features are dependent upon the machine configuration; refer to *IBM Finance Communications System Configurator (GA27-2762)*.
- 2-SDLC Comm = SDLC Communications, configuration dependent.
- 3-DCA = Device Cluster Adapter, Feature #3101.
- 4-CAF = Controller Attachment Feature, Feature #4401.
- 5-FCA = Fan Out Communications Adapter, and prerequisites.
- 6-DLP = Distribution List Printer.

To order one of the above pre-configured diskettes from PID, use the feature codes below:

Pre-configured Diskette	Feature No.
Standalone	#9445
Basic	#9145
Cluster	#9245
3602	#9345

To order optional source code for diskette creation together with a pre-configured diskette, select feature #7029 for 9/1600 M tape distribution, or #7031 for 9/6250 M tape.

To order optional source code for diskette creation without a pre-configured diskette, select feature #9001 together with #7029 or #7031 as appropriate.

User storage is used for various tables and user document edit routines required by CHX/3694 document processing functions. Sort pattern size is 7 bytes per routing - transit table entry. The maximum user edit

routine plus the maximum sort pattern size must be smaller than 10K bytes.

SOFTWARE REQUIREMENTS

For installation of the CHX/3694 diskette, or execution of CHX/3694, there are no additional programming requirements. The diskette received from PID is loaded in the primary drive, and the IML operation performed.

To implement a user validation exit routine for use by CHX/3694 during document processing applications, the user may employ the IBM 3694 Application Macro Expansions program product (5748-F56).

For creation of an operational CHX/3694 diskette from the optional tape, and for communicating to the host, the host system requires programming systems as follows: DOS/VSE, OS/VS1 (Release 7), or OS/VS2 (MVS Release 3.8) and subsequent operating system releases, unless otherwise identified. In addition, the following components are required:

- DOS/VSE (DOS/VS Extended).  
Either  
- ACF/VTAME (5746-RC7)  
Or  
- Advanced Communications Function for NCP/VS (ACF/NCP/VS), (5735-XX1) and ACF/VTAM Release 2 (5746-RC3)  
- VSE/VSAM (5746-AM2).  
- 3600 Finance Communication System Host Support Independent Release 7.0 (5747-BR1).  
- 3694 Application Macro Expansions (5748-F56)
- OS/VS  
- Advanced Communications Function for NCP/VS (ACF/NCP/VS) (5735-XX1).  
- Advanced Communications Function for VTAM (ACF/VTAM), (5735-RC2).  
- 3694 Host Support Independent Release 7.0 (5748-F56).  
- 3694 Application Macro Expansions (5748-F56).

In addition, for creation of the operational diskette from the optional tape, Subsystem Support Services (SSS) is required.

COMPATIBILITY

For inbound (to the host) data transmission and outbound transmission of cycle sort, exception split and statement preparation tables, CHX/3694 is compatible with Check Processing Executive/Virtual Storage (CHX/VS). For outbound (from the host) data transmission, CHX/3694 is compatible with JES2, JES3 and VSE/POWER for the purpose of printing on either a 3287 or 3262 printer attached to a 3694 or 3602.

DATA SECURITY

While ultimate responsibility for security of MICR documents and captured data rests with the customer, CHX/3694 provides for the tracking of all item data changes and corrections, as well as all data transmissions on the 3694 master list printer. Operator identification is associated with all captured data for auditing purposes. Communication sessions may be validated at the CHX/VS processor location through the use of customer-written installation authorization exit routines (an ACF/VTAM facility).

PERFORMANCE CONSIDERATIONS

Document throughput of the 3694 under CHX/3694 control is dependent on the following:

- Operator keying rate.
- Operator document feeding rate.
- Number of out-of-balance conditions.
- Time required to resolve out-of-balance conditions.
- Length of documents (for automatic feed).
- Number of operator interventions due to items such as:  
Pocket-full conditions,  
Hopper-empty conditions,  
Jams.

DOCUMENTATION: (available from Mechanicsburg)

General Information Manual

**CHECK PROCESSING EXECUTIVE/VIRTUAL STORAGE  
CHX/VS REL.1 (5748-F54)****PURPOSE**

Check Processing Executive/Virtual Storage (CHX/VS) provides host support for transmission of document data captured at an IBM 3694 Document Processor. Additionally, CHX/VS provides a Cycle Sort/Statement Preparation Fine Sort interface to support the related application facilities of Check Processing Executive/3694 (CHX/3694).

CHX/VS may be used to communicate with CHX/3694 (5748-F53) operating in either individual 3694s or in a 3694 or 3602 operating as a cluster coordinator.

**HIGHLIGHTS**

CHX/VS provides for the receipt and acknowledgement of 3694-transmitted data streams and conversion to user input format.

Using the Virtual Telecommunications Access Method (VTAM), application data (images of documents captured at the 3694) are received, stored on the CHX/VS data base by run, and balanced. Balancing a run involves accumulating control totals during the transmission and comparing those totals to control totals sent from the 3694 in the input stream. An extract facility is provided to reformat captured run data into files comparable to the Input Create files produced by CPCS (5734-F11) and DOS/CHECK (5746-F12). A log file is maintained to provide reconstruction facility for the CHX/VS data base. CHX/VS prepares a network activity journal file which records online event information.

The Cycle Sort/Statement Preparation Fine Sort function provides an interface for user-written host application programs to provide Cycle Sort/Exception data and Statement Preparation Fine Sort data to CHX/3694. Data supplied in the specified format is processed by CHX/VS and the appropriate tables are transmitted to the specified 3694 or 3602 so that the Cycle Sort and Statement Preparation Fine Sort applications can be run.

**CUSTOMER RESPONSIBILITIES**

CHX/VS will usually be installed in conjunction with CHX/3694. *Program Reference and Operations Manual (CHX/VS)*, and *Program Reference Manual (CHX/3694)* should be read and followed during the installation. User programming may be required to conform to the CHX/VS cycle sort/statement preparation fine sort interface requirements. To operate CHX/VS at the host site, operations personnel should be thoroughly familiar with the *CHX/VS Program Reference and Operations Manual*.

**SPECIFIED OPERATING ENVIRONMENT**

CHX/VS is designed to operate in conjunction with the IBM CHX/3694 program product operating in an IBM 3694 or 3602.

**HARDWARE REQUIREMENTS**

The program product requires the following host system configuration:

- Any IBM system having the minimum requirements for DOS/VSE, OS/VS1 or OS/VS2 (MVS) and a virtual partition of 256K to support operation of CHX/VS programs, ACF/VTAM and VSAM.
- Any direct access storage device supported by DOS/VSE, OS/VS1 or OS/VS2 (MVS) for storage of application data.
- A magnetic tape drive unit for installation of the program product.
- IBM 3705 Communications Controller with storage and features capable of supporting ACF/NCP/VS or a comparable integrated communications adapter.
- Availability of a local or remote 3270 display for supervision/control function (CHX/VS does not require a dedicated CRT).

**SOFTWARE REQUIREMENTS**

CHX/VS requires the following programming systems. CHX/VS operates under DOS/VSE, OS/VS1 (Release 7), OS/VS2 (MVS Release 3.8) and subsequent operating system releases unless otherwise identified. In addition, the following components are required:

- DOS/VSE (DOS/VS Extended).  
Either
  - ACF/VTAME (5746-RC7).Or
  - Advanced Communications Functions for NCP/VS (ACF/NCP/VS), (5735-XX1) and ACF/VTAM Release 2 (5746-RC3).
  - VSE/VSAM (5746-AM2).

In addition, the following must be available to prepare CHX/3694 user edit routines which CHX/VS will transmit to the 3694:

- 3600 Host Support Independent Release 7.0 (5747-BR1).
- 3694 Application Macro Expansions (5748-F56).
- OS/VS.
  - Advanced Communications Functions for NCP/VS (ACF/NCP/VS), (5735-XX1).
  - Advanced Communications Functions for VTAM (ACF/VTAM), (5735-RC2).

In addition, the following must be available to prepare CHX/3694 user edit routines which CHX/VS will transmit to the 3694:

- 3600 Host Support Independent Release 7.0 (5744-CA3).
- 3694 Application Macro Expansion (5748-F56).

**DATA SECURITY**

CHX/VS uses ACF/VTAM functions to communicate with the CHX/VS control terminal. The customer may provide an installation exit routine to ACF/VTAM to perform security/validation checking of the CHX/VS control terminal LOGON requests.

**PERFORMANCE CONSIDERATIONS**

The performance of CHX/VS is dependent on system resources that are available (including types and models of supported I/O devices, and telecommunication line speeds), paging characteristics, concurrent processing and the particular data being processed.

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual*

**MVS SYSTEM INTEGRITY APPLIES:** Yes



PROGRAM PRODUCTS

**3600 ADMINISTRATIVE APPLICATION SUPPORT  
5748-F55**

**DESCRIPTION**

The IBM 3600 Administrative Application Support program product is a Finance Communication System (FCS) application program which executes in a 3601 or 3602 and provides field oriented operation on the 3604-7 or the 3278-2 attached via the Device Cluster Adapter (DCA 3278). The program supports SLU type 2 communication protocol (SNA 3270) and 3270 formatted datastreams to/from the user host application programs. Local print support is provided to allow printing the display image on a 3615 Administrative Printer.

Use of the 3600 Administrative Application Support program allows existing user applications written for the 3270 keyboard display under CICS/VS or IMS/VS to be implemented on a 3600 FCS without modification to host programs.

**HIGHLIGHTS**

The program uses the facilities of the Datastream Mapping Macros (DATSM) provided in the 3600 FCS Host Support Programs to provide the following functions:

- Simulate 3270 command orders received from the host.
- Simulate 3270 function keys.
- Simulate 3270 program function keys and program access keys.
- Simulate 3270 attribute byte processing.
- Maintain a screen image buffer.
- Provide the capability of displaying a datastream formatted for a device of one screen size on a device having different screen dimensions (windowing).

In addition to the 3270 commands and function keys simulated via the use of the DATSM macros, the following functions are provided:

- Print the screen image on an available 3615 printer.
- Position cursor to first unprotected field on the screen.
- Enter command processing mode.

The following standard command processing routines are provided:

- Change window parameters.
- Logon
- Logoff
- Send a message to another workstation.
- Enter date and time information.
- Return

The 3600 Administrative Application Support program may be tailored at assembly time by specifying the following options:

- Add user command processing routines.
- Modify message text produced by the program.
- Specify LOGON requirements.
- Define user fields, constants and equate values.
- Specify whether or not printer support should be available.
- Specify user exits.

User exits may be defined at appropriate points in the program to allow inclusion of user written routines to accomplish the following:

- Inclusion of constant data fields or format data into the screen image buffer from sources other than the datastream sent from the host.
- Editing of operator keyed data field.
- Verifying time and date entered by the operator.
- Verifying LOGON information.

**CUSTOMER RESPONSIBILITIES**

The user must provide host application programs written for SNA 3270s to interface with the 3600 Administrative Application Support program.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum Finance Communication System consists of the following configuration:

- IBM 3601 or 3602 Finance Communication Controller with a minimum of 24K of user programmable storage.
- IBM 3604 Keyboard/Display or DCA 3278.

Primary keyboard/display support is for the 3604-7 or DCA 3278. Other mds of the 3604 are supported via the windowing facilities of the program.

The program product is designed to support one workstation (3604-7 or DCA 3278) in 24K bytes of user programmable storage. Each additional workstation will require approximately 6K bytes of storage. The screen image buffer (approximately 2K bytes) may reside in expanded user storage.

In order to create an operational diskette the following minimum host system is required:

- A S/370, 3031, 3032, 3033 or 4300 processor with at least 512K bytes of virtual storage for DOS/VS or 768K virtual storage for OS/VS1 or OS/VS2 MVS.
- A Direct Access Storage Device supported by DOS/VS, DOS/VSE, OS/VS1, OS/VS2 MVS, Subsystem Support Services and the Host Support for IBM 3600 Finance Communications System.
- A card read/punch device supported by DOS/VS, DOS/VSE or OS/VS
- One Magnetic tape drive unit for installation of the program product.
- An IBM 3704 or 3705 Communication Controller with storage and features capable of supporting NCP/VS.

**SOFTWARE REQUIREMENTS**

The 3600 Administrative Application Support program requires the programming systems listed below. To assemble and transmit the application program to the 3600 Controller, the user should have installed a current release of one of the following operating systems:

- Disk Operating System (DOS/VS) (5745-010)
- Disk Operating System Extended (DOS/VSE) (5745-020)
- Operating System (OS/VS1) (5741-VS1)
- Operating System (OS/VS2 MVS) (5752-VS2)

Additionally, the latest applicable releases of the following components at the time of availability are required:

**DOS/VS or DOS/VSE**

- Assembler - (5745-SC-ASM)
- Network Control Program/VS (NCP/VS) (5747-AJ2) or (ACF/NCP/VS) (5735-XX1)
- Virtual Telecommunications Access Method (VTAM) (5745-SC-VTM) or (ACF/VTAM) (5746-RC3) or (ACF/VTAME) (5746-RC7)
- Virtual Sequential Access Method (VSAM) (5745-SC-VSM) or (VSE/VSAM) (5746-AM2)
- Access Method Services (5745-SC-AMS)
- Host Support for IBM 3600 Finance Communications System (DOS/VS) (5747-BR1)
- Subsystem Support Services (SSS) (5747-CC6)

**OS/VS1 or OS/VS2 MVS**

- Assembler XF (5741-SC1-03 or 5752-SC1-03)
- Network Control Program/VS (NCP/VS) (5744-BA2) or (ACF/NCP/VS) (5735-XX1)
- Virtual Telecommunications Access Method (VTAM) (5741-SC1-23 or 5752-SC1-23) or (ACF/VTAM) (5735-RC2) or Telecommunications Access Method (TCAM) (5741-SC1-21 or 5752-SC1-21) (ACF/TCAM) (5735-RC3)
- Virtual Sequential Access Method (VSAM) (5741-SC1-DE or 5752-SC1-DE)
- Host Support for IBM 3600 Finance Communications System (OS/VS) (5744-CA3)
- Subsystem Support Services (SSS) (5741-SC1-SS or 5752-SC1-SS)
- Access Method Services (5741-SC1-DK or 5752-SC1-DK)

User written host application programs which interface with the 3600 Administrative Application Support program may execute under one of the following DB/DC program products:

- Information Management System (IMS/VS) (5740-XX2) with the DC feature
- Customer Information Control System (CICS/OS/VS) (5740-XX1)
- Customer Information Control System (CICS/DOS/VS) (5746-XX3)

**COMPATIBILITY**

The 3600 Administrative Application Program is compatible with the SNA 3270 SLU type 2 support provided by the following program products:

- Information Management System (IMS/VS) (5740-XX2) with the DC feature
- Customer Information Control System (CICS/OS/VS) (5740-XX1)
- Customer Information Control System (CICS/DOS/VS) (5746-XX3)

The user must provide host application programming to interface with the 3600 Administrative Application Support program. The program is compatible with the following IBM host application program products:



PROGRAM PRODUCTS

**3600 Administrative Application Support (cont'd)**

**Customer Information Facility/VS**

- Using CICS/DOS/VS (5746-XXS)
- Using CICS/OS/VS (5740-XYC)
- Using IMS/VS (5740-XYB)

User written VTAM or TCAM host application programs will interface with the 3600 Administrative Application Support program if the communication protocol and 3270 datastreams produced are equivalent to IMS/VS-MFS or CICS/VS-BMS implementation of SLU Type 2 (SNA 3270) support.

**PERFORMANCE CONSIDERATIONS**

The performance of a 3600 FCS application is dependent on the resources available in the controller such as number and speed of loops, host link speed, number of active workstations, etc. Performance will also be affected by the host application programs and the host system resources available.

**MVS INTEGRITY**

IBM will accept APARs describing any situation where the installation of the 3600 Administrative Application Support program causes an exposure to the system integrity of MVS. However, the 3600 Administrative Application Support program is not intended to run in an authorized state at any time and should therefore represent no threat to the system integrity of MVS.

**DOCUMENTATION: (available from Mechanicsburg)**

- |                                    |             |
|------------------------------------|-------------|
| General Information Manual         | (GH20-2414) |
| Licensed Program Design Objectives | (GH20-5052) |

**IBM 3694 APPLICATION MACRO EXPANSIONS  
VER. 1 MOD. LEVEL 1 (5748-F56)****PURPOSE**

This licensed program contains the 3694 Application Macro Expansions. These macro definitions can be utilized, in conjunction with the 3600 Finance Communications Assembler Language (through host processor assembly), in a user supplied application program to generate instructions which, when executed in the 3694 Document Processor mdl 1 or 2, perform the following document processing functions:

- 3694 Initialization.
  - High or low speed.
  - Autofeed or manual feed.
- Operational control.
  - Start/stop transport.
  - Pause/resume feed.
  - Clear transport.
  - Write indicators.
  - Dispatch/stop document control section.
- 3694 Document Control Section.
  - Logical and arithmetic operations.
  - Branch on condition.
  - Numeric base conversion.
  - Image matching.
  - Modulus checking.
  - Data movement.
  - Read document data.
  - Release document.
  - Scan a field on a document.
  - Search field for digit error.
  - Pocket selection.
  - Table lookup.
  - Chain for input data.
  - Wait for input data.
  - Write to Master list printer.

**HIGHLIGHTS**

Some of the application functions that can be performed using these instructions include:

- 3694 Full Function Path Operation (3694 mdls 1A-1D and 2A-2D).
  - Read the document (MICR) data input.
  - Read the keyboard data input.
  - Validate the input.
  - Perform inflight processing.
  - Create multiple output records.
  - Write to the master list printer.
  - Inscribe a document.
  - Endorse a document.
  - Item Identification control and printing.
  - Pocket selection.
  - Microfilming.
- High Speed Path Operation (3694 mdls 2A-2D).
  - Read MICR data input from document.
  - Validate input.
  - Inflight processing preparation.
  - Item Identification Control.
  - Pocket selection.
  - Microfilming.
  - 'PAID' Stamping.

**CUSTOMER RESPONSIBILITIES:**

The customer is responsible for installing the 3694 Application Macro Expansions licensed program product, and implementing appropriate security procedures through programming and physical control methods.

**SPECIFIED OPERATING ENVIRONMENT****SOFTWARE REQUIREMENTS**

**Host Programming Requirements:** The 3694 Application Macro Expansions licensed program requires the same operating systems prerequisites and Host Programs which are required by the 3600 Independent Release 6.0 (IR/6.0).

In addition, the following are also required:

3694 Ind. Rel. 1.0

3600 Host Support Independent Release 6.0:

5747-BR1 DOS/VS (Version 6)

5744-CA3 OS/VS (Version 5)

**DOCUMENTATION:** (available from Mechanicsburg)

*3694 Application Macro Expansions Licensed Program Summary (GC31-0011) ... 3694 Application Macro Expansions Licensed Program Specification (GC31-0012) ... IBM 3694 FCS 3694 Programmer's Guide (GA23-0027) ... IBM 3600 System Summary (GC27-0001) ... IBM 3600 FCS Host Services User's Guide (GC22-9056).*

**RPQs ACCEPTED:** No



PROGRAM PRODUCTS

**5748-MS1 - INT. PROD. FAC. VM ENV. R3.0**  
**INTERACTIVE PRODUCTIVITY FACILITY**  
**VM ENVIRONMENT**  
**RELEASE 3 Modification Level 0**

**PURPOSE**

The Interactive Productivity Facility is designed to simplify the tasks and increase the productivity of those who use and manage IBM computer resources. Release 3.0 of Interactive Productivity Facility is specifically designed to assist users of the VM/SP System Installation Productivity Option/Extended (VM/SP System IPO/E) by providing the user a simplified and productive interface to VM/370 systems.

**SPECIAL SALES INFORMATION**

Release 3.0 of the Interactive Productivity Facility is designed to run in the VM/SP System IPO/E environment.

The Interactive Productivity Facility is included in the base of the VM/SP System IPO/E. It is recommended that it not be used outside this environment. However, if ordered independently, installation instructions are provided.

**HIGHLIGHTS**

- Interactive user interface with the system via display panels.  
Using facilities of CMS in the VM environment, the Interactive System Productivity Facility provides a simplified interface to users. The interactive interface is provided via structured menu panels that guide the user in the selection of activities that lead to the execution of system functions.
- Prompting for input parameters.  
Data entry panels prompt the user for the parameters required for the execution of system functions.
- Simplified procedures to invoke program products and product functions.  
After prompting the user for the required parameters, the Interactive Productivity Facility transfers the prompted information into the appropriate system input format and invokes the necessary system functions.
- Interactive explain service.  
To assist the new or infrequent system user, explanatory information is provided online.
- VM/SP System IPO/E Environment.  
The Interactive Productivity Facility, a licensed program, is part of the VM/SP System IPO/E environment.

**INTERACTIVE PRODUCTIVITY FACILITY CONTENT**

The Interactive Productivity Facility is composed of the following components:

1. Dialog Manager  
The Dialog Manager, running under CMS, provides the basic functions required to control the user interface and the execution of dialogs.
2. Executable Dialogs  
Consisting of:
  - Menu, data entry, explain panels
  - Control statement files
  - Function routines that:
    - Display panels
    - Analyze user input
    - Invoke CP/CMS commands
3. EXECs to perform selected tasks are supplied by Interactive Productivity Facility for the following programs. See "Installation and Use Considerations."

<b>A.</b>	<b>VM/SP System IPO/E Base Programs</b>	<b>Number</b>	<b>Rel. Level</b>
	VM/370	5749-010	6.0
	VM/System Product	5664-167	1.1
	VM/IPCS Extension	5748-SA1	2.0
<b>B.</b>	<b>VM/SP System IPO/E Optional Programs</b>	<b>Number</b>	<b>Rel. Level</b>
	IIPS	5668-012	1.0
	COBOL (OS)	5740-CB1	2.3
	COBOL Int. Debug	5734-CB4	1.4
	RPG II	5746-RG1	3.0
	PL/I Opt. Comp. & Libs. (OS)	5734-PL3	3.1
	PL/I Opt. Comp.		

(OS)	5734-PL1	3.1
PL/I Res. Lib. (OS)	5734-LM4	3.1
PL/I Trans. Lib. (OS)	5734-LM5	3.1
EP/VS (OS)	5744-AN1	3.0
VS APL	5748-AP1	4.0
DMS/CMS	5748-XXB	1.0
FORTTRAN (G1)	5734-FO2	2.0
FORTTRAN (Mod.II) Lib.	5734-LM3	2.3
FORTTRAN Int. Debug	5734-FO5	2.1
VS BASIC	5748-XX1	3.0
PLANCODE/I	5740-XX8	2.2
VM/Performance Monitor		
Analysis	5798-CPX	3.5
Doc. Comp. Facility	5748-XX9	2.0
RSCS Networking	5748-XP1	2.0
VSE/VSAM	5746-AM2	2.0
VM/IFS	5748-XXC	1.0
VM/Directory Maintenance	5748-XE4	1.0
GDDM (with PGF)	5748-XXH	1.0
VM/Pass Through Facility	5748-RC1	1.0

<b>C.</b>	<b>VM/SP System IPO/E Documented Support Programs</b>	<b>Number</b>	<b>Rel. Level</b>
	A Departmental Reporting System II	5796-PLN	1.4
	APL/Data Interface II	5796-PNG	1.4
	APL Extended Editor & Full Screen Manager	5796-PLY	1.3
	Financial Planning Sys. II	5798-DCN	1.3
	Query-by-Example	5796-PKT	1.7
	STAIRS/CMS	5785-CAH	1.1

**Note:** The above programs, referred to as Documented Support programs, have been installed and their IVPs are run as part of the overall VM/SP System IPO/E environment. However, they are ordered independently of the VM/SP System IPO/E.

4. User's Guide  
Documentation, available in hardcopy, machine-readable form and microfiche that describes how to use the Interactive Productivity Facility in the VM environment.
5. Program Logic Manual  
Documentation, available in microfiche form, that describes the function and interfaces of the Interactive Productivity Facility in the VM environment.

**SPECIFIED OPERATING ENVIRONMENT**

The following is the Specified Operating Environment for the Interactive Productivity Facility:

**HARDWARE REQUIREMENTS**

The Interactive Productive Facility is designed to operate with the following minimum hardware configurations when required for the full function offered by the Interactive Productivity Facility for all licensed programs supported:

- Processors:** IBM S/370, 303X, 4300 \*, or 3081 supported by VM/SP that meet the minimum processor storage requirements described below.
- Terminals:** One IBM 3277-2 or one 3278-2.
- Printer:** One printer supported by the operating system.
- Tape:** One tape drive supported by the operating system.
- Reader:** None.

<b>Processor Storage:</b>	<b>0.5MB *</b>
DASD:	
3310	3
3330	3
3340	3
3350	2
3370 **	2
3380 **	4

\* Installation of Interactive Productivity Facility on the .5 megabyte 4331 Processor requires the Control Storage Expansion optional feature (#1901). This requirements is based on the VM/370 minimum processor storage size of 384K bytes needed to IPL. If 3340 DASD devices are attached to the 4331 Processor, a minimum processor storage size of 1.0 MB is required.

\*\* Indicates number of actuators.

PROGRAM PRODUCTS

**Interactive Productivity Facility VM Environment R3  
(cont'd)**

**SOFTWARE REQUIREMENTS**

The Interactive Productivity Facility is designed to operate with the following products.

Program Name	Number	Rel. Level
VM/370	5749-010	6.0
VM/System Product	5664-167	
VM/IPCS Extension (Note1)	5748-SA1	2.0

Note 1: VM/IPCS Extension contains functions necessary to execute the problem reporting procedures generated by Interactive Productivity Facility.

**INSTALLATION and USE CONSIDERATIONS**

It is recommended that Release 3.0 of the Interactive Productivity Facility be installed and used in the VM/SP System IPO/E environment. The VM/SP System IPO/E provides an environment in which the device addresses and library and space allocation (system structure) are specified to conform with those that Interactive Productivity Facility functions expect. A description of this environment is found in the *VM/SP System IPO/E Planning Guide* (GC20-1874). If installed and used independently, the dialogs and EXECs dependent upon VM/SP System IPO/E structure may be invalidated unless the system structure is defined as found in the *VM/SP System IPO/E Planning Guide*. To use the Interactive Productivity Facility optional feature install function to install the licensed programs listed in 3B, those programs must be ordered in the VM/SP System IPO/E format.

**DATA SECURITY**

Customers using Interactive Productivity Facility can use the security facilities provided by CMS in the VM environment. The customer is responsible for the selection, implementation and adequacy of these facilities.

**DOCUMENTATION**  
(available from Mechanicsburg)

The following documentation will be available concurrent with program availability:

*Interactive Productivity Facility Dialog Manager Logic Flow* (ZZ20-4611) ... Microfiche (LYB0-2477) containing Interactive Productivity Facility Logic Flow, Dialog Panels and *User's Guide* ... Microfiche (LYB0-2478) containing Interactive Productivity Facility Dialog Manager source listings ... Interactive Productivity Facility Program Function Key Template for 3277 (SX20-2388) or 3276/3278 (SX20-2389) ... *Interactive Productivity Facility - VM Environment, Licensed Program Specifications* (GH20-5304).

**Related Publications:** The following are new with this release and will be available prior to or concurrent with program availability:

*VM/SP System IPO/E General Information Manual* (GC20-1890) ... *VM/SP System IPO/E Planning Guide* (GC20-1874) ... VM/SP System IPO/E and Interactive Productivity Facility Reference Summary Card (GX20-2387).

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**5748-MS1 - INT. PROD. FAC. VSE, VM/VSE R4.0  
INTERACTIVE PRODUCTIVITY FACILITY  
VSE ENVIRONMENT RELEASE 4.0  
VM/VSE ENVIRONMENT RELEASE 4.0**

**PURPOSE**

The Interactive Productivity Facility Release 4.0 (VSE, VM/VSE Environments) is designed to simplify the tasks and increase the productivity of those who use and manage IBM computer resources. Release 4.0 of Interactive Productivity Facility is specifically designed to assist users of Release 3.0 of System Installation Productivity Option/Extended (VSE System IPO/E) by providing the user a simplified and productive interface to VSE systems.

**SPECIAL SALES INFORMATION**

Release 4.0 of the Interactive Productivity Facility (VSE, VM/VSE Environments) is designed to operate in the VSE System IPO/E Release 3.0 environment.

**HIGHLIGHTS**

- Interactive user interface with the system via display panels.  
Using facilities of VSE/ICCF in the VSE environment, the Interactive Productivity Facility provides a simplified interface to users. The interactive interface is provided via structured visual display menu panels that guide the user in the selection of activities that lead to the execution of system functions.
- Prompting for input parameters  
Data entry panels prompt the user for the parameters required for the execution of system functions.
- Simplified procedures to invoke products and product functions.  
After prompting the user for the required parameters, the Interactive Productivity Facility transfers the prompted information into the appropriate system input format and invokes the necessary system functions.
- Interactive explain service  
To assist the new or infrequent system user, explanatory information is provided online.
- VSE System IPO/E Environment  
The Interactive Productivity Facility (VSE Environment), a licensed program, is part of the VSE System IPO/E.

The Interactive Productivity Facility is included in the base of each System IPO/E. It is recommended that it not be used outside this environment. However, if ordered independently, installation instructions are provided.

**INTERACTIVE PRODUCTIVITY FACILITY CONTENT**

The Interactive Productivity Facility has the following components:

1. Dialog Manager  
The Dialog Manager, running under VSE/ICCF or VM/SP CMS, provides the basic functions required to control the user interface and the execution of dialogs. The dialog manager is shipped in the VM Environment and the VSE environment. The VM/VSE Environment in Release 4.0 is designed to run in conjunction with the VM Environment and to use its dialog manager.
2. Executable Dialogs  
The executable dialogs consist of:
  - Menu panels that guide the user in selecting activities to be performed.
  - Data entry panels that guide the user in supplying the required information to execute system functions.
  - Explain panels that provide additional information for the new or infrequent user.
  - Skeleton JCL to which user-provided information is added for execution of system functions.
  - Function routines that:
    - Display panels
    - Analyze user input
    - Assign values to JCL parameters
    - Create executable JCL
3. Executable jobstreams to perform selected tasks are supplied by the Interactive Productivity Facility for the following products. Also, see "Installation and Use Considerations."

A. System IPO/E Base Programs	Number	Rel. Level
DOS/VSE SCP	5745-030	3.0
Device Support Facility	5747-DS2	4.0
VSE/Advanced Functions	5746-XE8	3.0
VSE/POWER	5746-XE3	2.0
VSE/VSAM	5746-AM2	2.0
VSE/IPCS	5746-SA1	3.0
CICS/VS	5746-XX3	1.5
DL/I DOS/VS	5746-XX1	1.6
VSE/ICCF	5746-TS1	3.0

B. System IPO/E Optional Programs	Number	Rel. Level
ACF/NCP/VS	5735-XX1	2.1
+ SSP for ACF/NCP/VS	5735-XX3	2.1
+ NCP/SSP SCP	5747-CH1	2.1
+ EP feature #6004	5747-CH1	2.1
ACF/VTAM	5746-RC3	3.0
+ VTAM SCP	5747-CF1	3.0
ACF/VTAME	5746-RC7	1.0
+ VTAM SCP	5747-CG2	1.0
BTAM-ES	5746-RC5	1.0
+ BTAM SCP	5747-CG1	1.0
Data Dictionary	5746-XXC	3.0
EP/VS (DOS)	5747-AG1	3.0
Sort/Merge II	5746-SM2	4.0
VSE/Access Control Logging & Reporting	5746-XE7	1.0
VSE/DITTO	5746-UT3	2.0
VSE/Fast Copy	5746-AM4	1.0
VSE/OCCF	5746-XC5	1.0
VSE/POWER/RJE	5746-XE3	2.0
VSE/POWER Shared Spool Feature	5746-XE3	1.0
VSE/VSAM Backup/Restore Feature	5746-AM2	2.0
VSE/VSAM Space Management for SAM feature	5746-AM2	Note 1

Note 1: There is no release designation for this feature.

**4. Documentation**

Documentation will be available in hardcopy, machine-readable, or microfiche that describes how to use the Interactive Productivity Facility in the VSE/ICCF and VM/SP CMS environments.

The following manuals will be available:

Name	Order Number
Interactive Productivity Facility General Information Manual	GH20-2492
User's Guide	SH20-5526
Reference Manual	SH20-2486
Program Directory	(shipped with product)
VM/VSE Feature Program Directory	(shipped with product)

A program logic manual will be available in microfiche form and hardcopy. It describes the function and interfaces of the Interactive Productivity Facility dialog manager in the VSE environment.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Interactive Productive Facility is designed to operate with the following minimum hardware configurations when required for the full function offered by the Interactive Productivity Facility for all licensed programs. Additional requirements may exist for hardware system service.

- Processors  
IBM S/370, 303X, and 4300 supported by VSE that meet the minimum processor storage requirements described below.
- Processor Storage

The minimum processor storage requirements are shown below:

	VSE Environment	VM/VSE Environment
B/I (1)	1.0 MB	1.0 MB (2)
DC (1)	1.0 MB	2.0 MB
DB/DC (1)	1.0 MB	2.0 MB

**Interactive Productivity Facility -VSE, VM/VSE R4 (cont'd)**

Figure 1. Minimum Processor Storage Requirements

Note 1: Batch/Interactive (B/I)  
Data Communication (DC)  
Data Base/Data Communication (DB/DC)

Note 2: ACF/VTAM or ACF/VTAME users who are running VSE as a guest machine under VM may experience performance degradation on an IBM system.

• Minimum DASD Requirements:

DASD Type	Environment	Minimum Spindles	Notes
3310	B/I	4	5, 6
3310	DC or DB/DC	5	6
3330	B/I	4	1, 5
3330	DC or DB/DC	5	1
3340	B/I	4	2, 5, 6
3340	DC or DB/DC	5	2, 6
3350	All	3	4
3370	All	3	3, 4

Figure 2. Minimum DASD Requirements.

The DASD requirements for VM/VSE are the sum of the requirements for the VM environment and the VSE environment.

Note 1: 3330 mdl 1 (3330 mdl 11s are treated as mdl 1s).

Note 2: 3340 mdl 70 or 70F or 3344 (one 3344 is equal to four 3340s).

Note 3: Actuators.

Note 4: The third spindle is required for verification.

Note 5: A fifth spindle is required for ACF/NCP.

Note 6: An additional spindle is required if using VM/VSE.

• Other hardware

The following minimum hardware is required for the Interactive Productivity Facility VSE Environment and VM/VSE Environment:

- One VSE-supported console.
- One local terminal which supports a 24 x 80 character screen format. This terminal must be supported by VSE, CICS/VS, VSE/ICCF, and the telecommunications access method selected by the user. In the VM/VSE Environment, this terminal must be supported by VM/CMS.
- One tape drive supported by the appropriate operating system.
- One VSE-supported printer.
- One VSE card image device (required for hardware system service) supported by the appropriate operating system.

**SOFTWARE REQUIREMENTS**

The VSE and VM/VSE Environments of the Interactive Productivity Facility are designed to operate with the following products:

Licensed Program Product Name	Number	Rel. Level
VSE/Advanced Functions	5746-XE8	3.0
DOS/VSE SCP	5745-030	3.0
VSE/ICCF	5746-TS1	3.0
VSE/IPCS	5746-SA1	3.0
VSE/POWER	5746-XE3	2.0
VSE/VSAM	5746-AM2	2.0
VSE/Fast Copy	5746-AM4	1.0
CICS DOS/VS	5746-XX3	1.5
DL/I DOS/VS	5746-XX1	1.6
BTAM-ES	5746-RC5	1.0
BTAM SCP	5747-CG1	1.0
ACF/VTAM		
VTAM SCP for ACF/VTAM	5747-CF1	3.0
ACF/VTAM for DOS/VSE	5746-RC3	3.0
ACF/VTAME		
VTAM SCP for ACF/VTAME	5746-CG2	1.0
ACF/VTAME for DOS/VSE	5746-RC7	1.0
Interactive Productivity Facility - VM Environment	5748-MS1	3.0
VM/SP	5664-167	1.1

Figure 3. Interactive Productivity Facility Environment.

**INSTALLATION and USE CONSIDERATIONS**

It is recommended that Release 4.0 of the Interactive Productivity Facility be installed and used in the VSE System IPO/E Release 3.0 environment. The System IPO/E provides environments in which the

device addresses and system structure (library and space allocations) are those that Interactive Productivity Facility functions expect. Descriptions of these environments are found in the *VSE System IPO/E Planning Guide* (GC20-1936) and the *VSE System IPO/E Reference Manual*.

If installed and used independently, the Interactive Productivity Facility dialogs and executable jobstreams dependent upon System IPO/E structure may be invalidated unless the system structure is defined as found in these documents. To use the Interactive Productivity Facility optional feature install function to install the licensed programs listed in the Interactive Productivity Facility Content section above, those programs must be ordered in the System IPO/E format.

**Interactive Productivity Facility Tables:** The Interactive Productivity Facility dialogs create tables based on input entered by the user. If a user of a prior release retains the same table data, Release 4.0 dialogs will continue to use the stored information. Where formats change from release to release, the Interactive Productivity Facility will convert the old format to the new format.

**DATA SECURITY**

Customers using Interactive Productivity Facility can use the security facilities provided by VSE/ICCF in the VSE environment or VM/SP CMS in the VM/VSE environment. The customer is responsible for the selection, implementation and adequacy of these facilities.

**DOCUMENTATION**

(available from Mechanicsburg)

The following documentation will be available concurrent with Interactive Productivity Facility availability:

- Interactive Productivity Facility Dialog Manager Logic Flow* (ZZ20-4611) ... Microfiche (LY80-2579) containing Interactive Productivity Facility Dialog Manager PLM, Panels, Skeletons, and Message File ... Microfiche (LY80-2580) containing Interactive Productivity Facility Dialog Manager source listings ... Interactive Productivity Facility Program Function Key Template for 3277 (SX20-2346) or 3276/3278 (SX20-2355) ... *Interactive Productivity Facility VSE Environment Licensed Program Specifications* (GH20-5527).

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**5748-MS1 - INT. PROD. FAC. VM ENV. R4.0  
INTERACTIVE PRODUCTIVITY FACILITY  
VM ENVIRONMENT RELEASE 4.0**

**PURPOSE**

The Interactive Productivity Facility is designed to simplify the tasks and increase the productivity of those who manage, service and use VM/SP systems. Release 4.0 of Interactive Productivity Facility is specifically designed to assist users of the VM/SP System Installation Productivity Option/Extended (VM/SP System IPO/E) by providing the user a simplified and productive interface to VM/SP systems.

**SPECIAL SALES INFORMATION**

Release 4.0 of the Interactive Productivity Facility is designed to run in the VM/SP System IPO/E Release 2.1 environment.

The Interactive Productivity Facility is included in the base set of products for the VM/SP System IPO/E. It is recommended that it not be used outside this environment. However, if ordered independently, installation instructions are provided.

**HIGHLIGHTS**

- Interactive user interface with the system via display panels.  
Using facilities of CMS and the Interactive System Productivity Facility (ISPF) in the VM environment, the Interactive Productivity Facility provides a simplified interface to users. The interactive interface is provided via structured menu panels that guide the user in the selection of activities that lead to the execution of system functions.
- Prompting for input parameters  
Data entry panels prompt the user for the parameters required for the execution of system functions.
- Simplified procedures to invoke program products and product functions.  
After prompting the user for the required parameters, the Interactive Productivity Facility transforms the prompted information into the appropriate system input format and invokes the necessary system functions.
- Interactive help service  
To assist the new or infrequent system user, explanatory information is provided online.
- VM/SP System IPO/E Environment  
The Interactive Productivity Facility, a licensed program, is part of the VM/SP System IPO/E environment.

**DESCRIPTION**

The Interactive Productivity Facility has the following components:

1. Executable Dialogs  
Consisting of:
  - Menu panels that guide the user in selecting activities to be performed.
  - Data entry panels that guide the user in supplying the required information to execute system functions.
  - Help panels that provide additional information for the new or infrequent user.
  - Control statement files to which user-provided information is added for execution of system functions.
  - Function routines (EXECs) that:
    - Display panels
    - Analyze user input
    - Invoke CP/CMS commands
2. User's Guide (SH20-5583-0)  
Documentation available from Mechanicsburg that describes how to use the Interactive Productivity Facility in the VM environment.
3. Dialogs that aid the user in installing and/or using the following programs which are included in the VM/SP System IPO/E Release 2.1. (See "Installation and Use" considerations.)

Program Name	Number	Rel.
Base Content:		
VM/System Product	5664-167	2.1
Interactive Productivity Facility	5748-MS1	4.0
ISPF	5668-960	1.0
VM/IPCS Extension	5748-SA1	2.0

**Optional Features:**

A Departmental Reporting System II (ADRS II) (with Bus. Graphics)	5796-PLN	1.7
APL/Data Interface II	5796-PNG	1.5
COBOL (OS)	5740-CB1	2.3
COBOL Int. Debug	5734-CB4	1.4
Doc. Comp. Facility (with For. Env. Feature)	5748-XX9	2.0
DMS/CMS	5748-XXB	2.0
EP/VS	5744-AN1	3.0
Financial Planning Sys. II	5798-DCN	1.3
FORTRAN Int. Debug	5734-FO5	2.2
GDDM (with PGF)	5748-XXH	2.0
Information/System-VM (with VM/VSE Data Feature)	5735-OZS	1.0
IIPS	5668-012	1.1
ISPF/PDF	5664-172	1.0
PL/I Opt. Comp/Libs	5734-PL3	4.0
PL/I Optimizing Comp.	5734-PL1	4.0
PL/I Resident Lib.	5734-LM4	4.0
PL/I Transient Lib.	5734-LM5	4.0
Query-by-Example	5796-PKT	1.9
RPG II	5746-RG1	3.0
RSCS Networking	5748-XP1	3.0
VM/Directory Maintenance	5748-XE4	2.0
VM/IFS	5748-XXC	1.0
VM/Pass Through Facility	5748-RC1	2.0
VM/Performance Monitor Analysis	5798-CPX	3.5
VS FORTRAN	5748-FO3	2.0
VS APL	5748-AP1	4.0
VS BASIC	5748-XX1	3.0
VSE/VSAM	5746-AM2	2.0

4. The Program Development environment dialogs are no longer shipped with the Interactive Productivity Facility Release 4.0. Examples of commands/EXECs providing similar function will be provided in the *Interactive Productivity Facility User's Guide*. An enriched Program Development dialog function is provided in the Interactive Systems Productivity Facility/Program Development Facility (5664-172) licensed program. ISPF/PDF is a recommended optional product of the VM/SP System IPO/E Release 2.1.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The Interactive Productive Facility is designed to operate with the minimum hardware configurations of the VM/SP System IPO/E environment.

The following chart summarizes the minimum hardware configurations for the VM/SP System IPO/E environment:

Processors:	One IBM processor supported by VM/SP Release 2.1
Processor Storage:	1.0MB
Terminals:	One IBM 3277-2, 3278 or 3279
Printer:	One IBM Printer supported by VM/SP Release 2.1
Reader:	None
DASD Actuators:	3310 3 3330 3 3340 3 3350 2 3370 2 3375 2 3380 2

For customers installing VM/SP System IPO/E on a 1 megabyte 4321 or 4331, the "small CP" option should be specified. This option removes certain functions from CP. Refer to the *VM/SP Planning and SYSGEN Guide* (SC19-6201) for details. (Note: Multiple Interactive Productivity Facility users executing in a one megabyte processor can affect system performance.)

**SOFTWARE REQUIREMENTS**

The Interactive Productivity Facility is designed to operate with the VM/System Product (5664-167) Release 2.1 and the VM/IPCS Extension (5748-SA1) Release 2.0. VM/IPCS Extension contains functions necessary to execute the problem reporting procedures provided with the Interactive Productivity Facility.

The Interactive System Productivity Facility (VM/CMS) (5668-960) Release 1.0 is a prerequisite for the Interactive Productivity Facility - VM Environment.

**Interactive Productivity Facility - VM R4 (cont'd)****INSTALLATION and USE CONSIDERATIONS**

It is recommended that Release 4.0 of the Interactive Productivity Facility be installed and used in the VM/SP System IPO/E Release 2.1 environment. The VM/SP System IPO/E provides an environment in which the device addresses, libraries and space allocations (system structure) are specified to conform with those that Interactive Productivity Facility functions expect. A description of this environment is found in the *VM/SP System IPO/E Planning Guide* (GC20-1874-4).

If installed and used independently, the dialogs, modules and EXECs dependent upon VM/SP System IPO/E structure may be invalidated unless the system structure is defined as found in the *VM/SP System IPO/E Planning Guide*. To use the Interactive Productivity Facility optional feature installation function to install the licensed programs listed in Item 3 above, those programs must be ordered in the VM/SP System IPO/E format.

**DATA SECURITY**

Customers using Interactive Productivity Facility can use the security facilities provided by CMS in the VM environment. The customer is responsible for the selection, implementation and adequacy of these facilities.

**DOCUMENTATION**

(available from Mechanicsburg)

*Interactive Productivity Facility - VM Environment User's Guide* (SH20-5583-0) ... *Interactive Productivity Facility - VM Environment Licensed Program Specifications* (GH20-5304-3). ... *VM/SP System IPO/E General Information Manual* (GC20-1890-2) ... *VM/SP System IPO/E Planning Guide* (GC20-1874-4) ... *Interactive Productivity Facility Program Function Key Template for 3275/3277* (SX20-2388-1) ... *Interactive Productivity Facility Program Function Key Template for 3276/3278/3279* (SX20-2389-3) ... *Interactive Productivity Facility Program Function Key Reference Summary Card* (GX20-2387-2) ... Microfiche containing Interactive Productivity Facility Dialog Panels (LYB0-2477-05) ... Microfiche containing source assembly listings for Interactive Productivity Facility modules (LYB0-2478-04).

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**5748-MS1 - INT. PROD. FAC. VSE ENV. R4.1**  
**INTERACTIVE PRODUCTIVITY FACILITY**  
**VSE ENVIRONMENT RELEASE 4.1**  
**VM/VSE ENVIRONMENT RELEASE 4.1**  
**5748-MS1**

**PURPOSE**

Release 4.1 of the Interactive Productivity Facility enhances the VSE System IPO/E Release 3.1. The Interactive Productivity Facility provides the intermediate system user with a simplified and productive interface to VSE systems.

**HIGHLIGHTS**

- Support for the addition of new products and new product releases.
- Full dialog support for 3375 DASD.
- Addition of VSE/OCCF verify dialogs.
- Dialog to support VSE/VSAM Backup/Restore feature.
- Dialog to support VSE/VSAM Space Management for SAM feature.

**DESCRIPTION**

- **Addition of Product Support**  
 Two products are added as fully supported products for installation and service in this release. They are:
  - NPDA (Version 1)                      Release 2.1
  - NCCF                                      Release 2.0
 The Software Product System Profile table has been updated to include information describing the added products.
- **3375 Support**  
 All affected dialogs are modified to make the 3375 DASD a fully supported device. Support is provided for system and data files.
- **Dialog to support VSE/VSAM Backup/Restore feature**  
 New panels, functions and job control skeletons are provided to prompt the user for the data required to generate the Access Method Services BACKUP and RESTORE jobs.
- **Dialog to support VSE/VSAM Space Management for SAM feature**  
 The SAM ESDS file type is now supported by the Interactive Productivity Facility.
- **Addition of a VSE/OCCF verify job**  
 Support is added to verify the installation of VSE/OCCF.
- **VM/VSE Environment**  
 The VM/VSE Environment continues to support VSE/Advanced Functions Release 3 as a guest machine with VM/SP Release 1.1.

**INTERACTIVE PRODUCTIVITY FACILITY CONTENT**

The Interactive Productivity Facility has the following components:

1. **Dialog Manager**  
 The Dialog Manager, running under VSE/ICCF or VM/SP CMS, provides the basic functions required to control the user interface and the execution of dialogs. The dialog manager is shipped in the VM Environment and the VSE environment. The VM/VSE Environment in Release 4.1 is designed to run with the VM Environment and to use VM dialog manager.
2. **Executable Dialogs**  
 The executable dialogs consist of:
  - Menu panels that guide the user in selecting activities to be performed.
  - Data entry panels that guide the user in supplying the required information to execute system functions.
  - Explain panels that provide additional information for the new or infrequent user.
  - Skeleton JCL to which user-provided information is added for execution of system functions.
  - Function routines that:
    - Display panels
    - Analyze user input
    - Assign values to JCL parameters
    - Create executable JCL

3. Executable jobstreams to perform selected tasks are supplied by the Interactive Productivity Facility for the following products. Also, see "Installation and Use Considerations".

A. System IPO/E Base Programs	Number	Rel. Level
DOS/VSE SCP	5745-030	3.0
Device Support Facility	5747-DS2	5.0
VSE/Advanced Functions	5746-XE8	3.0
VSE/POWER	5746-XE3	2.0
VSE/VSAM	5746-AM2	3.0
VSE/IPCS	5746-SA1	3.0
CICS/VS	5746-XX3	1.5
DL/I DOS/VS	5746-XX1	1.6
VSE/ICCF	5746-TS1	3.0

B. System IPO/E Optional Programs	Number	Rel. Level
ACF/NCP/VS	5735-XX1	2.1
+ SSP for ACF/NCP/VS	5735-XX3	2.1
+ NCP/SSP SCP	5747-CH1	2.1
+ EP feature #6004	5747-CH1	3.0
ACF/VTAM	5746-RC3	3.0
+ VTAM SCP	5747-CF1	3.0
ACF/VTAME	5746-RC7	1.0
+ VTAM SCP	5747-CG2	1.0
BTAM-ES	5746-RC5	1.0
+ BTAM SCP	5747-CG1	1.0
Data Dictionary	5746-XXC	4.0
DOS/VS COBOL	5746-CB1	3.0 *
DOS/VS PL/I Compiler/Libs	5736-PL3	6.0 *
DOS/VS PL/I Opt. Compiler	5736-PL1	6.0 *
DOS/VS PL/I Res. Library	5736-LM4	6.0 *
DOS/VS PL/I Tran Library	5736-LM5	6.0 *
DOS/VS RPG II	5746-RG1	3.0 *
EP/VS (DOS)	5747-AG1	3.0
NCCF	5735-XX6	2.0
NPDA	5735-XX8 (V1)	2.1
Sort/Merge II	5746-SM2	4.0
VSE/Access Control		
Logging & Reporting	5746-XE7	1.0
VSE/DITTO	5746-UT3	3.0
VSE/Fast Copy	5746-AM4	1.0
VSE/OCCF	5746-XC5	1.0
VSE/POWER/RJE	5746-XE3	2.0
VSE/POWER Shared		
Spool Feature	5746-XE3	1.0
VSE/VSAM Backup/Restore Feature	5746-AM2	2.0
VSE/VSAM Space Management for SAM feature	5746-AM2	**

\* These products are returned to fully supported product status for installation and service in this release. These products are installed into the standard System IPO/E DASD space. The tapes for these products are distributed in the same format as ordered outside the VSE System IPO/E.

\*\*There is no release designation for this feature.

4. **Documentation**  
 Documentation will be available in hardcopy and microfiche that describes how to use the Interactive Productivity Facility in the VSE/ICCF and VM/SP CMS environments.

The following manuals will be available:

Name	Order Number
Interactive Productivity Facility General Information Manual	GH20-2492
User's Guide	SH20-5526
Reference Manual	SH20-2486
VSE Feature Program Directory	(shipped with product)
VM/VSE Feature Program Directory	(shipped with product)

Microfiche has been restructured as follows:

Interactive Productivity Facility Panels, skeletons, tables, messages for VSE Environment	LYBO-2579
Dialog manager source listings, PLM, and PLM TNLS for VSE Environment	LYBO-2580
Panels, skeletons, tables, messages	

PROGRAM PRODUCTS

Interactive Productivity Facility R4.1 (cont'd)

for VM/VSE Environment LYB0-2568  
Dialog manager source listings,  
PLM, and PLM TNLS for  
VM/VSE Environment LYB0-2572

A program logic manual will be available in microfiche form and hardcopy. It describes the function and interfaces of the Interactive Productivity Facility dialog manager in the VSE environment.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The Interactive Productive Facility is designed to operate with the following minimum hardware configurations when required for the full function offered by the Interactive Productivity Facility for all supported licensed programs. Additional requirements may exist for system service.

- Processors  
IBM S/370, 303X, 4300 supported by VSE or VM/SP that meet the minimum processor storage requirements described below.

- Processor Storage

The minimum processor storage requirements are:

	VSE Environment	VM/VSE Environment
B/I (1)	1 MB	1 MB (2)
DC (1)	1 MB	2 MB
DB/DC (1)	1 MB	2 MB

Figure 1. Minimum Processor Storage Requirements

Note 1: Batch/Interactive (B/I)  
Data Communication (DC)  
Data Base/Data Communication (DB/DC)

Note 2: ACF/VTAM or ACF/VTAME users who are running VSE as a guest machine under VM/SP may experience performance degradation on a 1 MB system.

- Minimum DASD Requirements for the VSE Environment:

DASD Type	Environment	Minimum Spindles	Notes
3310	B/I	4	5, 6
3310	DC or DB/DC	5	6
3330	B/I	4	1, 5
3330	DC or DB/DC	5	1
3340	B/I	4	2, 5, 6
3340	DC or DB/DC	5	2, 6
3350	All	3	4
3370	All	3	3, 4
3375	All	3	4

Figure 2. Minimum DASD Requirements.

The DASD requirements for VM/VSE are the sum of the requirements for the VM environment and the VSE environment.

- Note 1: 3330 mdl 1 (3330 mdl 11s are treated as mdl 1s).
- Note 2: 3340 mdl 70 or 70F or 3344 (one 3344 is equal to four 3340s).
- Note 3: Actuators.
- Note 4: The third spindle is required for verification.
- Note 5: A fifth spindle is required for ACF/NCP.
- Note 6: An additional spindle is required if using VM/VSE.

- Other hardware

The following minimum hardware is required for the Interactive Productivity Facility VSE Environment and VM/VSE Environment:

- One VSE-supported console.
- One local terminal which supports a 24 x 80 character screen format. This terminal must be supported by VSE, CICS/VS, VSE/ICCF, and the telecommunications access method selected by the user. In the VM/VSE Environment, this terminal must be supported by VM/SP CMS.

- One tape drive supported by the appropriate operating system.
- One VSE-supported printer.
- One VSE card image device (required for system service) supported by the appropriate operating system.

SOFTWARE REQUIREMENTS

Interactive Productivity Facility in the VSE and VM/VSE Environments is designed to operate with the following products:

Licensed Program Product Name	Number	Rel. Level
DOS/VSE SCP	5745-030	3.0
Device Support Facility	5747-DS2	5.0
VSE/Advanced Functions	5746-XE8	3.0
VSE/ICCF	5746-TS1	3.0
VSE/IPCS (Note 1)	5746-SA1	3.0
VSE/POWER	5746-XE3	2.0
VSE/VSAM (Note 2)	5746-AM2	3.0
VSE/Fast Copy (Note 3)	5746-AM4	1.0
CICS DOS/VS	5746-XX3	1.5
DL/I DOS/VS	5746-XX1	1.6
BTAM-ES (Note 4)	5746-RC5	1.0
BTAM SCP	5747-CG1	1.0
ACF/VTAM (Note 4)		
VTAM SCP for ACF/VTAM	5747-CF1	3.0
ACF/VTAM for DOS/VSE	5746-RC3	3.0
ACF/VTAME (Note 4)		
VTAM SCP for ACF/VTAME	5747-CG2	1.0
ACF/VTAME for DOS/VSE	5746-RC7	1.0
Interactive Productivity Facility - VM Environment	5748-MS1	3.0
VM/SP	5664-167	1.1

Figure 3. Interactive Productivity Facility Environment.

Note 1: VSE/IPCS contains functions necessary to execute the problem reporting procedures generated by the Interactive Productivity Facility.

Note 2: VSE/VSAM contains functions necessary to execute the following installation verification procedures: CICS/VS, DL/I DOS/VS, Data Dictionary and Sort/Merge II.

Note 3: VSE/Fast Copy contains functions necessary to execute, tailor and service procedures generated by the Interactive Productivity Facility.

Note 4: For VSE CICS/VS users, ACF/VTAM or ACF/VTAME is the recommended telecommunications access method together with the associated SCP code.

VSE users without CICS/VS must select and install BTAM-ES and its associated SCP code. The VM/VSE Environment does not require a telecommunications access method unless it is required by a support product.

INSTALLATION and USE CONSIDERATIONS

It is recommended that Release 4.1 of the Interactive Productivity Facility be installed and used in the VSE System IPO/E Release 3.1 environment. The System IPO/E provides environments in which the device addresses and system structure (library and space allocations) are those that Interactive Productivity Facility functions expect. Descriptions of these environments are found in the *VSE System IPO/E Planning Guide (GC20-1936)* and the *VSE System IPO/E Reference Manual*.

If installed and used independently, the Interactive Productivity Facility dialogs and executable jobstreams dependent upon System IPO/E structure may be invalidated unless the system structure is defined as found in these documents. To use the Interactive Productivity Facility optional feature install function to install the licensed programs listed in the Interactive Productivity Facility Content section above, those programs must be ordered in the System IPO/E format.

**Interactive Productivity Facility Tables:** The Interactive Productivity Facility dialogs create tables based on input entered by the user. If a user of a prior release retains the same table data, Release 4.1 dialogs will continue to use the stored information. Where formats change from release to release, the Interactive Productivity Facility will convert the old format to the new format.

DATA SECURITY

Customers using Interactive Productivity Facility can use the security facilities provided by VSE/ICCF in the VSE environment or VM/SP CMS in the VM/VSE environment. The customer is responsible for the selection, implementation and adequacy of these facilities.

DOCUMENTATION  
(available from Mechanicsburg)

The following documentation will be available concurrent with Interactive Productivity Facility availability:

**Interactive Productivity Facility R4.1 (cont'd)**

Microfiche (LYB0-2579) containing Tables, Panels, Skeletons, and Message Files for VSE Environment ... Microfiche (LYB0-2580) containing Interactive Productivity Facility Dialog Manager Source Listings, PLM, and PLM TNLs for VSE Environment ... Microfiche (LYB0-2568) containing Tables, Panels Skeletons, and Message Files for VM/VSE Environment ... Microfiche (LYB0-2572) containing Interactive Productivity Facility Dialog Manager source listings, PLM, and PLM TNLs for VM/VSE Environment ... Interactive Productivity Facility Program Function Key Template for 3277 (SX20-2346) or 3276/3278 (SX20-2355) ... *Interactive Productivity Facility VSE Environment Licensed Program Specifications* (GH20-5527).

RPQs ACCEPTED: No

**5748-MS1 - INT. PROD. FAC. VM ENV. R5.0  
INTERACTIVE PRODUCTIVITY FACILITY  
VM ENVIRONMENT RELEASE 5.0  
5748-MS1**

**PURPOSE**

The VM/Interactive Productivity Facility Release 5.0 is designed to simplify the user interface to the VM/SP System. VM/IPF communicates with the user through dialogs (panels) that support Administrative, Operations and General User functions, and thus can reduce the skill level required to use the system while improving user productivity. This offering enhances the user's capabilities in the Application Development, Information Center, and Engineering/Scientific environments in both autonomous departments and large establishments with distributed processing.

**SPECIAL SALES INFORMATION**

Release 5.0 of the Interactive Productivity Facility is designed to run in the VM/SP Release 2 and Release 3 environments and will be supported in the VM/SP System IPO/E environment.

**OVERVIEW**

Major enhancements/improvements to this release designed to support the System Administrator, Operator and General User include:

- Panel-Driven Directory Maintenance Functions
- A Problem Reporting and Management Facility
- Network Communications Support
- Accounting Function Support
- CMS File Communications Support
- Operator Panels
- A CP/CMS Command Entry Facility
- Indexing To Tasks
- Improved Human Factors of Panels and Documents
- System Tailoring Support
- New Task Structured Documents
  - General Use Guide
  - Administration Guide
  - Operation
  - Problem Control
  - System Reference

To assist the user in selecting tasks to be performed, a series of menu panels are available, and organized in a hierarchical structure. The user selects the desired task from the menu. This will lead to the execution of system functions. Through an indexing function, the experienced user can select the task directly, without the need to go through each level of the hierarchy.

Through Data Entry panels, the Interactive Productivity Facility prompts the user for information required to execute system functions. Using a 'fill-in-the-blanks' technique, the user supplies the necessary system parameter information, and the Interactive Productivity Facility transforms this into the appropriate system input format and invokes the necessary system functions.

For the new or infrequent user who requires additional information, most menu and data entry panels are supplemented with Help panels. Thus, the Interactive Productivity Facility is designed to relieve users from many tedious, error prone tasks and improve productivity.

**HIGHLIGHTS**

• **Panel Driven Directory Maintenance Functions**

Support is provided by panels for the Administrator to:

- Work with a user's directory to enroll, change, remove users and change user's password or storage size.
- Work with minidisks to add, change, extend, or delete them.
- Provide directory status information by listing DASD space, checking directory integrity or checking status of users
- Correct directory maintenance problems by rebuilding the directory from backup, initializing the directory or enabling a disabled directory
- Use the CP directory map to create, browse, or print the directory map of DASD space
- Perform general housekeeping functions

Support is provided by panels for the General User to:

- Change passwords, storage size, distribution codes and disk accessing
- Display user's own passwords or modes
- Establish/drop links to other users, control access by others to user's disks, and control auto-IPLs

• **Problem Reporting and Management Facility**

The Problem Control Facility (PCF) is a problem reporting and tracking facility used to report, answer, close and update problems and generate problem reports. The facility helps to correlate system dump problem reports with the user problem reports and can be used to control problem reports from multiple systems.

• **Network Communications Support**

Panels are provided to support the operator/administrator in the RSCS environment to initialize network(s), add/delete links and routes, and query networks for status.

• **Accounting Functions Support**

The user can, via panels, select accounting parameters for automatic execution by the VM accounting program

• **CMS File Communications Support**

Panel support is provided for the CMS communications EXECs: NOTE, TELL, DEFAULTS. A panel interface is provided for the EXECs: NAMES, SENDFILE and RDRLIST.

• **Operator Panels**

Panels are available to assist the user to attach devices, set logs, control spool files (rdr/punch/printer), query the system for status, and backup/restore data.

The operator can define a schedule for auto-backup of DASD volumes, or exercise this schedule, via panels at intervals of his choice. The saved data will then be available on tape in the event data recovery is required.

• **CP/CMS Command Entry Facility**

A facility is provided to allow EXECs and CP/CMS commands to be entered from the command line of most panels. This facility also:

- Prevents certain machine-destructive CP/CMS parameters, commands or options from being executed from the command line if the user selects 'protective' environments
- Re-displays unsuccessful/incorrect commands
- Maintains a history of successfully completed commands for display/re-use

• **Indexing To Tasks**

The indexing facility provides the user the ability to select a function or task to be executed, from a table, without the need to progress through each level of the hierarchy.

• **Improved Human Factors of Panels and Documentation**

The panels and documentation have been structured to improve readability, eliminate unnecessary words, and use concrete words and phrases in place of complex or abstract terms.

• **System Tailoring Support**

Panels are provided to:

- Specify when accounting reports are automatically printed
- Add a real disk to DIRMAINT resources list
- Initialize or label a real disk
- Specify the default printer for automatic start at IPL time
- Change FCB/UCS parameters and printer spool classes of the default printer.
- New Task-Structured Documents

Task-structured documents are provided for Administrators, Operators, and General Users. Task, versus function orientation, has been shown to increase usability and user acceptance.

**DESCRIPTION**

**The Interactive Productivity Facility has the following components:**

1. **Executable Dialogs (Panels)**

- Menu panels that guide the user in selecting activities to be performed.
- Data Entry panels that guide the user in supplying the required information needed to execute system functions.
- Help panels to provide additional information for the new or infrequent user.
- Control statement files to which user-provided information is added for execution of system functions.
- Function routines (EXECs) that:
  - Display panels
  - Analyze user input
  - Invoke CP/CMS commands
  - Invoke applications
  - Service VM/SP System IPO/E feature products

## PROGRAM PRODUCTS

**Interactive Productivity Facility - VM R5 (cont'd)**

## 2. Publications: To be available concurrent with program availability:

VM/IPF Rel. 5 Administration Guide	SC24-5230
VM/IPF Rel. 5 General Use Guide	SC24-5233
VM/IPF Rel. 5 Operation	SC24-5229
VM/IPF Rel. 5 Problem Control	SC24-5231
VM/IPF Rel. 5 Administration Messages	SC24-5234
VM/IPF Rel. 5 General Use Messages	SC24-5232
VM/IPF Rel. 5 Licensed Program Specification	SC24-5235
VM/IPF Rel. 5 System Reference	SC24-5228

may affect system performance. Further information on VM/IPF performance will be made available prior to General Availability.

RPQs ACCEPTED: No

## 3. Courses

Two courses are provided which teach how to use the VM/SP components EXEC2 and XEDIT. The IIPS program product must be installed to use these courses.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VM/IPF is designed to operate on those IBM processors supported by VM/SP Release 2 or 3 with at least 1 megabyte of storage. Terminal(s) required are IBM 327X or equivalent.

**SOFTWARE REQUIREMENTS**

The Interactive Productivity Facility is designed to operate with the VM/SP (5664-167) Release 2 or 3, VM/IPCS Extension (5748-SA1) Release 2.0, VM/Directory Maintenance (5748-XE4) Release 2.0 and RSCS (5748-XP1) Release 3.0. The VM/IPCS Extension program product contains functions necessary to execute the problem reporting procedures provided with the Interactive Productivity Facility. The VM/Directory Maintenance functions and RSCS functions are implemented (and simplified) by a set of user panels.

The Interactive System Productivity Facility (ISPF, 5668-960) Release 1.1 is a prerequisite for the Interactive Productivity Facility - VM Environment.

**CONVERSION**

Several functions included in VM/IPF Release 4 have been restructured for VM/IPF Release 5 and some will not be included in this release:

- The System Utilities panels have been replaced by the General VM/SP Tasks.
- The Problem Management commands (SPROB and GPROB) have been replaced by Problem Control Facility functions.
- The OPTIMIZE command has been replaced by the XEDIT VMFOPT command.
- The MAIL facility has been removed and replaced by panel support access to the VM/SP Productivity Aids.
- The saving of Shared Systems and DCSSs has been modified and the panel now asks for a specific name to save.
- Documentation has been restructured and references to the VM System IPO/E removed.
- The stacked product tape installation function has been removed from the System Management panels and the INSTIPF (Exec) eliminated.
- The REVIEW command has been removed.
- Computer-Based Training courses supplied with VM/IPF Release 5 are limited to XEDIT and EXEC2.
- The ASSIST function has been modified. The ASSIST, ASSIST C, and ASSIST D commands, and Command Mode and General System Utilities via ASSIST are no longer available. The function System Help is not available from the General User panels.
- Panel access to the program product INFO/SYSTEM has been removed.
- The FLIST, BROWSE and MOUNT functions and associated CMS HELP can only be invoked from the command line. Panel support for these functions has been removed.

**INSTALLATION and USE CONSIDERATIONS**

VM/IPF 5 will be supported in the VM/SP System IPO/E environment but may be installed without the VM/SP System IPO/E. VM/IPF 5 functions require a specific system configuration (device addresses, directories, and space allocations). This system structure information is included in the installation instructions.

**DATA SECURITY**

VM/IPF runs as a virtual machine in VM/SP and is subject to the security facilities provided by CP. It is organized to provide for three types of users: General, Operator and System Administrator. Through use of standard CP Directory facilities, the Installation Manager can restrict access to each functional area. A user gains no additional VM/SP CP authorization capability from the use of VM/IPF.

Customer Management is responsible for the selection, adequacy and use of these features for the protection of their data.

**PERFORMANCE CONSIDERATIONS**

It is recommended that VM/IPF be installed on a 2 megabyte or greater processor. Multiple VM/IPF users executing in a 2 megabyte processor

**VM PASS-THROUGH FACILITY  
5748-RC1****PURPOSE**

The VM Pass-Through Facility provides the VM/370 user with interactive remote access to host facilities that support the IBM 3271 and 3274 Control Units over BSC multi-point lines. This product supports connection to host systems such as OS/VS2, OS/VS1, DOS/VS, VSE and other VM/370 systems. Host applications supporting 3270 BSC remote displays such as TSO, CICS and CMS, may be accessed via the VM Pass-Through Facility. A user connected through the VM Pass-Through Facility interfaces with the host application, and the user's screen duplicates exactly what the host displays as though the 3270 were attached directly to the host system. When connected to a SNA host the VM Pass-Through user will have full 3270 BSC access to the SNA network. In this environment, VM Pass-Through can be used as the first step towards full participation in a SNA network.

**HIGHLIGHTS****Release 2**

- **DDP Support:** Support for the remote initialization and control of distributed IBM 4300 processors. Feature #9511 and appropriate 4331 and/or 4341 EC level changes are required. See 4300 Machine Pages for details.
- **3270 Printer Support:** Support for the IBM 3270 Information Display System printers from directly (or indirectly) attached subsystems such as CICS or TSO for printing at the Pass-Through node.

**User Communication Services:** The VM/370 user is able to gain remote access to interactive host applications through the VM Pass-Through Virtual Machine. The user may connect to this virtual machine from local or remote 3276, 3277, 3278 or 3279 display terminals.

**User Selected Host:** Once a user has connected to the Pass-Through virtual machine, the user may request connection to any host supported by the installation. The user is assigned to a free active logical port of the host connection. Once connection is made to the host machine the user is presented a logo from that system and is free to communicate to that system until session termination.

**Selection Screen:** A selection screen is available to assist the user in connecting to a host. The selection screen displays active and inactive nodes and allows the user to specify a session disconnect sequence.

**Notepad Facility:** The Notepad facility allows a CMS user to append a copy of the current screen image to a CMS file.

**Message Facility:** VM/370 users may send messages to other VM/370 systems and users.

**Terminal Support:** Users may gain access to Pass-Through services using IBM BSC 3276, 3277, 3278 and 3279 display terminals having a screen size of at least 24 x 80 characters. IBM 3279 displays are supported in base color only. Extended color, highlighting and programmed symbols are not supported. Once connected to the Pass-Through facilities, the user terminal is supported using the VM/Basic Systems Extensions Release 2, VM/System Extensions Release 2 or VM/System Product full screen support.

**Up to 32 Ports Per Line:** For each BSC leased line supported in 3271/4 emulation mode, VM Pass-Through will allow a maximum of 32 active display printer sessions to concurrently share that line. Users are connected by Pass-Through to logical ports associated with the line.

**Communication Facilities:** The VM Pass-Through Facility supports interconnection with other host systems. These hosts may include other VM/370 systems with or without the VM Pass-Through Facility program installed.

**Multiple Host Nodes Supported:** Multiple connections between the local VM/370 system with Pass-Through and host nodes are supported. Upon connection to the Pass-Through virtual machine the user selects which host node is required for the user's session. Upon disconnection from that host node another host node may be selected for another session.

**327X Line Emulation:** VM Pass-Through emulates a remote IBM 3271 or 3274 on a BSC multipoint leased line connection to another node which is programmed to support the remote 3270 (e.g., TSO, CICS and CMS). The local VM/370 system is transparent to the host node.

**Pass-Through to Pass-Through Connection:** VM Pass-Through supports interconnection to Pass-Through virtual machines executing in other VM/370 nodes.

**CUSTOMER RESPONSIBILITIES**

In addition to the responsibilities in the VM/370 section of the Sales Manual under the heading "Customer Responsibilities", the customer is responsible for ordering and installing the latest level of the VM/370 SCP and VM/System Product Release 2.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The VM/System Product is designed to run on the S/370 Models 135, 135-3, 138, 145, 145-3, 148, 155II, 158, 158-3, 158AP, 158MP, 165II, 168, 168-3, 168AP; on the 3031, 3031AP, 3032, 3033, 3033N, 3033S, 3033AP, 3033AP-2 and 3033MP Processor Complexes; and on IBM 4300 Processors; and requires VM/SP Release 2 to operate. See the pages for VM/System Product.

**Real Storage Requirement:** VM Pass-Through Facility, Release 2, in conjunction with VM/SP Release 2 requires a minimum user-accessible storage of 512K.

**SOFTWARE REQUIREMENTS**

The VM Pass-Through Facility, Release 2 is designed to operate with the VM/System Product, Release 2. IPCS support is designed to operate with the IPCS-E program product.

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**VM/INTERACTIVE PROBLEM CONTROL SYSTEM  
EXTENSION  
5748-SA1**

**PURPOSE**

IPCS is a software problem handling facility intended for use by customer personnel and, where appropriate, IBM Program Support Representatives (PSRs). IPCS will reduce the time, effort and expense required to resolve software problems by providing facilities for Problem Reporting, Problem Management and Problem Diagnosis.

**DESCRIPTION**

- **Problem Reporting** - Problem Reporting facilities standardize the problem reporting process, identify previous occurrences of the same problem on the system and allow faster and more specific identification of similar problems previously experienced by the entire VM/370 customer base. Duplicate problem recognition (1) reduces the amount and expense of unnecessary hardcopy documentation and (2) allows faster identification of available fixes that can be applied to the system.
- **Problem Management** - Problem Management facilities provide the capabilities of (1) updating the individual disk-resident problem reports and summary problem status reports, and (2) displaying and printing these reports. These facilities allow the customer and/or PSR to track and manage problems from their occurrence through their resolution.
- **Problem Diagnosis** - Problem Diagnosis facilities provide the capability to interactively view disk-resident problem data (i.e., CP and CMS ABEND dumps and all other dumps taken through the new VM/370 VMDUMP Facility. (See "VMDUMP" in VM/370 pages for further information on the VMDUMP facility available in VM/370 Release 6.) This capability allows the customer and/or PSR to interactively diagnose a dump-related problem from any VM/370 supported terminal, without the need for hardcopy problem data.
- **Remote Usage** - The VM/370 telecommunication capability enables the use of IPCS by customer personnel located remotely from the IPCS site. Use of IPCS in this manner is dependent upon the availability of appropriate customer-provided telecommunication facilities at both the IPCS and remote sites.

**IPCS HIGHLIGHTS**

**Problem Reporting**

- IPCS generates a disk-resident Problem Report for a software problem. The report contains specific symptoms of the problem as well as identification information such as time stamp, system level, etc. Optionally, the report can contain free-form descriptive information and/or identification of CMS files containing data related to this problem.
- IPCS provides facilities for printing Problem Reports or viewing them from a display.
- IPCS automatically extracts the appropriate problem symptoms from the dumps accompanying CP and CMS ABENDs. IPCS prompts the user for symptoms of other problems.
- IPCS automatically compares symptoms of the current problem with those of previous problems encountered at the installation and notifies the user of possible duplicates.

**Problem Management**

- IPCS provides facilities for updating the status of open problems from initial reporting through closing.
- IPCS provides facilities for displaying or printing the status of any, all or combinations of problems on file at the installation.

**Problem Diagnosis**

- IPCS provides a variety of dump viewing sub-commands which allow the user to interactively locate data, display data, print data or control the display screen for CP and CMS ABEND dumps, and any other dumps taken through the new VM/370 VMDUMP facility. (See "VMDUMP" in VM/370 pages for further information of the VMDUMP facility available in VM/370 Release 6.)
- IPCS provides facilities to print CP and CMS ABEND dumps, and any other dumps taken through the new VM/370 VMDUMP facility.

**APAR Generation:** An IPCS command, "APAR", will provide the facility for generating the hardcopy APAR and offloading problem data to tape or hardcopy for subsequent submission of the problem to IBM. This facility can reduce the turnaround time involved in problem resolution by providing more complete and accurate input to the IBM support organization.

**General Problem Reporting, Tracking and Dump Viewing Support:** IPCS will generate a Problem Report, track problem status and permit interactive dump viewing for all problems having a dump taken through the new VM/370 VMDUMP facility. (See "VMDUMP" in VM/370

pages for further information of the VMDUMP facility available in VM/370 Release 6.) The IPCS user can enter problem symptom information to be included in the Problem Report for any problem where this information is not automatically extracted from the dump.

By using VMDUMP, the operator of a guest virtual machine can make a dump of any user-detected software problem available for subsequent interactive dump viewing and dump printing through the facilities of the VM/IPCS Extension program product.

**CUSTOMER RESPONSIBILITY**

While IPCS is a powerful tool to assist the customer with software problem handling, it remains the responsibility of the customer to establish appropriate procedures for problem reporting, problem diagnosis and problem management.

IPCS requires no extraordinary installation procedures. Refer to the *General Information Manual* and the program directory shipped with the VM/IPCS Extension for the installation procedures required.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The VM/IPCS Extension Program Product is designed to operate on the IBM processors supported by VM/370 Release 6 with the VMDUMP facility.

**SOFTWARE REQUIREMENTS**

No additional system facilities are required over and above those required by VM/370 Release 6. See VM/370 pages for details. The VM/IPCS Extension program product can be operated with, but does not require, the following VM products and all the devices they support: (1) Release 2 of the VM/BASIC System Extensions program product, and/or (2) Release 2 of the VM/System Extensions program product. Additionally, Release 2 of VM/IPCS Extension program product can be operated with, but does not require, the following VM product: (1) The VM/System Product.

**COMPATIBILITY**

To implement the full capabilities of IPCS in the VM/System Product environment, and to correctly support the control block modified by the VM/System Product, installations should migrate to Release 2 of the VM/IPCS Extension program product.

**CONVERSION CONSIDERATIONS**

VM/IPCS provides a CONVERT command to reformat files established by the currently available VM/370 IPCS (Component 5749-DMM) to the format required by VM/IPCS Extension.

The facilities of Release 2 can be used with dumps previously processed by or files created by Release 1 of VM/IPCS Extension.

**DOCUMENTATION:** (available from Mechanicsburg)

- VM/Interactive Problem Control System Extension: General Information (GC34-2019)
  - VM/Interactive Problem Control System Extension: Program Summary (GC34-2018)
  - VM/Interactive Problem Control System Extension: User's Guide and Reference \*
  - VM/Interactive Problem Control System Extension: Logic \*
  - VM/Interactive Problem Control System Licensed Program Specifications (GC34-2025)
- \* Available with the availability of the IPCS Extension PP.



## AIRLINE CONTROL PROGRAM/ TRANSACTION PROCESSING FACILITY ACP/TPF (5748-T11)

### PURPOSE

ACP is a reliable, highly responsive, performance-oriented operating system for realtime transaction-driven applications. The ACP System provides the Multisystem Networking Facility within the framework of the Advanced Communications Functions (ACF) of SNA. The Multisystem Networking Facility is offered as a feature in a separately-orderable component called ACP/ACF. The ACP/TPF is a prerequisite to the ACP/ACF feature. The following is a description of the ACP/TPF Program Product and ACP/ACF feature when used in conjunction with the currently available PRPQ 5799-ACP Version 9 Release 2 (ACP 9.2).

### DESCRIPTION

ACP systems are characterized by thousands of terminals dispersed over a large geographical area where each location may have from one to several hundred terminals. ACP provides realtime inquiry and update to a large centralized data base where message length is relatively short in both directions and response time is generally less than 3 seconds.

A key attribute of ACP is its reliability and availability. This is a result of a well managed operation and the use of the many support tools provided with ACP:

- Over 280 operator commands.
- 1- to 3-minute system restart.
- Online data base load/dump/copy.
- Online debugging aids and offline test tools.
- Dynamic system performance monitoring.
- Processor, line, and I/O error recovery and recording.

**Applicability:** ACP is applicable to any online transaction oriented application which requires fast message response time from a large number of terminals. Some examples of applications are airline seat reservations ... hotel reservations ... credit authorization/verification ... car rental reservations/billing ... police car dispatching ... electronic funds transfer switching ... teller memo post ... message switching ... loan payment processing.

### SYSTEM SUPERVISOR

**Work Management:** Messages, entries, tasks and jobs are terms used to describe units of work in an operating system. The terms used in ACP are message or entry, both of which apply to the input characters that trigger a work unit.

At any one time, there are likely to be many entries in the system, each handling a unique unit of work. ACP will service existing entries which are ready to be processed before creating entries to service new input messages. The level of multiprogramming is controlled by the creation of entries, which is influenced by the amount of main storage available. Although entry processing may be deferred, the primary thrust is to speed an entry through the system.

**Main Storage Management:** The organization of main storage is one of the keys to the high performance of ACP. Part of main storage contains programs and data that are common to all entries and which remain in main storage. This portion is called fixed storage. Another portion, called working storage, is allocated to entries as required. Storage protection is used for fixed storage, inhibiting an application from illegally modifying the control program, core-resident application programs and critical data records. Working storage is divided into fixed size blocks. These block sizes are compatible over all levels of storage which permits the system to efficiently provide the application environment with the illusion of a single level of storage.

**Program Management:** Application programs are written in Assembler language and request control program services by means of system supplied macros. Programs may be allocated to fixed main storage or file storage. The main storage in which file resident programs must be placed in order to be executed is dynamically managed to eliminate redundant file accessing. The system uses a program sharing table to keep track of program segments that are currently in main storage. Through the use of system macros and system conventions all application program segments are re-entrant; therefore, one copy of the program may be shared by many entries at the same time.

**Data Management:** ACP considers the online files as a common data resource to be shared by the applications. An application may structure data to satisfy unique processing requirements, but the structuring is done within the context of the basic data structure supported by the system programs. The most primitive level of problem state data reference is done with symbolic addresses which supervisor programs use to locate a record on some physical storage media. Therefore, all problem state programs are independent of the physical residence of the data. The basic data structures are fixed, pool, tape, general file and general data set.

Fixed file records are records whose symbolic addresses are calculated by a system routine which uses a record type and an ordinal number. The record type identifies a set of data within the data base and the ordinal number identifies a relative record within the record type. The fixed file records appear as a sequential data structure to the application environment.

Pool records are records for which the system maintains an availability indicator for each record. When an application requests pool file space, ACP returns the symbolic address of one of the available records in the pool. When the application is finished with the record, the record associated with the address is marked available.

A common technique used by applications is to form data structures that use fixed records as indexes to pool records. The combination of fixed and pool structures provides the application designer with the tools to implement application oriented data management sub-systems in an ACP environment.

A number of important features are available to the user of fixed and pool structures:

**Record hold** is a method of reserving data records for the exclusive use of an entry during a record update. This feature prevents lost data when multiple entries are trying to update the same record.

**Record duplication** decreases the probability of losing critical data due to hardware failure and increases the accessibility of the records. If a record is duplicated, two copies, on separate devices, will be updated whenever file storage is updated. The additional copy reduces the probability that, upon retrieval, a record will be unavailable due to hardware failure. Most of the time both copies are available in which case the copy with the shortest device queue is used.

ACP has the capability of automatically logging all file updates to tape for selected record types. This function can be used for file backup.

File records with high reference frequencies may be selected for virtual file access (VFA). The main storage into which these records must be placed during application processing is managed to eliminate redundant file accesses. The system uses a record sharing table to keep track of records that are currently in main storage. VFA can potentially decrease the accessing requirements of the file subsystem.

The principle of a single level of storage keeps the devices on which the records are located completely transparent to the application. The file address reference which the Application Programmer references is completely independent of hardware characteristics. This device independence allows easy migration between file devices without application coding complications or modifications.

The organization of fixed and pool files distributes the records associated with a record type over physical file storage to reduce queuing time at the devices. Thus, when an application accesses successive records within a record type, each record may be obtained from a different physical component. The physical organization may be envisioned as a group of disk packs, each identical in format and type of contents. A record type forms equal layers on each pack. Each pack holds a portion of every fixed record type and every pool type included in the online files.

Tape files are classified into two categories, realtime and general. Realtime tapes are mandatory on a system and are used by ACP and applications for output critical to system operation and for testing. General tapes are treated as a sequential file and can be either written or read by the online system.

The records of a general data set are allocated sequentially within the same disk module. The allocation of a general data set to physical devices is done during online execution. The data set is dedicated to the entry requesting the use of the data set. The structure of the data within a general file or data set is application dependent.

**Restart:** ACP backs up critical data that resides in all levels of storage. The system data considered critical is grouped into special records called keypoints. In some cases, critical application data, backed up by the system, are grouped into records called globals.

Globals and keypoints are periodically written to different disk modules on a cyclic basis. In the event of a device failure from the primary back up device, the system can select an alternate disk module. A restart may be initiated automatically by ACP when it determines that such action is required, or by an operator taking a manual action. Restart time is usually one to three minutes.

**Cohabitation:** At other than peak periods, a relatively small amount of processor power is used by the ACP application environment. This available processor power is utilized by allowing OS/VS or an ACP test system to operate in the same processor with ACP. Cohabitation of ACP with OS/VS or ACP is accomplished with a software facility, known as the hypervisor, in conjunction with S/370 relocate hardware. The ACP hypervisor facility preserves the responsiveness of ACP applications by servicing ACP requests first. The Virtual Machine Assist (VMA) feature may be used to improve OS/VS performance, if it is

## ACP/TPF (cont'd)

available on the processor. The ACP and OS/VS or ACP test systems are protected from each other such that failure of one will not adversely affect the other.

The hypervisor allows sharing of the system byte and block multiplexer channels, control units and main storage. While input/output devices can not be shared by ACP and OS/VS, their assignment can be changed from one system to the other by the operator. Main storage must be partitioned into two fixed size areas, one for each system, when the processor is initialized.

The hypervisor supports OS/VS1 or OS/VS2 (SVS or MVS) or ACP test system under ACP. However, ACP and only one other system may coexist between system restarts.

**Operator Commands:** ACP provides a complete set of operator commands and programs to allow the operator to control the system. The commands perform such functions as hardware reconfiguration, altering system tuning parameters, changing the current application program version to be used, starting OS/VS operation under the hypervisor and sending broadcast messages. In all, there are over 280 different operator commands available. These commands can be entered from up to ten selected terminals that function as operator consoles.

### COMMUNICATIONS FACILITIES:

Both large terminal networks and computer networks are supported by ACP.

ACP's terminal environment consists of remote cluster controllers connected to the host system via medium speed communication lines using either Synchronous Data Link Control or Airlines Line Control.

ACP's computer network environment consists of remote central processing units connected to the ACP host system via medium speed communication lines using either Binary Synchronous Communication, Synchronous Link Control or Synchronous Data Link Control.

Extensive functional capabilities are provided in the area of message handling for long message input assembly and long message output transmission. Unsolicited message support allows the broadcasting of output from either an application or the computer operator. Application independence for the 3270 terminal is provided by the screen mapping and paging package.

Communications support functions include a comprehensive set of operator commands for network monitoring and control. Online utilities are provided to load and dump the programmable communications controllers (3705 and 3600). Reliability, availability and serviceability features include numerous communication trace functions as well as controller and link diagnostics.

**Systems Network Architecture:** ACP provides Systems Network Architecture (SNA) support for the 3600 Finance Communications System and for the 3270 Information Display System. The following functions are provided with SNA support:

- Distributed function of remote intelligent controllers.
- SNA and SDLC message integrity.
- SDLC line control efficiency.

In addition, the advanced communications function (ACF) provides for multi-system networking. The ACP/ACF feature supports cross system message routing, through which data may be transmitted across systems to its destination, without host intervention after initial session establishment.

ACP supports SNA interfaces with the SNA network via the 3705 Network Control Program (NCP/VS). The message protocol used by the 3600 application programs generated via the Program Customizer (PC3600) is supported by ACP.

**Performance:** SNA support is provided without compromise of the ACP high performance characteristics. For an inquiry message the instruction path is shorter than the performance oriented Airlines Line Control (ALC) path. This is primarily due to the line handling responsibilities assumed by the NCP/VS (i.e., polling, error recovery, translation).

In addition to the one input and one output message protocol used by PC3600, ACP provides support for attaching many terminals to a single SNA Logical Unit (LU) at a cluster controller. This feature is directed at the point of sale environment, where multiple terminals at the intelligent controller share a single SNA communication path to the host.

In any telecommunications system, the time required to perform a restart after a system interruption must be short. In keeping with the objective of less than 3-minute restart, the ACP SNA software does not automatically reinitialize the network on restart. Normally, the host and the cluster controllers will preserve message sequence numbers over a system interruption and no network initialization is required. However, following a 3705 failure, ACP performs the network start up function. This is performed in a fully parallel fashion to minimize the time required for network restart.

**Application Interface:** The ACP/application message processing interface consists of a parameter list with networking addressing formats used by system routines and a pointer to a main storage block containing the text of the message. This interface is common to all network components including those adhering to SNA protocols.

**Message Integrity/Security:** The complete message integrity capability provided in SNA by message sequence numbering is fully supported by ACP. The SNA sequence number of an inbound message is available to both the host and the cluster application programs. This number can be used for message recovery, audit trails and output reply correlation at the cluster controller.

As an optional feature, ACP provides a complete message recovery and reply tracking package. As each message is received in the host, it is analyzed by the application to determine if it is recoverable. ACP will write each recoverable message to the online disks and track the expected reply. When the reply is received from the application, it is written to disk and tracked until the positive response is received from the cluster controller. Recovery action is initiated if the application reply or the cluster response is not received within the specified time. In addition, ACP provides an application oriented recovery package which allows message recovery and data base recovery to be combined. This message recovery package can also be used by the application program to age messages sent to remote processors in the network.

ACP provides the support to encrypt and decrypt messages to or from the 3614 Consumer Transaction Facility. To facilitate the exchange of encrypted messages from any network end point (remote processors as well as 3614s), the encrypt/decrypt algorithm is provided as a supervisor call subroutine in ACP. Since this same algorithm is also provided in the 3600 software, all messages in the SNA 3600 network may be encrypted for maximum security.

**Message Handling:** ACP provides broad functional support in the area of message handling. Major areas of support include:

**Long Message Assembly -** Long messages sent from the remote controllers are segmented for transmission to the host. These segments are assembled on disk by ACP before presenting the entire message to the application program.

**Long Message Transmission -** Long messages sent by the application are segmented and queued on disk by ACP for transmission to the remote cluster controller. For 3600, these segments are transmitted using SNA pacing to protect against overloading the cluster controllers and the 3705. For 3270 these segments are collected by ACP and transferred to the NCP in a continuous data stream.

**Unsolicited Message Transmission -** An unsolicited message is an output message without a corresponding previous input. At the request of the application program, ACP queues unsolicited messages on disk by destination address. Prior to transmission, permission to send is requested and a positive response from the terminal or logical unit triggers the transfer.

**Bulk Data Transfer -** ACP provides specialized SNA support to facilitate the transfer of bulk data to and from the remote cluster controllers. Transmission of negative credit files and off-host authorized transactions are two examples of bulk data. On interactive transaction messages, the application is shielded from the details of the SNA message protocol by ACP. However, during long transmission the host application must establish meaningful checkpoints to minimize retransmission time in the event of a failure. For defined batch transfer logical units and application programs, ACP allows the application to receive, decode and send SNA responses. The normal long message assembly and transmit support is used in handling multiple segment output for the batch logical unit.

**Screen Mapping -** The application program achieves 3270 device independence by using the ACP screen mapping package to edit, construct and format 3270 data streams. Input messages originating at the terminal contain field oriented data consisting of device dependent control characters and message text. ACP deletes the control characters and presents the text to the application as a set of variable length data fields. This process is controlled by a predefined screen map. In the outbound direction, ACP constructs the terminal dependent data stream from the application provided data fields and the screen map.

**3270 Scrolling and Paging -** When a display message is greater than the screen size, it is either handled as a continuous scroll or as pages in a book. The application provides the display message as a long output message. After the first page is displayed on the screen, the terminal operator controls the screen with page or scroll commands. Scroll commands reposition the screen image a line or group of lines at a time. The entire process is controlled by the screen map which defines the page or scroll size. This feature facilitates split screen operation.

**1980/ALA (Alternate Line Attachment) -** Consumer Finance accounts have existing networks which include 1980 terminals. Support for the 1980/ALA RPO, which allows non-SNA terminals to be attached to a 3601-3 Finance Communications Controller, permits the use of a single host connection for 1980 terminals and the standard 3600 SNA devices.

**ACP/TPF (cont'd)**

**Support Functions:** The supporting functions provided with the ACP SNA capability include the following:

**Operator Commands** - These commands give the ACP computer operator the ability to control the SNA network. The status of an NCP, a line, a cluster controller or an individual logical unit may be displayed at the console. The operator may also stop or start any portion of the SNA network and may alter the frequency for host selection of the NCP.

**Online 3705 load/dump** - The 3705 may be loaded or dumped online in parallel with realtime operation. The OS/VS provided NCP generation process is used offline to create 3705 load modules. These load images are then stored in the online disk files and are transferred to the 3705 on command from the ACP operator. Dump images are temporarily accumulated online for later spooling to tape and offline printing in standard format.

**Online 3600 load/dump** - The 3600 and 3614 may be loaded online in parallel with realtime operation. The OS/VS provided Subsystem Support Services package is used offline to create remote controller load images. The load images are stored in the online ACP disk files and are transferred to a 3600 or 3614 on command from either the ACP operator's console or from the remote cluster. Dump images are temporarily accumulated online for later spooling to tape for offline printing in standard format by Subsystem Support Services.

**3705 and SDLC Link Diagnostics** - ACP provides for concurrent maintenance of the SNA network with online 3705 diagnostics. These 3705 resident diagnostics are activated from the ACP operator's console and perform data path tests in parallel with normal message flow in the NCP. The link test transmits a test message and receives an echo on the SDLC link without disturbing the normal message traffic on other lines connected to the NCP.

**Line and Message Trace** - ACP provides extensive communication trace facilities at a link and NCP level. These trace functions are initiated from the ACP operator's console and the output is written to a log tape for offline printing. All messages sent to and received from the NCP can be traced. Link trace is performed in the NCP with accumulated trace data forwarded to ACP for logging.

**Line Fallback** - In the event of a permanent SDLC failure, the host operator can perform link fallback by manually dialing the cluster controllers on the failing link. Normal message flow is resumed by an ACP operator command which makes the necessary control block adjustments. The application program is unaware of the address change that has taken place.

**Performance Measurement** - This package performs online gathering of raw measurements for the offline data reduction package. The reduction programs produce reports which can be used to determine input loads, output loads, message rates, message processing characteristics, line occupancy and response time. SNA communication statistics are compiled and presented at varying levels of detail, extending from the system as a whole to an individual logical unit. Since the host system is not fully aware of the line traffic in an SNA environment, statistics online occupancy is not possible for all SDLC lines.

**Network Generation** - A single SNA network definition (NCP system generation input) is used to create both the NCP and the ACP network tables. The ACP SNA table generation program runs independently of the ACP system generation. This facilitates network configuration changes and growth without requiring a new ACP system generation.

**Binary Synchronous Communications:** ACP provides Binary Synchronous Communications (BSC) support using standard point-to-point and multipoint data link protocols (for details see the *General Information - Binary Synchronous Communication Manual (GA27-3004)*).

ACP supports BSC line protocol with non-IBM as well as IBM systems.

**Data Link Operation:** The ACP support of BSC links is characterized by the following operational attributes:

**Transmission code** - To provide more general usability, ACP handles BSC lines operating with either EBCDIC or USASCII transmission code. EBCDIC transparency is optionally provided to allow the transmission of binary data between computers.

**Blocked transmission** - Long messages consisting of multiple message blocks can be received and sent by ACP. There is no limit to the total message size in either the inbound or the outbound direction.

**Send limit control** - To balance line utilization between input and output, ACP limits the number of output messages sent between input operations. The send limit is defined at network generation time and can be altered online by the ACP operator.

**Master/Slave contention priority** - BSC point-to-point message protocol allows each end of the line to contend for transmission time. When both ends bid for the line simultaneously, the contention is resolved by a master/slave relationship. ACP may be either master or slave. This attribute is defined by line at network generation time and can be changed online by the ACP operator.

**Control or tributary multipoint support** - The control station on a BSC line either polls or selects the tributary stations. Polling invites the tributary to send data. Selection requests permission to send from the control station to the tributary station. ACP may be either the control or the tributary station.

ACP interfaces with the BSC lines via the 3705 Emulation Program (EP). When SDLC and BSC links are connected to the same 3705, ACP supports the Partitioned Emulation Program (PEP).

ACP BSC support provides least queuing by communication line. When multiple lines exist between two computers, output messages are queued to the line with the smallest message queue. This balances the line usage and promotes fast delivery of messages.

When multiple BSC lines exist between two computers, ACP provides alternate line routing in the event that one or more of the lines fail. ACP also returns undeliverable messages to the originating application when all lines to a particular destination are inoperative.

**Message Integrity:** BSC line protocol requires positive acknowledgment. In addition, ACP provides a generalized message logging and tracking mechanism which can be used by the application programs. Prior to transmitting a request to a remote computer, the application can request that ACP log the output with any associated data and activate a time out. When the data reply is received from the remote computer, the application can retrieve the log record and deactivate the time out. ACP ensures the integrity of the log over a system interruption.

Although 3614 encryption is provided with the SNA support, this algorithm can also be used to encipher and decipher messages sent and received over BSC lines.

**Message Handling:** ACP provides normal long message handling for both incoming and outgoing long multiple block messages.

Blocked input messages are assembled on disk before presenting the entire message to the application program. While input message size and block size is unlimited, message blocks which are compatible with ACP core blocks are handled most efficiently.

Long output messages are segmented on disk by the application and are queued by ACP on a line basis. ACP controls the transmission of each block and ensures that the entire message is sent successfully. Although output message size is unlimited, output message blocks must be 1020 bytes or less.

**Operator commands** - A complete set of operator commands are provided for monitoring and control of the BSC network. The status of each line and station may be displayed at the operators console. The operator may stop or start any network component, alter lines operational characteristics, load or dump the 3705 or initiate selected online link diagnostics.

**Synchronous Link Control (SLC):** SLC is a highly efficient protocol designed to control the interchange of messages on a point-to-point link between two processors. The link is synchronous on full duplex, private leased voice grade lines. Each link consists of up to 7 communication lines. The transmission load is balanced across the available lines (parallel transmission of data blocks). ACP supports SLC links with lines operating at speeds of up to 9,600 BAUD. All data messages are sequenced allowing each processor to detect missing or spurious messages and permit corrective procedures. The 3705 (EP), in conjunction with a prerequisite RPQ (see special RPQs/features), is used to attach SLC lines to the processor.

**Airline Line Control (ALC):** Airline Line Control was developed to satisfy the high speed communications requirements of airline reservation applications, but has since been adopted by other industries. ALC uses synchronous line transmission, full duplex, on dedicated communications lines. The lines may be either leased common carrier or private.

ALC characters are 6 bits in length, allowing for more efficient use of the line. Transmission integrity is maintained using cyclic checks. Terminal interchanges (e.g., 2,946, 2,948) and the S/7 when used as a line concentrator, use ALC.

Polling is performed using roll call or hub polling methods. Roll call causes each interchange/concentrator to be separately polled by the processor. In hub polling, the processor initiates the polling scan by sending a poll to the most remote interchange/concentrator. The poll message then ripples automatically down to the closest remote interchange/concentrator. This significantly reduces processor polling overhead and increases line efficiency.

Extensive management facilities are available to control the ALC networks and provide status information. Operator commands are provided to alter or stop polling, reconfigure and display the status of individual network components. Segmentation and reblocking of long messages, and the handling of unsolicited messages are performed by the ACP.

The 3705 in conjunction with the Emulation Program (EP) and a prerequisite ALC RPQ (see special RPQs/feature), is used to attach ALC lines to the processor. ACP provides load (IPL) and dump support for

## ACP/TPF (cont'd)

the 3705 (EP). The Partitioned Emulator Program (PEP) is supported with the ALC RPQ for the 3705II with the type III scanner.

The S/7 (RMX S/7) is supported as a remote concentrator and provides the interface between line disciplines and the ALC functions in ACP. RMX S/7 can be used for the attachment of devices utilizing BSC and start/stop line disciplines (e.g., 3270, 2740). S/7 RMX utilizes standard software support (MSP 7 and TPMM) to provide the necessary line controls, translation, message queueing and processing functions.

Data collection counters are maintained in the RMX S/7 and, along with other data, are sent to the processor to facilitate the evaluation of the S/7 performance.

Screen Mapping/Paging functions, described earlier under SNA support, are also available to applications utilizing S/7 attached 3270s. The 3270 terminals can be logged onto a S/7 resident application. Log messages to non-S/7 resident applications are forwarded to ACP for processing.

**Networking:** ACP networking support provides the networking advantages of shared terminals, shared lines and reduced application/data base redundancy. Synchronous Data Link Control (SDLC), Synchronous Link Control (SLC) and Binary Synchronous Communications (BSC) may be used for intercomputer communication.

A *domain* within the ACP System in general, and SNA in particular, means a set of communication facilities (i.e., processors, channels, communications controllers, cluster controllers, lines, terminals and applications) identified to a single control point within a single S/370 processor for the purpose of establishing connections among the facilities. "Remote" domains may be identified to a given ("local") domain. This, in essence, extends the scope of connections permitted within a single domain by distributing the network identity to more than one processor. Establishing a connection between facilities in a remote domain within the framework of IBM networks always implies that the control information needed to establish the connection must at least flow through a processor, channel and communication controller in at least two domains. (This is not necessarily true for a domain identified in a non-IBM processor, i.e., the physical arrangement of the "processor" and the "communications controller" may be different than a S/370). Ordinarily, the control information to establish a cross domain connection will flow over an SDLC line, but cross domain connections may be established between two processor logical units attached via S/370 channels through the use of two channel adapters in the same communications controller.

The ability of *system supplied* programs to establish a connection on behalf of two facilities in different domains through the simple use of network names is called, for the purpose of describing ACP networking support, a *dynamic* interprocessor connection. In the ACP system, a dynamic interprocessor connection is characterized by the system supplied program called the Log Processor which is capable of interpreting a "Log In" (LOGI) message requesting a connection to a cross-domain resource. If special installation programs must be implemented to *establish* connections between communication facilities in different domains, then the connection is called a *relay* interprocessor connection. (Generally, relay applications define the remote processor to be a "terminal", or secondary SNA logical unit, and invent special rules or protocol to satisfy the unique connection.)

An ACP Message Router Package of the ACP Communications Control Program (CCP) supports dynamic interprocessor connections over BSC and SLC links. An SNA System Services Control Point (SSCP) component of the CCP supports dynamic interprocessor connections over SDLC links and uses the standard Advanced Communications Function (ACF) defined by SNA in support of Multisystem Networking Facilities. The SNA multisystem network support is simply called ACP/ACF. The ACP Message Router Package (support of BSC and SLC links) and ACP/ACF (support of SDLC links), both system supplied support for establishing dynamic interprocessor connections, are mutually exclusive.

However, an ACP System may be configured to use the ACP Message Router package for BSC and/or SLC dynamic interprocessor links which also uses the ACP support for SNA facilities in a single domain (i.e., not ACP/ACF). This simply means the SNA facilities in such an environment must use relay interprocessor connections to reach remote facilities. Alternatively, an ACP system may be configured to use ACP/ACF which implies that the non-SNA facilities must use a relay interprocessor connection to reach remote facilities. In an ACP/ACF environment:

1. A relay application, identified as a SNA Logical Unit (LU), may be used to support SDLC interprocessor connections between a non-SNA and a SNA facility.
2. A relay application must be implemented to support BSC or interprocessor connections between a SNA and a non-SNA facility.
3. A relay application must be implemented to support BSC or SLC interprocessor connections between two facilities both of which are non-SNA. Such a relay application can establish a connection

by taking advantage of a feature of ACP BSC support which associates network (application) names with BSC stations. However, the interprocessor connection cannot be established with the Log Processor.

The use of the ACP Message Router Package (BSC and SLC support) implies that each message that is routed through several domains must pass through a processor of each domain in the path traversed. The use of ACP/ACF means that after the interprocessor connection is established, the normal flow of a message routed through several domains need only pass through the communication controllers (3705s) of the path traversed. However, at least one of the end points in an SNA cross domain (dynamic interprocessor) connection must reside in a processor.

The ACP networking facility provides for terminal log-in, alternate line selection on errors and message least queueing for load balancing over multiple lines.

Terminals or SNA logical units may be either permanently logged into a fixed application or selectively logged in with a special terminal operator log-in message. The permanent log-in could be used for the point of sale environment, where many terminals share a single communication path to the host. The selective log-in provides more flexibility but still requires the terminal operator to input a special ACP login message.

Alternate line selection and least queueing are supported for SLC and BSC lines.

Alternate line selection is provided to ensure that messages are delivered to the addressed destination. If there are multiple lines to a remote computer and a line experiences a permanent failure, alternate lines may be used to transmit the message. If an alternate line is not available, the message is returned to the originator.

Least queueing is the selection of the communication line with the smallest queue for the transmission of output messages. This technique balances the communications load over multiple lines to a single destination and promotes prompt message delivery.

**Application Interface:** The networking interface is the common ACP/application interface used for communication with all network components regardless of line discipline or terminal characteristics. The message text and a small set of routing parameters are provided by ACP on initial entry to the application. On output the message text and associated routing parameters are returned to ACP. This interface also allows the application program to be independent of the computer which controls the terminals.

**Support Functions:** Networking functions include operator commands, network awareness, and network trace.

**Operator Commands -** Provide monitoring and control of the computer network. The status of the communications link (multiple lines) to a remote computer and of an individual application can be displayed at ACP operator's console. The capability to start or stop an individual application and a communications path is provided.

**Network Awareness -** When the status of an individual application is changed (stopped or started), this change is sent to all ACP systems in the network. In the event of a lost status change message, a complete status of all applications is sent on a time initiated basis. In this way, network awareness is maintained in the ACP components of the network.

**Network Trace -** Many terminals and applications may send a message to a single remote computer over one communications link. In this environment it is highly desirable to single out particular terminal or application traffic for tracing. ACP provides a network trace which allows console operator selection of specific network paths, trace points and trace data for collection.

**SNA Restrictions:** The following Advanced Communications Function (ACF) features as defined by SNA in support of Multisystem Networking Facilities are either not supported or are restricted by ACP/ACF.

- Resource takeover for Logical Units (LUs) controlled by another domain is not supported.
- Remote NCPs are not supported.
- Communication Controllers (3705s) shared among processors through the use of multiple channel adapters (multiple tails) within the controller *are* supported. However, if the SSCP of ACP/ACF is to own any logical unit (LU) in a node which is adjacent to the 3705 node and which is attached by an SDLC line, then it must own all such LUs.

### SUPPORT PROGRAMS:

Support programs include those that help ensure against permanent loss of data records, programs that facilitate the expansion of file storage, programs that assist in maintaining system file storage integrity and programs used in the initialization, installation and performance measurement processes.

**Capture/Restore:** The constant availability of the online data increases the exposure of file storage to the effects of software and/or hardware

PROGRAM PRODUCTS

ACP/TPF (cont'd)

malfunctions. This exposure is minimized by ensuring that critical data can be replaced if necessary.

Maintenance of file storage copies on auxiliary storage media (disk packs, tapes, etc.) helps ensure against the loss of critical data. The process of copying file storage to auxiliary storage is called CAPTURE, and the process of restoring the capture to file storage is called RESTORE. The period of capture typically varies from one per day to one per week depending on user requirements.

One means of capturing file storage is to stop the system, then using standard OS/VS utilities, copy the storage to disk or tape. This procedure prevents the online use of the ACP system during a capture. A second method is to use the online capture supplied with the ACP system. This program captures the files during normal system operation, but during periods of low activity. Each file storage device is copied to magnetic tape. Simultaneously, a separate tape, called an exception tape, collects a copy of all records modified while the capture is in progress. The combination of the two sets of tapes represents a consistent, and static capture of the data base at the instant the online capture program completes processing. A significant advantage of the Capture/Restore feature is that it permits 24 hour operation of the system by performing its function while the system is operational.

Restoration of a full system restores the system to the time and date of the capture. Further programs or procedures may be required to reconstruct the files due to the activity between the time of capture and time of restore. Since the data is application dependent, the additional reconstruction is a user responsibility. A way of accomplishing the reconstruction is by using an ACP facility to log all file updates. These updates can then be applied to the restored module(s).

**File Reorganization:** Normal system growth usually dictates an increase in the number of file storage devices. Addition of new devices provides an increase in both fixed and pool areas.

A fixed file reorganization program is provided to accomplish this expansion. This program collects all records in the fixed area using the record types and ordinal numbers of the old system definition. The records are written onto the new system configuration by using the new system definition of file storage. Since application programs use a record type ordinal number to reference fixed file storage records, the reorganization is transparent to the application.

**File Address Recoup:** Application programs may fail to return pool addresses, in which case the record is lost for further application usage, which diminishes the number of available pool records. Correction of application errors eliminates the problem but the system must recover the records. Also, whenever the system encounters a catastrophic failure some records may be made unavailable. The File Recoup program is provided to recover lost pool records so they can be made available to the system for further usage. The Recoup program interfaces closely with the application environment to determine which records are valid. A useful by-product of the File Recoup program is information which identifies application programs which may have lost the file pool addresses. Another useful function is surveillance of the data base to discover potential deterioration such as broken chain structures.

**Test Facilities:** A comprehensive set of test facilities is provided for application development and maintenance.

The ACP test facilities provide:

- A check on violations (or possible violations) of programming conventions.
- An orderly progression from simple debugging through complex multiprogramming tests including the entry of messages from terminals.
- A uniform data definition and data base for use in all levels of testing.
- The ability to batch various test runs.
- A flexible method to specify and/or modify data for each test, including the facility to restore the test data base between individual test cases.
- A method of simulating unavailable programs.
- Flexibility in specifying the types of output desired.
- Online components to assist in the detection of faulty programs.
- Offline components to print the results of a test.
- Debugging Aids (traces, formatted dump, address stop).

The ACP test facilities are designed to be used at three major levels of testing:

**Unit Testing:** The independent testing of an individual program segment.

**Package and Transaction Testing:** Testing several programs together to check the validity of interrelated functions within a package of programs. This may include testing a complete transaction in a single

or multi-thread environment. Multi-thread means concurrent entries will be processed by the package. Thus, the reentrant programming conventions are verified.

**System Test:** Multi-thread test through a realistic simulation of the environment in which the programs will ultimately operate.

COMPONENTS OF THE ACP TESTING ENVIRONMENT

**System Test Compiler (STC):** Used to create a test data base, input test messages and control information for a test unit. STC runs offline under control of OS/VS and is the primary vehicle for test data preparation.

**Program Test Vehicle (PTV):** Creates a testing environment which runs under ACP. Interfaces between PTV and the control program are used to provide comprehensive checks on application programs. PTV can be best thought of as an additional program loaded with an ACP system. This program, when activated, controls the execution of test cases. Live terminals can be active simultaneously with PTV.

**Real Time Trace (RTT):** Used to monitor and record the activity of application programs in the ACP system. RTT can be run either in an operational system or when testing under the control of PTV. The output of RTT is a historical record of input message and control program macro activity. The level of output detail is controlled by option indicators in functional messages when used in an operation environment, and by control statements when used in a PTV environment.

**Selective File Dump & Trace (SFDT) and System Test Post Processor (STPP):** Writes specified file records to tape and, in conjunction with the STC post processor, formats all traces and printouts of main storage for ease of analysis. Key areas with symbolic names are labeled. Data blocks associated with each entry are grouped with that entry.

**System Initialization Program (SIP):** This package consists of documentation, macros and programs that are used to generate an ACP system. The generator of a system using SIP assigns variables, using terms that are common to the environment. SIP is designed to ensure that the assignment of variables is complete and that the variables are consistent with one another.

SIP permits the system installers to declare ACP system parameters through the use of macro instructions. These SIP macro instructions are used by the OS/VS assembly program to process parameters which are dependent upon a unique system configuration. SIP macro instructions are used to generate a portion of the configuration dependent data macros as well as keypoints. The SIP macro instructions also produce the OS/VS job control language (JCL) which is necessary to catalog ACP macro definitions and assemble the ACP programs.

The major output of SIP is:

- An OS/VS object library of all online and offline programs.
- An OS/VS Load Module Library of ACP programs.
- The System Allocator Table (as an OS/VS data set) which assigns programs to their storage locations.
- Formatted Loader File which includes the assembled IPL program which loads the ACP system.

**System Performance Measurement:** System performance functions (data collection/reduction) are designed to provide operational data on significant activities involved in processing messages. By analyzing the reports generated by this package, the user can determine how efficiently the installation is running, discover where the bottlenecks are, and what changes in system allocation (core, file, lines, terminals) could improve system performance.

The major functions of this program are to:

- Provide a tool that can be used during the installation and post-cutover periods to tune the system to peak efficiency
- Provide a means of periodically monitoring system performance.
- Provide sufficient statistics so that long-term trends can be observed from the runs, thus providing the base for predicting growth in system load and justification for future expansion.

**Data Collection:** Collectors are run in a continuous or sampling mode, allowing multiple types of data to be collected while avoiding significant interference with message processing. All collection programs write the data gathered to an online tape. No attempt is made to reduce any of the data online, as this would defeat the objective of causing a minimum impact on the system being measured. Data collection can be run to provide a history file of key system parameters such as milliseconds per message, file accesses per message, core usage per message, program calls per message, message rate and message length. The above information, plus the transaction history and trend, can be used to predict the need for more memory, channels, files, lines, or terminals or the need for more processor capacity.

PROGRAM PRODUCTS

ACP/TPF (cont'd)

**Data Reduction:** All data reduction associated with the system performance package is executed under control of an OS/VS system. The data reduction reports are designed to be used by an analyst familiar with ACP, but not necessarily a statistician. Frequency distribution reports including means, standard deviations and variations of each parameter are also available.

This program is written in PL/1 to allow easy tailoring for each installation.

DEVICE SUPPORT

Processors - S/370

- Model 135, 135-3, 138
- Model 145, 145-3, 148
- Model 158, 158-3
- Model 168, 168-3
- Model 195
- 3033, 3032, 3031 Processors

Channels

- 2860-1,2,3 Selector Channel
- 2870-1 Multiplexer Channel
- 2880-1,2 Block Multiplexer Channel

Direct Access Storage Devices

- 2305-2 Fixed Head Storage
- 2314 Direct Access Storage Facility (with Airline Buffer RPQ)
- 2319 Disk Storage
- 2835-2 Storage Control
- 3830-1,2 Storage Control
- 3880-1 Storage Control
- 3330-1 Disk Storage
- 3333-1 Disk Storage
- 3340 Direct Access Storage Facility
- 3350 Direct Access Storage Facility (Native mode only)

Integrated File Adapter for mdl 135, 138  
Integrated Storage Control for mdls 145, 148, 158 and 168

Tape

- 240X Tape
- 2803 Tape Control
- 3420 Magnetic Tape Unit
- 3803 Tape Control

Unit Record

- 3211 Printer
- 3505 Card Reader
- 3525 Card Punch

Transmission Control Unit

- 2703 Transmission Control
- 2969 Programmable Terminal Interchange
- 3705-I, II Communications Controller (Locally attached)

Terminal Interchange/Control Units

- 1971 Terminal Control Unit
- 2946-4 Terminal Control Subsystem
- 2948 Display Terminal Interface
- S/7 (RMX/7) Remote Multiplexer
- 3271 Control Unit mdl 11, 12
- 3272 Local Control Unit mdl 1, 2
- 3274 Control Unit mdl 1B, 1C
- 3601 Finance Communication Controller (via 3705 mdl 1, 2A, 2B, 3A, 3B)
- 3602 Finance Communication Controller (via 3705 NCP) mdl 1A, 1B
- 3603 Terminal attachment Unit
- 7411 Terminal Control Unit
- 7441 Terminal Control Unit

Terminals

- 1977-1 Terminal Unit
- 1980-9 I/O Typewriter
- 1980-21/24 Terminal Printer
- 2740-2 Communication Terminal
- 2915-3 Display Terminal
- 3262 Printer
- 3268 Printer mdl 2
- 3275,77,78 Display Stations
- 3276 Control Unit Display Station mdl 11, 12
- 3284,86,87,89 Printers
- 3604 Keyboard Display mdls 1-6
- 3606 Financial Services Terminal mdl 1, 2
- 3608 Printing Financial Services Terminal mdl 1, 2
- 3610 Document Printer mdls 1-4
- 3611 Passbook Printer mdl 1, 2
- 3612 Passbook and Document Printer mdl 1, 2, 3
- 3614,24 Consumer Transaction Facility mdl 1, 2, 11, 12

- 3618 Administrative Line Printer mdl 1
- 3767 Communication Terminal (2740 Emulation)
- 4505 Video Display

Consoles

- 1052-7 Printer-Keyboard
- 2150 Console (with 1052-7)
- 3210-1 Console Printer-Keyboard
- 3215 Console Printer-Keyboard
- 7412 Console Console (with 3215)
- 3277 Display Station (with 328X Printer)

Features Recommended

- VM Assist
- Two Channel Switch
- DASD String Switch
- Tape Switching

RPQs/Special Features

3705 EP

Airline Line Control

- PRPQ #P85000 SABRE Line Control, one/3705 (3705-I only)
- RPQ #858655 SABRE Full Duplex Line Control, one/3705
- #4701 Line Interface Base, Type 1
- RPQ #858657 SABRE FDX Line Set, one/FDX line
- #1541 channel adapter type 1
- RPQ #858911 and #858912 3705-II type 3 Communication Scanner and type 4 channel adapter

Synchronous Link Control

- PRPQ #7S0003 Line Control FDX IATA, one 3705 (3705-I only)
- #1642 Communication Scanner, Type 2 only
- 4718 Line Set, Type 1H, 1/FDX Line

Binary Synchronous Communications

- #4714 Line Set, Type 1D, one/two HDX

System/7, ALC Line Control, BSC, 2740

Software

- TPMM 5799-WFG, MSP 7
- RMX/7

Hardware

- D08010 TP Multiplex Feature
- D08011 TP Multiplex Module
- D08123 TPMM Synchronous Direct Interface
- D08014 Interface Group
- D08015 Data Set Interface Cable
- 8K0703 3600 Alternative Line Attachment

CUSTOMER RESPONSIBILITIES

To successfully install and use ACP, the customer responsibility includes installing at least the minimum required machine configuration, communication equipment and appropriate communications lines. In addition, the customer must have installed the appropriate operating system as required by the ACP Support functions ... have a thorough knowledge of the ACP application ... train systems analysts, programmers and operators in ACP ... develop an implementation plan ... design and create a data base ... design terminal formats ... design and implement the ACP system ... prepare the physical site ... design and implement application programs using ACP macro instructions and the basic assembler language ... develop procedures to assure adequate security for data in the system ... develop appropriate backup procedures for the customer's application ... develop conversion procedures and schedules.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The minimum IBM hardware system configuration required for operating ACP.

- IBM S/370 mdl 135 - 512K bytes
- System Console (3215 or equivalent)
- Two IBM 3330, 3340 or 3350 Spindles
- Four IBM 3420 Tape Drives
- One IBM 3705 Communications Controller

**Configuration Alternatives:** System throughput is governed by the most restrictive system element and generally the processor instruction execution rate is the limiting element. Based upon this condition the communication and file subsystem should be designed to support the processor with the objective that they do not become the limiting system element.



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PP 5748-T11.7  
Nov 83

PROGRAM PRODUCTS

ACP/TPF (cont'd)

SOFTWARE REQUIREMENTS

ACP requires OS/VS1 or OS/VS2 for offline batch utility functions. If support for the IBM 3600 Finance Communication System is used, ACP requires those versions of OS/VS1 or OS/VS2 which support Subsystem Support Services (SSS). See the appropriate 3600 SRLs for required configurations needed to support OS/VS1 or OS/VS2.

In addition, ACP is designed to operate with NCP/VS which resides within the 3705 Communications Controller supporting SDLC lines. Support for BSC is through EP/VS. Support of the Partitioned Emulator Program (PEP) is provided for configurations requiring both SDLC and BSC lines.

DOCUMENTATION: (available from Mechanicsburg)

*Airlines Control Program/Transaction Processing Facility General Information Manual (GH20-2140) ... ACP System Concepts and Facilities (GH20-1473) ... ACP System Design Guide (ZZ30-3637).*



PROGRAM PRODUCTS

**AIRLINE CONTROL PROGRAM/  
TRANSACTION PROCESSING FACILITY (TPF)  
VERSION 2 (TPF2)  
TPF2/ACF Feature - TPF2/HPO Feature  
5748-T12**

**PURPOSE**

TPF2 is a high performance, high availability system for realtime applications. TPF2 systems are characterized by thousands of terminals dispersed over a large geographical area where each location may have from one to several hundred terminals. TPF2 provides realtime inquiry and update to a large centralized data base.

Key attributes of TPF2 are its reliability and availability. This results from a well managed operation and the use of support tools provided with the TPF2 system:

- 24 hour operation.
- Multi-application support and portability.
- Over 300 operator commands.
- Online debugging aids and offline test tools.
- CPU, line and I/O error recovery and recording.

The TPF2 program product is a system control program which has been designed for high performance and high availability as a transaction processor. The TPF2/ACF2 feature provides the facility for multi-system networking and distributed processing facilities at SNA3 levels. ACF2 is a prerequisite of the High Performance Option. The TPF2 HPO feature provides the ability to share a data base in a loosely coupled multi-processor environment.

**HIGHLIGHTS of TPF VERSION 2**

- Improved Recoup Capability - This enhanced utility has been integrated into the TPF2 program product. This program fulfills a need for a generalized utility for online pool record recovery and employs table driven descriptor records for ease of maintenance.
- Interactive Test Enhancements - The Interactive Program Test Facility (IPTF) is a tool to assist in the development and testing of TPF2 applications. IPTF supports interactive testing and debugging of TPF2 Entry Control Block controlled programs from a CRAS terminal. Test environments may be created, used for unit testing, saved, and reused for regression testing.
- Processor Support - TPF2 supports the 303X, 3083 and 4341 processors. The 3081 processor is supported in uniprocessor mode only.
- DASD Buffer - The typically high TPF message rate requires a very high data record retrieval rate. A 3350 DASD buffer is supported which reduces the impact of the data record retrieval rate by reducing channel and device utilization. This buffer has been made available by IBM as a hardware RPQ on the 3880 DASD control unit.
- 3705-80 Support - TPF Version 2 will support the 3705-80 Communications Controller.
- 3375 Support - TPF Version 2 will support the 3375 DASD Storage Device.
- Sabretalk Hooks - The capability has been added to TPF2 for executing programs which have been compiled by the sabretalk compiler, which may be used by some customers. This capability does not affect TPF2 performance.
- Functional Console - TPF supports Functional Consoles, a facility for distributing selected system messages to terminals which have been specifically enabled by the user.

**HIGHLIGHTS of the HPO FEATURE**

- Loosely Coupled Facility - Many larger TPF users have outgrown the largest uniprocessors. TPF2 offers these users a growth path for new application program development and growth of existing applications.

TPF2 extends the upper limit of TPF processing capability by supporting multiple processors which share a common data base. Up to four processors may share a common TPF2 data base. Processors may be added or removed from a TPF2 complex with minimal effect on system availability. Thus, the availability characteristics of a TPF system are enhanced in a TPF2 configuration using the loosely coupled facility. Functional console support improves the operability of a loosely coupled environment. Processors supported are the 3033 and the 3083J with requisite RPQs.

During periods of low activity, TPF2 processors may be removed from the complex and used for backup or other data processing requirements. These processors may be reintroduced during periods of high activity.

- Multiple data base function - TPF2, through support for Multiple Application Subsystems, permits concurrent processing of different

applications with separate data bases. TPF2 may support up to 64 discrete data bases, subsystems, each contained on different DASD devices. Each subsystem may present a unique perspective of the same data base to more than one subsystem user. Up to 128 subsystem users are permitted per subsystem with a maximum of 128 subsystem users in a TPF2 system.

A subsystem, or discrete data base, can be quiesced or moved to another processor without impacting other subsystems in the same processor. Applications using a data base operate independently and simultaneously with other subsystems, providing portability and individual control. New applications and equipment may be staged in a planned, orderly manner.

**HIGHLIGHTS of the ACF2 FEATURE**

- Network Participation - Through the facility of the ACF2 Feature, TPF2 provides support of SNA Advanced Communications Function (ACF) and Multisystem Networking Facility (MSNF). This support allows sharing of lines and terminals among multiple CPUs in an integrated network of computing systems. TPF2/ACF is a Cross-Domain Resource Manager (CDRM) and will communicate with the MSNF Facilities of ACF/VTAM, ACF/TCAM and other TPF/ACF CDRMs to control cross-domain session initialization, termination and recovery. The TPF2/ACF Feature supports cross system message routing. Through this facility data may be transmitted across systems to its destination without host intervention after initial session establishment. Also highlighted in the TPF2/ACF Feature is the support for Automatic Network Shutdown, Bi-directional Pacing, and Warm Start.
- The Network Extension Facility (NEF) - NEF, a PRPQ, enhances ACF/NCP/VS to allow 3705I and 3705II NCP management of Airlines Line Control (ALC) communication networks. This PRPQ (P09021) is supported by the TPF2/ACF Feature thus extending SNA-like benefits to ALC terminals.

**APPLICABILITY**

TPF2 is applicable to any online transaction oriented application which requires fast message response time from a large number of terminals. TPF2 is also applicable to users requiring high reliability and availability.

Some examples of applications are airline/seat reservations ... hotel reservations ... credit authorization/verification ... car rental reservations/billing ... police car dispatching ... electronic funds transfer switching ... teller memo post ... message switching ... loan payment processing.

**DESCRIPTION**

**MAIN SUPERVISOR**

**Processor Resource Management:** Shared resources, specifically a data base shared by several processors, is a facility which is offered with TPF2.

**System Task Dispatcher:** Messages, entries, tasks and jobs are terms used to describe units of work in an operating system. The terms used in TPF2 are message or entry, both of which apply to the input characters that trigger a work unit.

At any time, there are likely to be many entries in the system, each handling a unique unit of work. TPF2 will service existing entries which are being processed before creating entries to service new messages. The level of multiprogramming and the number of entries created is influenced by factors such as the amount of main storage available. Although entry processing may be deferred, the primary thrust is to speed an entry through the system.

**Main Storage Management:** The organization of main storage is one of the keys to the high performance of TPF2. Part of main storage contains programs and data that are common to all entries and which remain in main storage. This portion is called main fixed storage. Another portion, called working storage, is allocated to entries as required. Storage protection is used for fixed storage, inhibiting an application from illegally modifying the control program, core-resident application programs and critical data records. Working storage is divided into fixed size blocks.

The Virtual File Access (VFA) function retains high usage programs and data in main storage to reduce DASD accesses. TPF2 uses a record sharing table to manage records currently in main storage. VFA is application transparent.

**Program Management:** Programs may be allocated to fixed main storage or DASD storage. The system uses a program sharing table to keep track of programs currently in main storage. All application programs are re-entrant, therefore, one copy of the program may be shared by many entries at the same time.

PROGRAM PRODUCTS

TPF2 (cont'd)

**Restart:** TPF2 backs up critical data which resides on all levels of storage. System data considered critical is grouped into special records called keypoints. Critical application data is grouped into records called globals.

Keypoints are periodically written to different areas of DASD on a cyclic basis. In the event of a device failure from the primary backup device, the system can select an alternate disk module. A restart may be initiated automatically by TPF2 when it determines that such action is required, or by the operator when it is determined that such action is required.

**DATA BASE SUPPORT**

**Data Management:** TPF2 considers online files a common data resource to be managed by Subsystem. TPF2 achieves high performance through rigid disciplines, one of which is fixed data record sizes. Symbolic addresses are used to locate records on direct access storage media, thus application programs are unaware of the physical location of data. Data resources include fixed DASD records, "pools" of available DASD records, tapes, general DASD files and general data sets.

Fixed DASD records are retrieved by a program which calculates a DASD address from information (a record type and ordinal number) provided by the requesting program. Record type identifies a set of data records within a system data base and the ordinal number identifies a relative record within that set of data records. Fixed records appear to the application as sequential data which is also directly accessible.

TPF2 maintains data integrity through record duplication. Two copies of a record, on separate devices, may be maintained. The additional copy reduces the probability that a record will be unavailable due to hardware failure. This facility is transparent to the application program.

TPF2 supports the ability to share DASD records via a "pool" of available records. Pool records are controlled through the use of an availability indicator for each record. When an application requests file pool space, TPF2 returns the symbolic address of one of the available records in the pool. When the application is finished with the record, an indicator associated with the record address is again marked available. A data hierarchy of fixed and pool records, with the fixed records containing pointers to the pools, is a common technique in application data base design.

There are two categories of tape files, realtime and general. Realtime tapes are mandatory and are used by the TPF2 basic subsystem for logging information critical to system operation and for testing. General tapes are treated as a sequential file and are assigned to one entry at a time.

The records of a general data set are allocated sequentially within the same disk module. The allocation of a general data set to a physical device is done during online execution. General data sets are formatted as OS sequential data sets and dedicated to the entry requesting the use of the data set.

**Data Set Services:** Support programs, or system utilities, include those which protect against permanent loss of data records, facilitate the expansion of DASD storage and assist in maintaining DASD storage integrity. Programs, all of which are subsystem unique, which are used in the initialization, installation and performance measurement process include:

**Parametric Recoup** - Pool records are dispensed from a main storage resident control block. Some records are intentionally discarded on the occasion of system restart to avoid dispensing pool records already in use. Application programs may also, through error, lose pool storage records. The Parametric Recoup program determines which pool records are valid and which are not. Invalid or "lost" records are then recovered. The program functions concurrently with other system activity and does not affect system availability. Parametric Recoup employs table driven descriptor records for ease of maintenance. A useful output of the Recoup program is a report identifying application programs which may have lost pool references.

**Capture/Restore** - The TPF2 data base, typically operational 24 hours a day, must be protected from the effects of software or hardware malfunctions. Capture/Restore, a utility which runs concurrently with other system activity, copies DASD module storage to magnetic tape, thus ensuring that critical data can be replaced if necessary. An "exception" tape collects a copy of any record modified while the capture is in progress. The combination of the two sets of tapes represents a consistent, and static capture of the data base at the instant the online capture program completes processing.

Restoration is a reversal of this procedure. The reconstruction of a data base, a user responsibility, may be accomplished through the use of a TPF2 facility to log updates to tape. These updates are applied to the restored data base.

**Data Base Reorganization** - If it is determined that the DASD configuration is inadequate, a user may employ this utility to alter

his online DASD storage configuration. This program redistributes the TPF2 data base over more, or fewer, DASD devices. This reorganization is transparent to an application.

**DATA COMMUNICATIONS SUPPORT**

**Data Communication Services:** TPF2 includes an array of computer operator facilities for system and network management:

**Operator Commands** - TPF2 provides a set of operator commands and programs to allow the operator to monitor and control the system and the network. Status of an NCP, line, cluster controller, or logical unit may be displayed. The facility to start or stop an individual application and communication path is provided. Over 300 operator commands may be entered from up to 99 selected terminals which function as operator consoles. Functional consoles are supported. This is a facility for distributing selected system functions to specifically enabled terminal(s).

**Network Generation** - A single SNA network definition (NCP system generation input) is used to create both the NCP and the TPF2 network tables. The TPF2 SNA table generation program runs independently of the TPF2 system generation. This facilitates network configuration changes and growth without requiring a new TPF2 system generation.

**Network Trace** - Many terminals and applications may send a message to a single remote computer over one communications link. In this environment it is highly desirable to single out particular terminal or application traffic for tracing. TPF2 provides a network trace which allows console operator selection of specific network paths, trace points and trace data for collection.

**Line and Message Trace** - TPF2 provides communication trace facilities at the link and NCP level. These trace functions are initiated from the TPF2 operator's console and the output written to a log tape for offline printing.

**Online 3705 and 3600 or 4700 Load/Dump** - The 3705 and the 3600 or 4700 may be loaded or dumped online in parallel with realtime operation. NCP and 3600 or 4700 load images, generated offline, are stored on the online disk files and loaded to the devices on command from the TPF2 operator. Dump images are temporarily accumulated online for later spooling to tape and offline printing. Load image generation and dump formatting is provided by System Support Services (SSS) for 3600 and Host Support for 4700.

**3705 and SDLC Link Diagnostics** - TPF2 provides concurrent maintenance of the SNA network with online 3705 diagnostics. 3705 resident diagnostics are activated from the TPF2 operator's console to perform data path and link tests.

**Performance Measurements** - This package determines input loads, output loads, message rates, message processing characteristics, line occupancy and response time. Since the host system is not fully aware of the line traffic in an SNA environment, statistics on line occupancy is not possible for all SDLC lines.

**Long Message Support** - Segmented input messages are assembled by TPF2 before being presented to the application. Long output messages are segmented and queued on disk for transmission. For the 3600 or 4700 controllers, these segments are transmitted using SNA pacing. TPF2 provides specialized SNA support to facilitate the transfer of bulk data such as negative credit files to and from remote cluster controllers.

**Unsolicited Message Transmission** - An unsolicited message is an output message without a corresponding previous input.

**Screen Mapping** - An application program can achieve 3270 device independence by using the TPF2 screen mapping package to edit, construct and format 3270 data streams. This process is controlled by a predefined screen map.

**3270 Scrolling and Paging** - When a display message is greater than the screen size, it is either handled as a continuous scroll or as pages in a book. The entire process is controlled by the screen map which defines the page or scroll size. This function facilitates split screen operation.

**COMMUNICATION FACILITIES**

Both large terminal networks and multiple computer networks are supported by TPF2. TPF's terminal network consists of remote cluster controllers connected to the host system via communication lines using either Synchronous Data Link Control (SDLC) or Airlines Line Control (ALC). SDLC, Synchronous Link Control (SLC) and Binary Synchronous Communications (BSC) are supported for communication between processors.

Application programs are independent of the processor which controls the terminals. Message text and a small set of routing parameters are provided by TPF2 on initial entry to the application. Message text and associated routing parameters are returned to TPF2.

The TPF2/ACF Feature of TPF2 provides for multi-system networking. TPF2/ACF supports cross system message routing, through which data

PROGRAM PRODUCTS

**TPF2 (cont'd)**

may be transmitted across systems to its destination, after initial session establishment, without host intervention.

**Systems Network Architecture (SNA):** TPF2 interfaces with an SNA network via the 3705 Network Control Program (ACF/NCP/VS) and is compatible with ACF/VTAM and ACF/TCAM. TPF2 supports the attachment of the 3270 Information Display System and the 3600 and 4700 Finance Communication Systems. TPF2 provides:

**Fast Network Restart** - When TPF2 is restarted it will assume the network is still active. Error conditions such as NCP Slow Down, Automatic Network Shutdown, and lost input or output messages are handled as exception conditions by error recovery routines.

**Application to application communication** provided through Application Program Interface (API) extensions.

**Support of inbound message traffic pacing** between application programs or supported terminals - This support can help to avoid buffer overrun.

**Support of 3705-I, 3705-II and 3705-80 multiple channel attachment capabilities** through ACF/NCP/VS - This allows a single communication controller to be shared by several processors. A 3705-II can support a maximum of four host systems.

**Network Operator Display Commands** - A network operator may obtain more information about the status of network resources such as nodes, lines, terminals, logical units, physical units and application programs.

**Capability for dynamic collection of tuning statistics** - I/O interface data may be dynamically collected. Such data may aid a user in selecting optimum values for system parameters.

**Extended serviceability** through support of the ACF/NCP/VS capability to concurrently trace up to eight lines attached to a 3705.

**Extended availability** through improved line fallback support for SNA devices - This facility allows a cluster controller to use an alternate path to the host should the primary path become inoperable. Use of an alternate path is completely transparent to user applications.

**Optimized management and control** of a user's data communications installation - This support includes:

- Enhanced SDLC data link test.
- Terminal connectivity test.
- Intensive mode recording of SDLC data link errors.
- Dynamic display of ACF/NCP/VS storage.
- Dynamic dump of ACF/NCP/VS storage.
- Network operator control for session termination.
- Operator command enhancements.
- Display command enhancements.

The message integrity capability provided in SNA by message sequence numbering is fully supported by TPF2. Additionally, TPF2 provides the support to encrypt and decrypt messages to or from any device.

As a system generation option, TPF2 provides a Message Recovery package which ensures each input message is successfully processed and its reply successfully delivered. TPF2 also provides an application oriented recovery package which allows message recovery and data base recovery to be combined.

**Multi-Host Networking** - A multi-host network is created by interconnection of single host networks. This permits sharing of applications and terminals in any domain by any user in the multi-host network. TPF2 participation in a multi-host network requires the TPF2/ACF2 feature. Connection to a multi-host network is through ACF/NCP/VS (Release 3). Connection to another host may be through an SDLC communication line or a 3705 with multiple channel adapters. TPF2 multi-host network support allows communication with the following hosts:

- ACF/VTAM
- ACF/TCAM
- TPF2/ACF2

The key facility provided by TPF2 multi-host networking support is a Cross-Domain Resource Manager (CDRM). A CDRM establishes/terminates and maintains cross-domain sessions. Once a session is established, normal flow of data between end points is direct and host intervention is not required.

Cross-domain communication between non-SNA facilities (terminals and applications) or over non-SNA links requires a relay program to be implemented. This program may be used to support the following:

1. Cross-domain communication between TPF2 terminals and applications and a remote host over BSC or SLC communication lines.
2. Communication between non-SNA TPF2 terminals and applications and a cross-domain SNA host.

The following Advanced Communications Function (ACF) functions as defined by SNA in support of Multisystem Networking Facilities are not supported by TPF2/ACF:

1. Resource takeover for Logical Units (LUs) controlled by another domain.
2. Remote NCPs.

**Binary Synchronous Communications (BSC):** TPF2 provides BSC support using standard point-to-point and multipoint data link protocols (for details see the *General Information - Binary Synchronous Communication Manual (GA27-3004)*).

TPF2 interfaces with the BSC lines via the 3705 Emulation Program (EP). When SDLC and BSC links are connected to the same 3705-I or 3705-II, TPF2 supports the Partitioned Emulation Program (PEP).

TPF2 BSC support includes least queuing by communication line and alternate line routing.

TPF2 provides a generalized message logging and tracking mechanism which can be used by the application programs.

**Synchronous Link Control (SLC):** SLC is a highly efficient protocol designed to control the interchange of messages on a point-to-point link between two processors. The link is synchronous on full duplex, private leased voice grade lines. Each link consists of up to 7 communication lines. The transmission load is balanced across the available lines (parallel transmission of data blocks). TPF2 supports SLC links with lines operating at speeds of up to 9,600 BAUD. All data messages are sequenced allowing each CPU to detect missing or spurious messages and permit corrective procedures. The 3705 (EP), in conjunction with a prerequisite RPQ (see RPQs/Special Features), is used to attach SLC lines to the CPU. When SDLC and SLC links are connected to the same 3705, TPF2 supports PEP.

**Airlines Line Control (ALC):** This high speed, full duplex, synchronous line control provides:

- 6 bit line characters with cyclic check characters.
- Polling - roll call or hub.
- Operator commands for ALC network control.
- Unsolicited messages.
- Screen mapping and paging.

The 3705-I or 3705-II in conjunction with the Emulation Program (EP) and a prerequisite ALC RPQ (see RPQs/Special Features), is used to attach ALC lines to the CPU. When SDLC and ALC links are connected to the same 3705, TPF2 supports PEP. TPF provides load (IPL) and dump support for the 3705 (EP). The Partitioned Emulator Program (PEP) is supported with the ALC RPQ for the 3705-II with the type III scanner.

ALC lines are also supported through the use of the Network Extension Facility (NEF) PRPQ. This PRPQ which runs in conjunction with ACF/NCP/VS in the 3705 provides a bridge between ALC lines and SNA service routines which process and pass SNA messages to the host system.

The System/7 (RMX System/7) is supported as a remote communication concentrator. RMX System/7 can be used for the attachment of 3270 BSC and 2740 start stop devices.

**SYSTEM INSTALLATION SUPPORT**

**System Initialization Program (SIP):** The SIP package consists of programs, macros and documentation used in generating a TPF system. A user assigns values to macro parameters using terms which are self explanatory. SIP ensures that necessary parameters are completed and that parameter values are consistent with one another. SIP macros also produce batch job control language (JCL) which is necessary to catalog TPF macro definitions and assemble TPF2 programs.

SIP provides:

- An object library of all online and offline programs.
- A Load Module Library of TPF2 programs.
- The System Allocator Table which assigns programs to their storage locations.
- Formatted Loader File which includes the assembled IPL program which loads the TPF2 system.

**PROGRAMMING DEVELOPMENT SUPPORT**

A comprehensive set of test facilities is provided for application development and maintenance. The TPF2 test facilities are designed to be used at three major levels of testing:

**Unit Testing** - The independent testing of an individual program segment.

**Package and Transaction Testing** - Testing several programs together to check the validity of interrelated functions within a

PROGRAM PRODUCTS

TPF2 (cont'd)

package of programs. This may include testing a complete transaction in a single or multi-thread environment.

**System Test** - Multi-thread testing through a simulation of the environment in which the programs will ultimately operate.

TPF2 Facilities which support application testing include:

**Interactive Program Test Facility (IPTF):** Allows testing and debugging of TPF2 applications. A user may create the testing environment. This environment allows the programmer to dynamically build a test Entry Control Block, set up controls and stop the execution of the tested program at any point. The programmer may test, modify and retest without leaving a terminal. Test environments may be created, used for unit testing, saved and reused for regression testing.

**System Test Compiler (STC):** STC is used to create a test data base, input test messages and control information for a test unit.

**Program Test Vehicle (PTV):** PTV provides a testing environment running under TPF2 and controls the execution of test cases. Live terminals can be active simultaneously with PTV.

**Real Time Trace (RTT):** RTT is used to monitor and record activity of application programs in the TPF2 system.

**System Performance Measurement:** Collectors are run in a continuous or sampling mode, allowing multiple types of data to be collected while avoiding significant interference with message processing. All collection programs write the data gathered to an online tape. No attempt is made to reduce any of the data online, as this would defeat the objective of causing a minimum impact on the system being measured. Data collection can be run to provide a history file of key system parameters such as milliseconds per message, DASD accesses per message, core usage per message, program calls per message, message rate and message length. The above information, plus the transaction history and trend, can be used to predict the need for more memory, channels, DASD, lines or terminals or the need for more CPU capacity.

**Data Reduction** - All data reduction associated with the system performance package is executed under control of an OS/VS system. The data reduction reports are designed to be used by an analyst familiar with TPF2, but not necessarily a statistician. Frequency distribution reports including means, standard deviations and variations of each parameter are also available. This program is written in PL/1 to allow easy tailoring for each installation.

**CUSTOMER RESPONSIBILITIES**

To successfully install and use TPF2, the customer responsibility includes installing at least the minimum required machine configuration, communication equipment, and appropriate communications lines. In addition, the customer must have installed the appropriate operating system as required by the TPF2 support functions ... have a thorough knowledge of the TPF2 application... train systems analysts, programmers and operators in TPF2 ... develop an implementation plan ... design and create a data base ... design terminal formats ... design and implement the TPF2 system ... prepare the physical site ... design and implement application programs using TPF2 macro instructions and the basic assembler language ... develop procedures to assure adequate security for data in the system ... develop appropriate backup procedures for the customer's application ... develop conversion procedures and schedules.

**TPF2 ACF FEATURE: Advanced Communication Function:** TPF2/ACF provides the capability to link multiple processors through TPF2/ACF support of SNA Advanced Communications Function (ACF) with the Multisystem Networking Facility (MSNF).

This support extends to:

- Sharing of lines and terminals among multiple CPUs.
- Control of cross-domain session initialization, termination and recovery.
- Cross system message routing without host intervention.
- Multiple channel adapters.
- Automatic network shutdown.
- Bi-directional pacing.
- Warm start.

**TPF2 HPO FEATURE: Loosely Coupled:** The TPF2 loosely coupled facility extends the upper limit of TPF2 capability by supporting multiple processors which share a common data base. Up to four processors may share a common TPF2 data base.

TPF2 locks data at the record level. The "record hold" function which has been a function of TPF since its inception has been engineered into the 3830 and 3880 DASD control units through RPQs with supporting microcode. In a shared data base environment, failure of a control unit need not cause a system outage since locks maintained in a control unit may be moved to backup control units. The RPQ'd control unit, under

TPF control, restricts individual record access, for purposes of modifying that record, to one of the loosely coupled processors. This record hold facility is transparent to existing application programs.

Processors may be added or removed from a TPF2 complex using the loosely coupled facility with minimum effect on end user availability. Processors supported are the 3033 and 3083J with requisite RPQs. This approach provides favorable backup and migration options as additional processors may be added at any time for lateral growth.

To take full advantage of a TPF2 system, all components should be duplicated. Then a failure, hardware or software, on any system component will affect performance to some degree but would have no effect on availability. TPF2 enhances the already demonstrated reliability of TPF1.

The integrity of a shared data base must be maintained. Clock Synchronization is provided to provide the TPF2 loosely coupled complex with Time of Day (TOD) clocks which are driven from a single source. Maintenance of global system data presents a similar problem which is managed by Interprocessor Communication (IPC). IPC is affected through the use of a dedicated DASD control unit employing the Limited Lock RPQ and a single storage device.

During periods of low activity, TPF2 processors may be removed from the complex and used for backup or other data processing requirements. These processors may be reintroduced during periods of high activity.

**Multiple Data Base:** Users may opt to run, on the same processor, unrelated applications and data bases. This option, which may be elected at system generation time, is the multiple data base function. Multiple data base function provides significant data base flexibility, allowing for separate and portable application data bases and providing improved integrity and security of data. These discrete data bases, contained on separate physical devices, are isolated and protected from other such data bases. In this environment, new applications may be designed and added to TPF2 without impacting existing applications and data bases.

Each group of applications, sharing a data base, is treated as a unique TPF2 subsystem. Each subsystem provides for shared data base, file pool, globals and application programs. Subsystems are independent and protected from other subsystems, thus assuring that new applications and equipment can be assimilated in a planned, orderly manner.

A primary or basic subsystem is used for operational control of all TPF2 resources.

Each subsystem, including the basic subsystem, may have multiple subsystem users. Subsystem users perceive a subset of the subsystem data base. Data may be shared by subsystem users or may be reserved for a particular subsystem user. This function permits up to 64 subsystems and up to 128 subsystem users which may exist in any combination on a TPF2 system.

A major advantage of the multiple data base function is the ability to add and remove applications within a TPF system by adding or removing subsystems. Each subsystem assumes the characteristic of portability and may be invoked online or quiesced and removed while preserving a transparency to all other subsystems.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**IBM DEVICE SUPPORT**

**Central Processing Units**

- 3031, 3032, 3033, 3033N, 3033S Processors
- 3081D Processor (uni-processor mode only)
- 3081K Processor (uni-processor mode only)
- 3083 Processors
- 4341 Processor
- 9083 Processor (RPQ)

**Channels**

Data Streaming on 3033, 3081, 3083, 9083

**Direct Access Storage Devices**

- 2305-2 Fixed Head Storage
- 3830-2 Storage Control
- 3880-1, 2, 3 Storage Control
- 3330-1 Disk Storage
- 3333-1 Disk Storage
- 3340 Direct Access Storage Facility
- 3350 Direct Access Storage Facility (native mode only)
- 3375 Direct Access Storage Facility
- 3380 Direct Access Storage Facility

**Tape**

- 240X Tape (303X and 4341 only)
- 2803 Tape Control (303X and 4341 only)

**PROGRAM PRODUCTS**
**TPF2 (cont'd)**

3420	Magnetic Tape Unit
3803	Tape Control
<b>Unit Record</b>	
1403	Printer
3211	Printer
3262	Printer
4245	Printer
2540	Reader/Punch
3505	Card Reader
3525	Card Punch
<b>Transmission Control Unit</b>	
3705-I, II	Communications Controller (locally attached)
3705-80	Communications Controller (locally attached)
<b>Terminal Interchange/Control Units</b>	
1971	Terminal Control Unit
2946-4	Terminal Control Subsystem
2948	Display Terminal Interface
System/7	Remote Multiplexor (RMX/7)
3271	Control Unit mdl 11, 12
3272	Local Control Unit mdl 1, 2
3274	Control Unit mdl 1B, 1C
3276	Control Unit/Display Station mdl 11, 12
3601, 3602	Finance Communication Controller(s) with attached devices (note 1)
3614, 3624	Consumer Transaction Facility
4700	Finance Communication Controller(s) with attached devices (notes 1 & 2)
7411	Terminal Control Unit
7441	Terminal Control Unit
System/36	System/36 (note 1)
8100	Information System (notes 1 & 3)
SLU Type P	(includes 3600, 4700, System/36, 8100) (note 1)

Note 1: See appropriate Sales Manual pages.  
 Note 2: 4700 may be supported as a 3600 controller.  
 Note 3: 8100 may be supported as a 3270 control unit.

**Terminals**

1977-1	Terminal Unit
1980-9	I/O Typewriter
1980-21/24	Terminal Printer
2740-2	Communication Terminal
2915-3	Display Terminal
3275	Display Station
3277	Display Station
3284, 86, 87, 89	Printers
3767	Communication Terminal (2740 Emulation)
4505	Video Display

**Consoles**

3210-1	Console Printer-Keyboard
3215	Console Printer-Keyboard
7412	Console (with 3215)
3277	Display Station (with 328X Printer)
3278-IIA	Display Station (with 328X Printer)
3036-1	Console

**Features Recommended**

Two Channel Switch  
 DASD String Switch  
 Tape Switching

**RPQs/Special Features**
**3705 EP/VS**
**Airlines Line Control**

PRPQ #P85000 SABRE Line Control, one/3705 (3705-I only)  
 RPQ #858655 SABRE Full Duplex Line Control, one/3705  
 #4701 Line Interface Base, Type 1  
 RPQ #858657 SABRE FDX Line Set, one/FDX line  
 #1541 channel adapter type 1  
 RPQ #858911 and #858912 3705-II type 3 Communication  
 Scanner and type 4 channel adapter

**Synchronous Link Control**

PRPQ #7S0003 Line Control FDX  
 IATA, one 3705 (3705-I only)  
 #1642 Communication Scanner, Type 2 only  
 4718 Line Set, Type 1H, 1/FDX line

**Binary Synchronous Communications**

#4714 Line Set, Type 1D, one/two HDX

**3705 ACF/NCP/VS**
**Airlines Line Control**

PRPQ P09021 Network Extension Facility (NEF)  
 System/7, ALC Line Control, BSC, 2740

**Software**

TPMM 5799-WFG, MSP7  
 RMX/7

**Hardware**

D08010	TP Multiplex Feature
D08011	TP Multiplex Module
D08123	TPMM Synchronous Direct Interface
D08014	Interface Group
D08015	Data Set Interface Cable
MK2436	Limited Lock (on 3830 DASD CU)
MK2292	Limited Lock (on 3880 DASD CU)
MM1301	Clock Synchronization (on 3033)
ML2922	3350 DASD Buffer
8P0861	Queued Request Facility (QRF) (first RPQ)
8P0863	Queued Request Facility (QRF) (subsequent RPQs)

**SOFTWARE REQUIREMENTS**

TPF2 may be used alone or with the ACF Feature. The TPF2 HPO Feature facility requires the TPF2/ACF2 Feature as a prerequisite.

A TPF2 user is required to have an OS/VS1 or MVS system installed for offline batch and utility functions.

The Assembler H program product (5734-AS1) is required for TPF2 program assemblies. The PL/1 Optimizing Compiler (5734-PL3) is required for compilation of TPF2 Data Reduction programs.

If support for the IBM 3600 or 4700 Finance Communication System is used, TPF2 requires those versions of OS/VS1 or MVS which support Subsystem Support Services (3600) or Host Support Services (4700). See the appropriate 3600 or 4700 SRLs for required configurations needed to support OS/VS1 or MVS. The 4700 appears as a 3600 and is transparent to the TPF2 system.

TPF2 supports the protocol used by application programs generated by the program customizer, PC3600. TPF2 3600 Load/Dump accommodates the attachment of the 4700 system.

In addition, TPF2 is designed to operate with ACF/NCP/VS which resides within the 3705 Communications Controller and supports SDLC lines. Support for BSC, SLC and ALC is through EP/VS. Support of the Partitioned Emulator Program (PEP) is provided for configurations including both SDLC and EP-supported lines.

**DOCUMENTATION**

(available from Mechanicsburg)

*ACF/TPF System Concepts and Architecture* (GH20-2157) ...  
*ACF/TPF Application Programmer's Guide* (GH20-2141) ... *ACF Installation Overview* (GE20-0597)

**RPQs ACCEPTED: No**

**OFFLINE IBM 3800 UTILITY PROGRAM PRODUCT  
5748-UT2****DESCRIPTION**

The Offline IBM 3800 Utility program product provides the offline 3800 user with the same functional capability as is available to the online 3800 user. The utility, which is executed in an online S/360 or 370 environment, can be used to create control information and place it on magnetic tape which can be used to set up the 3800 for the printing of user data.

**HIGHLIGHTS**

The Offline IBM 3800 Utility:

- Provides the offline 3800 user with powerful utility control statements to achieve the full range of function available to the online 3800 user.
- Provides functions (graphic character modification, user-designed characters, national use graphics, copy modification, and user-defined character arrangement tables) not available through operator control or default selection.
- Promotes increased throughput and decreased risk of operator error by reducing operator intervention.
- Provides flexibility to place control files on the same tape volume as print files or on a separate tape volume.
- Provides operator communication via printed output on the offline 3800.
- Prints the contents of tape control files on an online system printer.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

The utility operates on all IBM S/360s and 370s supported by the programming systems specified below.

The storage requirements for OS and OS/VS (real or virtual) are 64K bytes for program execution in addition to that required by the prerequisite operating system. An additional 8K bytes will be required if copy modification modules or graphic modification modules are loaded.

In order to operate the Tape-To-Printing Subsystem feature of the 3800, the utility output is written to 9-track tape with a density of 800, 1600 or 6250 bpi or to 7-track tape with a density of 200, 556 and 800 bpi, odd parity and the data converter feature.

**SOFTWARE REQUIREMENTS**

The Utility operates with OS/VS1 Release 6, OS/VS2 Release 1.7 (SVS), OS/VS2 Release 3.7 (MVS), OS/MVT Release 21.8 and DOS/VS Release 34. The Utility will also run under VM/370 Release 3 using one of the systems mentioned previously.

**DOCUMENTATION:** (available from Mechanicsburg)

*Introducing the IBM 3800 Tape-To-Printing Subsystem Feature and its Utility (5748-UT2) (GA26-1653) ... Forms Design Reference Guide for the IBM 3800 Printing Subsystem (GA26-1633) ... IBM 3800 Printing Subsystem Character Design and Coding Form (GX26-3713).*

**TERMS and CONDITIONS:** See PP Index

## DISPLAY MANAGEMENT SYSTEM/3790 5748-XC2

[ NO LONGER AVAILABLE, effective May, 1983. ]

### PURPOSE

This program product is a productivity aid for users of the 3790 Communication System that eases the design, coding, testing and support of the 3790 application programs. The DMS/3790 program product consists of a forms-oriented program generator for modules interfacing with the operator terminals, a teleprocessing interface program, and a set of macros to invoke functions, retrieve data, and manage the program's working storage.

### DESCRIPTION

The DMS/3790 program product produces a class of programs referred to as screen handlers. The user defines the screen handler on a set of forms that is provided with DMS/3790. These forms allow the user to describe layouts (screen, line printer or 3793), input and output fields and the editing characteristics of these fields. In addition, the meaning of program function keys, program attention keys and selector pen detectable fields can be described. The output of the 3790 Program Generator will be programs which are ready for assembly. A facility is also available which will allow these forms to be prepared interactively under CICS/VS, TSO or VM/370.

DMS/3790 will provide the Communications Interface Monitor (CIM) as an optional feature. This feature manages communications between 3790 user application programs and IMS/VS or CICS/VS. CIM supports opening and closing of sessions with IMS/VS and CICS/VS, recovering from sessions that failed due to errors, sending messages to and receiving replies from the host system and storing replies in 3790 user buffers, indexed or relative data sets or work area files. CIM supports CICS/VS Release 1.3 and IMS/VS Release 1.1.4 host applications using VTAM. CIM will provide communications between DMS/3790 programs and IMS/VS via SLU type P.

DMS/3790 provides a Linkage Service facility which establishes standard interfaces and communication protocols between modules via a set of macros. Programmers can invoke application functions by names specifying only what data is to be operated on and where the result is to be stored. Linkage services locates the invoked function and, if at the host, CIM will transmit the data and store the reply in the specified location.

The Get Collection facility of DMS/3790 allows programmers to request inquiry data by name, specifying only a key field. Get Collection will permit inquiries against local or host resident files or files split between the 3790 and host systems. If the data resides on the host system, control will be given to the Communications Interface Monitor which will send the transaction to the host to retrieve the data.

The Work Area Management (WAM) facility of DMS/3790 provides temporary working storage for application programs. The WAM macros provide for high-level manipulation of this working storage, and symbolic addressing of storage. The Work Area is designed for storing terminal input data and passing data between modules on the 3790 and between the 3790 and the host.

### HIGHLIGHTS

- DMS/3790 forms allow an application designer to describe the 3790 interface with the display operator. The forms provided are:
  - The Layout Form which defines:
    - Program information such as name, number and record layouts.
    - The screen format to be displayed to the operator.
    - The location of variable display and input fields on the display.
    - The meaning of PA keys, PF keys and selector light-pen attentions.
    - Special error messages that may be displayed to the terminal operator.
  - The Field Processing Form which defines:
    - Variable fields to be displayed to the operator.
    - Input fields to be entered by the operator.
    - Input field edits, including count, required or optional, type, selfcheck, picture, range and value.
    - Selector light-pen data.
    - The action that is to be taken if an edit detects an error.
  - The Buffer Description Form which defines the layout of fields in a record or buffer.
- Flexible panel definition provides for:
  - Field-by-Field Support.
  - Full Screen Processing Support.
  - Full 3277 Field Attribute Capability.

Extensive Operator Communications.

Deferred and Immediate Selector Light-Pen Support.

- Interactive Forms Preparation facility is a productivity tool that aids the designer in describing the interface with the display operator. It operates with a 3277 mdl 2 attached to the S/370 via a 3271 or 3277 control unit. This facility operates under TSO/TCAM, TSO/VTAM, CICS/VS and VM/370. This feature supports all the capabilities of the form plus:

Full screen entry of display and print layouts.

Left-right and up-down scrolling capability.

Automatic prompting for field attributes.

Restart capability.

Help panels.

- The Work Area Manager is a high function facility for temporary working storage.

It contains a two-level hierarchical structure. It provides for root segment and multiple dependent segment types, and multiple occurrences of each dependent type.

It is application oriented. The programmer assigns symbolic names to the root and dependent segment types. Using these names and flexible work area macros the programmer can easily add desired segments, add new occurrences of segments, insert segments at the start or middle of a chain and delete segments anywhere in the work area.

It provides for security checking.

The Work Area Manager performs all work area disk I/O for the program. If a segment has been updated by an application, the Work Area Manager automatically writes that segment to disk, eliminating the chance of losing the new information. The Work Area Manager controls record pools for allocation of work areas to programs and gives segments to all programs as needed.

- Get Collection supports distribution of inquiry data in the 3790 environment.

Inquiry data is requested by name, specifying only a key field. System-wide symbolic names are given to groups of related fields called collections. The programmer requests a collection by its symbolic name, specifying only the key of the collection.

A collection can be resident on the 3790, the host S/370 system, or distributed between the two systems. If it is 3790 resident, Get Collection will retrieve it from the local disk and present it to the program. If it is host resident, Get Collection will search the local disk to determine if it has previously been retrieved before requesting it from the host system. This reuse of data can improve response time to the user, and can minimize communications traffic and host processing overhead. If a collection can reside both locally and at the host system, Get Collection will search the local data set to see if it is residing locally before going to the host system. This allows the system designer to permanently store those collections that are most frequently used on the controller without limiting access to collections that are on the host system.

Location of collections is transparent to 3790 programs. Get Collection allows the system designer to change where collections reside without having to be concerned about the programs that reference them. A reassembly of these programs is necessary to allow them access to the moved collection. It is the user's responsibility to provide the necessary host application programs to transfer the collections.

Get Collection is transparent to the 3790 program because it automatically invokes the Communications Interface Monitor if the collection is located at the host system. When the program regains control, it looks as if the collection was resident on the local 3790 disk.

- Linkage Services supports the distribution of function in the 3790 environment.

Functions are invoked by name, specifying only the input and where to place the reply. A symbolic name is given to each function in the distributed system. The program invokes a function by this symbolic name, identifying the data that is to be passed to the function and where the reply is to be stored.

Linkage Services provides a set of standard data interfaces that can be used between 3790 programs. These interfaces identify the data that is to be operated on by a called function and where the calling function expects the reply to be stored.

Functions can be local or host resident. If a called function resides at the host, Linkage Services will invoke the communications facility to transmit the data to host system. When the reply is

PROGRAM PRODUCTS

DMS/3790 (cont'd)

retrieved, it will be stored in the area specified by the calling function.

Location of invoked functions is transparent to the programmer. Linkage Services allows the system designer to change where functions are located without being concerned about the programs that invoke them. Only a reassembly of the invoking programs is necessary to provide access to the moved function. It is the user's responsibility to write the application programs which perform the specific function.

- Communications Interface Monitor (CIM) is a separate feature of the DMS/3790 product.

CIM controls the 3790 side of the communications link. The session control functions performed include opening and closing of sessions, recovery from temporary errors, restarting and resynchronizing interrupted sessions and maintaining a log of communications errors.

CIM transmits requests to the host from the calling program's buffer, the calling program's work area, indexed records or relative records.

CIM retrieves replies from the host and stores them in the calling program's buffer, the calling program's work area, indexed records or relative records.

CUSTOMER RESPONSIBILITIES

To install and use the DMS/3790 program product the user must:

1. Acquire a knowledge of the functions provided by the different facilities.
2. Learn the new macros provided for implementing these facilities.
3. Learn how to prepare the forms provided for the screen handler generation.
4. Generate the necessary tables required at the host system for Linkage Services and Get Collection.
5. Provide the necessary data set and program IDs to be used.
6. Provide the necessary host application programs if the CIM feature is used.
7. Provide additional programming for the screen handler user routines if required for the 3790 applications.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

DMS/3790 requires the following system configuration:

- An IBM S/370 mdl 115 or larger for DOS/VS, mdl 135 or larger for OS/VS1 or a mdl 145 or larger for OS/VS2. The machine configuration for DMS/3790 varies according to the user's application needs. The requirement for operation under CICS/VS or IMS/VS is any IBM S/370 with enough real storage to meet the combined operating requirements of CICS/VS or IMS/VS, the host operating system, the appropriate access methods and other user-required applications. DMS/3790 requires 85K of virtual storage. The program operates in a virtual equals virtual environment.
- Depending upon the operating system used, any direct access storage device supported by the Virtual Storage Access Method (VSAM) and OS/VS1, OS/VS2 or DOS/VS.
- Any card read/punch and printer supported by OS/VS1, OS/VS2 or DOS/VS.
- Any magnetic tape drive supported by OS/VS1, OS/VS2 or DOS/VS (required for installation only.)
- A minimum of 1-3271 or 1-3272 and 1-3277 mdl 2 Display Station if the Interactive Forms Preparation facility is used.
- A 3704 or 3705 Communications Controller for online operations (if the 3790 is not local channel attached).

or

A 3747 Data Converter for offline diskette creation.

- A 3791 Controller, mdl 1A or larger.
  - 3791 configuration support feature #9431, #9165 or #9169. (CIM does not support feature #9431).
  - DMS/3790 will support only the following attached devices included in the above configuration:
    - 3793 Keyboard/Printer
    - 3277 mdl 1 or 2
  - A minimum of either 1-3277 or 1-3793 is required. In addition to above attached devices, the line printer (feature #4710, #4711 or #4715) is also supported.

SOFTWARE REQUIREMENTS

DMS/3790 is written in S/370 Assembler language, PL/S\* and 3790 programming statements as follows:

- Interactive Forms Preparation - PL/S\* and Assembler
- Screen Handler Generator - PL/S\* and Assembler
- Get Collection - Assembler
- Linkage Services - Assembler
- Work Area Management - Assembler and 3790 Programming Statements
- Communications Interface Monitor (feature) - 3790 Programming Statements

\* Programming Language/Systems (PL/S) is an IBM proprietary language.

Assembler language and 3790 programming statements source code is provided with the DMS/3790 program product.

Depending upon the host operating system used, the following programs are required:

OS/VS

	VS1	VS2
OS/VS Assembler XF	5741-SC1-03	5752-SC1-03* 5742-SC1-03**
Linkage Editor	5741-SC1-04	5752-SC1-04* 5742-SC1-04**
Virtual Storage Access Method (VSAM)	5741-SC1-DE	5752-SC1-DE* 5742-SC1-DE**
IDCAMS (Access Method Services)	5741-SC1-DK	5752-SC1-DK* 5742-SC1-DK**
Sequential Access Method	5741-SC1-DO	5752-SC1-DO* 5742-SC1-DO**
Virtual Telecommunications Access Method (VTAM)	5741-SC1-23	5752-SC1-23* 5742-SC1-23**
3704/3705 Network Control Program (NCP/VS) (If 3790 is not local channel attached)	5744-BA2	5744-BA2
Subsystem Support Services (SSS)	5741-SC1-SS	5752-SC1-SS* 5742-SC1-SS**
3790 Host Support	5744-BZ3	5744-BZ3
Customer Information Control System (CICS/VS), Version 1 Release 3.0 ***	5740-XX1	5740-XX1
or Information Management System (IMS/VS) Version 1, Release 1.4***	5740-XX2	5740-XX2
Telecommunications Access Method (TCAM)	-----	5752-SC1-21* 5742-SC1-21**
TSO Subroutines for TCAM	-----	5752-SC1-T8* 5742-SC1-T8**
TSO		
Data Management	-----	5752-SC1-T3* 5742-SC1-T3**
Scheduler	-----	5752-SC1-T4* 5742-SC1-T4**
Supervisor	-----	5742-SC1-T7**

\* = MVS  
\*\* = SVS  
\*\*\* Also applies to subsequent releases unless otherwise identified.

Note 1: VTAM or TCAM/NCP/VS Direct, NCP/VS and SSS are required for the transmission of programs from the host to the 3790. They are not required if the Batch Data Exchange facility is used to forward programs to the 3790.

Note 2:

## PROGRAM PRODUCTS

**DMS/3790 (cont'd)**

VTAM, NCP/VS and CICS/VS or IMS/VS are required if the Communications Interface Monitor feature of DMS/3790 is to be used.

**Note 3:**

For the Interactive Forms Preparation facility CICS/VS or TSO with either VTAM or TCAM is required.

**DOS/VS: Release 33**

DOS/VS Assembler	5745-SC-ASM
Linkage Editor	5745-SC-LNK
Virtual Storage Access Method (VSAM)	5745-SC-VSM
Access Method Services	5745-SC-AMS
Sequential Disk IOCS	5745-SC-DSK
Virtual Telecommunications Access Method (VTAM)	5745-SC-VTM
Extended Telecommunications Modules (EXTM) with CICS/VS Version 1, Release 3.0	5746-XXB
3704/3705 Network Control Program/VS (NCP/VS) (if 3790 is not local channel attached)	5747-AJ2
Subsystem Support Services (SSS)	5745-SC-SSS
3790 Host Support	5747-BQ1
Customer Information Control System (CICS/VS) Version 1, Release 3.0 (and subsequent releases unless otherwise identified)	5746-XX3

**Note 1:**

NCP/VS, SSS and either VTAM or EXTM are required for the transmission of programs from the host to the 3790. They are not required if the Batch Data Exchange facility is used to transfer programs to the 3790.

**Note 2:**

NCP/VS and CICS/VS with either VTAM or EXTM are required if the Communications Interface Monitor feature of DMS/3790 is to be used.

**Note 3:**

For the Interactive Forms Preparation facility CICS/VS is required.

**VM/370:** VM/370 can be used for execution of the screen handler generator, for interactive forms preparation and for assembly of programs if a 3790 macro library is available. For validation and transmission of programs to the 3790 and for use of the CIM feature of DMS/3790, a DOS/VS or OS/VS system is required.

**DOCUMENTATION**  
(available from Mechanicsburg)

Title	Order Number
General Information Manual	To Be
Sales Flyer	Announced

**TERMS and CONDITIONS:** See PP Index

**DISPLAY MANAGEMENT SYSTEM/3770  
(DMS/3770), RELEASE 1  
5748-XC3**

**PURPOSE**

This program product is a productivity aid for users of the 3770 Communication System that simplifies the design, coding, testing and maintenance of the 3770 application programs. The DMS/3770 program product consists of an interactive or forms driven panel definition program, a screen handler program generator, a local data set access manager, a host communication access manager and an application function manager.

The 3770 programmable system is an operator oriented communication system that consists of an IBM 3774 or 3775 Programmable Communication Terminal and its attached devices. The operator terminal consists of the console keyboard, the 480 character gas panel display, the console printer and the 3278 Display Station mdl 2 RPQ #EJ2657 (3774 only). Support for the RPQ will be available in a later release. Records may be stored on one fixed diskette drive, and/or two additional diskette drives that are optional. Other devices supported are the 3501 Card Reader, the 2502 Card Reader and the 3521 Card Read/Punch.

Programs prepared on the host system are transmitted to the 3770 where they may be executed. These programs can operate in a stand-alone manner or with host communication.

The S/370 host system supports the 3770 under DOS/VS, OS/VS1, OS/VS2 and VM/370 (CMS). 3770 programs are created and tested at the host system and are transmitted by the user to the 3770.

DMS/3770 generates a 3770 application program which supports data collection and maintenance from the 3770 console. Local data sets may be either indexed or relative in organization. Host data sets may have any form of organization which the user-written host program will support.

**HIGHLIGHTS**

- Improved programmer productivity.
- The cost of maintaining 3770 application programs should be reduced because of system modularity and standardized documentation.
- Tedious aspects of 3770 programming are removed without prohibiting unique implementation via user exits.
- Distribution of function or data from the host system to the 3770 or vice versa.
- Application may be described on the Interactive Forms Preparation facility or by using the DMS/3770 forms.
- Full Screen Processing facility.

**DESCRIPTION**

- Field by field support.

The Interactive Forms Preparation Facility (IFP) is a productivity tool that aids the application designer in describing the interface with the display operator. This facility operates under TSO, CICS/VS and CMS. The IFP provides for online entry of the information necessary to generate screen handler programs by using a 3271 or 3272 and one 3277 mdl 2 Display Station or one 3275 Display Station (or equivalent 3274/3276/3278 combination). This facility provides the capability to improve productivity with functions such as:

- Full screen entry of display and print layouts.
- Left-right and up-down scrolling capability.
- Automatic prompting for field definitions.
- Restart capability.
- Help panels.

DMS/3770 forms allow an application programmer to describe the 3770 interface with the display operator. In order to use the screen handler function of DMS/3770 for specifying operator communications, certain forms must be filled out, keyed and input to the DMS/3770 screen handler generator. The forms are divided into two groups: (1) data definition and (2) screen handler definition. Data definition consists of the buffer definition form. This form allows the user to specify the formats of buffers or records. A DMS/3770 data definition processor edits this form and then generates, in card form, the appropriate 3770 code for the definitions. These definitions can then be added to a MACLIB or source statement library for reference at assembly time for the application.

There are two forms which provide for the screen handler definition. Contents of these forms allow input of basic program information of field editing characteristics.

The host communication function supports the BSC mode of line use. SDLC support is also available.

Five operational functions may be selected by the application programmer to be provided in the generated functional program:

- Add** --- Selected input data fields from the panel described by the application programmer are collected and arranged in the order specified by the buffer description and are stored in the local/host data sets selected by the operator.
- Display** --- Previously entered data is retrieved and merged with the panel described by the application programmer, and is displayed on the operator console of the 3770. A record may be retrieved by the operator by entering the key of the record, by entering the relative record number of the record, or by entering a null key which signifies "next record".
- Verify** --- Previously entered data is retrieved by key or by entering a null key ("next record"). The operator is supplied with the prompts from the application programmer specified panel and is required to rekey the entry values. If the existing data and the newly keyed data match, the next field is processed. Three attempts at each field are allowed before the new value is accepted in the case of mismatch. The original data is not shown to the verify operator to maintain keying independence. Indexed data sets include a verification indicator. The indicator will be changed to a "V" if the record was verified correct as is, and will be changed to a "C" if the record was altered during the verify operation.
- Update** --- Previously entered data is retrieved by key or by entering a null key ("next record"). The data is then merged with the panel described by the application programmer, and is displayed on the operator console one field at a time. After each input value is displayed, the operator is given the opportunity to alter it. After the last field, the record is rewritten to the source data set. If an indexed data set is being processed, the verification indicator will be changed to a "U" if a field is updated.
- Delete** --- The record is selected by the operator by key only, is merged with the application programmer specified panel and is displayed on the operator console. The operator is then prompted to continue or to abort the delete request. "No" implies abort, "yes" implies continue. The record is then removed from the data set by altering the key so that it is no longer selectable. (The deleted record may be returned to active status by the operator.)

Continuous running routines -- the operator has the option of performing a selected function in a continuous mode.

DMS/3770 requires at the host a number of input, output and work files to retain information as it is processing the various screen handler forms. These files are:

1. Input file.
2. Layout & field processing file (work).
3. Mapping file (work).
4. Generated output file.

**CUSTOMER RESPONSIBILITIES**

To install and use the DMS/3770 program product the user must:

1. Acquire a knowledge of the functions provided by the different facilities.
2. Learn the new macros provided for implementing these facilities.
3. Learn how to use the IFP facility or the forms provided for the screen handler generation.
4. Provide the necessary data set and program ID's to be used.
5. Provide the necessary host application programs and install CICS/VS or IMS/VS if host communications is used.
6. Provide any necessary user programming to perform functions not provided by DMS/3770. This may be done via user exits.
7. Provide the NCP/VS and Access Method Generations if online diskette transmission or DMS/3770 Host Communications is used.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

DMS/3770 requires the following system configuration:

- An IBM S/370 mdl 115 or larger for DOS/VS, an IBM mdl 135 or larger for OS/VS1 or an IBM mdl 145 or larger for OS/VS2 and comparable mdls of the IBM 3031, 3032, and 3033. The machine configuration for DMS/3770 varies according to the user's application needs. The requirement for operation under CICS/VS or IMS/VS is any S/370 with enough real storage to meet the combined operating requirements of CICS/VS or IMS/VS, the host operating system, the appropriate access methods and other

PROGRAM PRODUCTS

DMS/3770 (cont'd)

user-required applications. The DMS/3770 IFP facility requires 112K (code requirement) of virtual storage. The DMS/3770 editor and generator requires 48K (code requirement) of virtual storage. Depending upon the operating system used, any direct access storage device supported by the virtual storage access method (VSAM) and OS/VS1, OS/VS2, or DOS/VS is supported.

- Any card read/punch and printer supported by OS/VS1, OS/VS2 or DOS/VS.
- Any magnetic tape drive supported by OS/VS1, OS/VS2 or DOS/VS (required for installation only).
- A minimum of one 3271 or 3272 and one 3277 Display Station mdl 2 or one 3275 Display Station (or equivalent 3274/3276/3278 combination) is required if the Interactive Forms Preparation Facility is used.
- An IBM 3704/3705 Controller or ICA for online operations or an IBM 3747 Data Converter for offline diskette creation.
- An IBM 3770 Programmable Communications Terminal (3774 or 3775).
- DMS/3770 will support the following devices attached to a 3770:
  - Gas Panel Display.
  - Console Printer.
  - 3501 or 2502 Card Reader.
  - 3521 Card Read/Punch.
  - 3278 Display Station mdl 2 RPQ #EJ2657 (3774 only).
  - Diskette Drives (0, 1 and 2).

DMS/3770 supports all models of the 2314, 3330 or 3340 Direct Access Storage devices for its input and output files. In addition to a single disk, this program product also requires a Card Reader/Punch and a printer. A tape drive is required only for installation.

SOFTWARE REQUIREMENTS

3770 operates under OS/VS (SVS 1.7\*) (MVS 3.0\*), VS/1 (6\*) DOS/VS (33\*) and VM/370 (Release 5)/CMS. (\* - and subsequent releases and modification levels unless otherwise stated.) The Sequential Access Method (SAM) and Virtual Storage Access Method (VSAM) are used for the input and output files. DMS/3770 is written in S/370 Assembler language, PL/S\*, and 3770 programming statements as follows:

- Interactive Forms Preparation -- PL/S\* and Assembler
- Screen Handler Generator -- PL/S\* and Assembler
- DSURPRL1, 2, 3 Macros -- 3770 Programming Statements
- DMS/3770 supplied utilities -- 3770 Programming Statements

\* Programming Language/Systems (PL/S) is an IBM proprietary language.  
Assembler language and 3770 programming statements source code is provided with the DMS/3770 program product.

Depending upon the Host Operating System used, the following programs are required:

	OS/VS1	OS/VS2
OS/VS Assembler XF	5741-SC1-03	5752-SC1-03 (MVS) 5742-SC1-03 (SVS)
Linkage Editor	5741-SC1-04	5752-SC1-04 (MVS) 5742-SC1-04 (SVS)
Virtual Storage Access Method (VSAM)	5741-SC1-DE	5752-SC1-DE (MVS) 5742-SC1-DE (SVS)
IDCAMS (Access Method Services)	5741-SC1-DK	5752-SC1-DK (MVS) 5742-SC1-DK (SVS)
Sequential Access Method (SAM)	5741-SC1-DO	5752-SC1-DO (MVS) 5742-SC1-DO (SVS)
Virtual Telecommunication Access Method (VTAM)	5741-SC1-23	5752-SC1-23 (MVS) 5742-SC1-23 (SVS)
VTAM (ACF/VTAM) and Prerequisite SCP		5735-RC2 (SVS)
3704/3705 Network Control Program (NCP/VS)	5744-BA2	5744-BA2
3705 Advanced Communications Function for Network Control Program (ACF/NCP) and Prerequisite SSP and SCP.	5735-XX1	5735-XX1
3790 Host Support Release 7 and subsequent releases and modification levels unless otherwise stated.	5744-BZ3	5744-BZ3
Customer Information Control System (CICS/VS), Version 1 Release 3.0 and subsequent releases and modification levels unless otherwise stated.	5740-XX1	5740-XX1

- or -

Information Management System (IMS/VS) Version 1, Release 1.4 and subsequent releases and modification levels unless otherwise stated.	5740-XX2	5740-XX2
Basic Telecommunications Access Method (BTAM) (on System Distribution Tape)	-----	-----
Telecommunication Access Method (TCAM)	5741-SC1-21	5752-SC1-21 (MVS) 5742-SC1-21 (SVS)
Advanced Communications Function for TCAM (ACF/TCAM)	5735-RC1	5735-RC1 (MVS) 5735-RC1 (SVS)
TSO subroutines for TCAM	-----	5752-SC1-T8 (MVS) 5742-SC1-T8 (SVS)
TSO		
Data Management	-----	5752-SC1-T3 (MVS) 5742-SC1-T3 (SVS)
Scheduler	-----	5752-SC1-T4 (MVS) 5742-SC1-T4 (SVS)
Supervisor	-----	5742-SC1-T7 (SVS)

Note 1: For the Interactive Forms Preparation Facility CICS/VS, CMS or TSO is required.

Note 2: CICS/VS or IMS/VS is required if the Programmable Communications Feature is used.

Note 3: If the 3278 RPQ #EJ2657 for the 3774 is installed, the appropriate levels of 3790 host support and engineering changes must be installed.

Note 4: IMS/VS supports 3770 as a 2770 in BSC Line Control, and as SLU-P under SNA SDLC.

	DOS/VS
DOS/VS Assembler	5745-SC-ASM
Linkage Editor	5745-SC-LNK
Virtual Storage Access Method (VSAM)	5745-SC-VSM
Access Method Services	5745-SC-AMS
Sequential Disk IOCS	5745-SC-DSK
Virtual Telecommunication Access Method (VTAM)	5745-SC-VTM
Advanced Communications Function VTAM (ACF/VTAM)	5746-RC3
Extended Telecommunications Modules (EXTM) with CICS/VS Version 1, Release 3.0	5746-XXB
3704/3705 Network Control Program/VS (NCP/VS)	5747-AJ2
3705 Advanced Communications Function for Network Control Program (ACF/NCP) and Prerequisite SSP and SCP.	5735-XX1
3790 Host Support Release 7 and subsequent releases and modification levels unless otherwise stated.	5747-BQ1
Customer Information Control System (CICS/VS) Version 1, Release 3.0 and subsequent releases and modification levels unless otherwise stated.	5746-XX3

Note 1: CICS/VS or CMS is required if the Interactive Forms Preparation Facility is used. CICS/VS is required if the programmable communication feature is used.

Note 2: If the 3278 RPQ #EJ2657 for the 3774 is installed, the appropriate levels of 3790 host support and engineering changes must be installed.

VM/370: CMS can be used for execution of the Screen Handler Generator and assembly of programs if a 3770 Macro Library is available. For validation and transmission of programs to the 3770 and for host communication, a DOS/VS or OS/VS system is required. Under VM/370 Release 5, the PA1 key function is not available for DMS/3770. PA1 is reserved for VM/370 usage. All IFP users under this release must use a 3270 display station having at least 12 PF keys.

COMPATIBILITY

DMS/3770, DMS/3790 and DMS/VS are similar in concept; however, because of the unique requirements of the individual systems, they are not compatible. The code generated by DMS/3770 contains 3770 unique macros. Therefore, the functional programs are not compatible with the IBM 3790 Communication System.



PROGRAM PRODUCTS

DMS/3770 (cont'd)

PERFORMANCE CONSIDERATIONS

Because of the variations possible with a communication terminal, it is difficult to predict performance. The performance of a DMS/3770 Generated Application Program executing on a 3770 terminal is highly dependent on the terminal resources available, data file placement and user written routines. Use of DMS/3770 generated programs should have a positive effect on the 3770 Programmable Communication Terminal performance. This is a result of the use of 3770 unique macro code as well as the structure of DMS/3770.

DOCUMENTATION: (available from Mechanicsburg)

Title	Order Number
DMS/3770 Licensed Program Specifications	GH20-4547
DMS/3770 Licensed Program Design Objectives	GH20-4593
DMS/3770 General Information Manual	GH20-2020
DMS/3770 Program Reference and Information Manual	SH20-2021

The DMS/3770 Buffer/Storage Form (GX20-2029), DMS/3770 Layout Form (GX20-2030) and DMS/3770 Field Processing Form (GX20-2031) are not supplied with the distribution tape and must be ordered separately. There are approximately 50 sheets per pad. The DMS/3770 additional editing form is on the reverse side of Form GX20-2031.

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**DEVELOPMENT MANAGEMENT SYSTEM/  
DISTRIBUTED PROCESSING CONTROL EXECUTIVE  
DMS/DPCX (5748-XC4)**

**PURPOSE**

Development Management System/Distributed Processing Control Executive is a licensed program which offers productivity gains in the development of applications for the IBM 8100/DPCX Information System. Running a host S/370, 4300 or 3000 Series Processor, DMS/DPCX assists the user in complete application definition and subsequent maintenance.

The DMS/DPCX generated applications execute on 8100/DPCX systems. DMS/DPCX minimizes the data processing experience and aptitude required to generate new application programs. Programmers can use DMS/DPCX to develop application programs with a minimum learning period. Complete applications are generated into source code for the 8100/DPCX system. As application complexity increases, so does the requirement for DP expertise. DMS/DPCX is a member of the Cross System Generator Set of program products which also contains DMS/DPPX and DMS/CSP. Each of these program products share a common, proven architecture and all are highly compatible in their implementation. They are all intended to simplify application development and increase programmer productivity.

**HIGHLIGHTS**

- Provides a S/370, 4300 or 3000 Series online interactive preparation facility, which operates under VM/CMS, TSO or CICS/VS.
- Complete application programs are defined. Primary capabilities provided include display formatting, field editing, arithmetic operations, conditional processing, data definition and file read, write and update.
- Supports distributed data processing using the 8100/DPCX and the host system.
  - Enhanced Instructions.
  - Distributed indexed access method.
  - 32K task virtual storage and other symbolic machine enhancements.
  - Advanced function device support (large display screens and color).
- Resultant application programs that execute on the 8100/DPCX system may be either interactive or batch.
- Application programmers are shielded from SNA protocol and sequences.
- Manages communications between the DMS/DPCX user application programs and IMS/VS or CICS/VS. DMS/DPCX includes the DMS/3790 Communications Interface Monitor (CIM) feature, which assists the application programmer in the initiation and termination of host sessions.
- Self-teaching.
  - TUTOR mode for new users.
  - PROMPT mode for experienced users.
  - HELP facility.
- Application models may be defined, stored and subsequently customized to meet new requirements.
- Application definitions may be tested on the host before they are generated for the 8100/DPCX system.
- A utility is provided to assist in converting DMS/3790 screens to DMS/DPCX format.
- Utilities are provided which allow map, data and application definitions to be copied, renamed, deleted, printed and imported or exported between member specification libraries.
- A DMS/DPCX application may invoke user-written applications written in DPCX programming statements.
- DMS/DPCX supports all currently announced displays and display printers attached to the 8100/DPCX.

**DESCRIPTION**

The user at a display terminal is guided through the definition and generation of a complete application. The definition includes:

- Data formats.
- Screen formats (Maps).
- Editing.
- Use of program function and attention keys.
- Selector pen-detectable fields.
- File read, write, update.
- Table definition.
- Application logic and flow.
- Data manipulation.
- Inclusion of user code.
- Linkage to other programs.

The user can operate in either of two modes, TUTOR or PROMPT. A HELP facility is provided for use in both modes.

The user may test his application's logic on the host through the DMS/DPCX Interactive Test Facility. The Test Facility will support access to user-defined files of test data.

DMS/DPCX converts these specifications into source application programs that are assembled and validated on the IBM S/370 or IBM 4300 Processor with PVS. Resultant programs are distributed to the 8100/DPCX program library and execute in full screen processing mode or as a batch program.

DMS/DPCX also provides the DMS/3790 execution-time services on the 8100/DPCX system, which assist in the task of host communications and allow existing DMS/3790 applications to be run.

Use of DMS/DPCX can result in application programs that:

- Can be invoked by other programs.
- Execute interactively with an operator.
- Execute in batch mode.
- Can use a spooled printer.

This interactive facility runs under TSO/TCAM, TSO/VTAM, VM/CMS, or CICS/VS.

**APPLICATION DEFINITION STEPS**

**Overview**

- DMS/DPCX allows the user to perform application definition as independent steps. The user selects the application development facility (data definition, map definition or application definition) to be performed. The facility selected may be terminated at any time, and defined information will be stored for future reference.
- The information collected by each process is stored in the Member Specification Library (MSL). The user may then use the application generation facility to combine all the information about a given application from the MSL and generate the necessary DPCX programming statements to perform the given application. Since all definitions are stored on the MSL, they may be referenced or used by several applications without re-definition.

**Step by Step**

- **Data Definition** - Allows the definition of data format and characteristics including the length, data type and relationships with other data items in a record. Once the data is defined for a given file, the attributes of the data items will be automatically retrieved by DMS/DPCX if they are referenced during user program definition. This promotes consistent use of data items for all applications using DMS/DPCX.
- **Map Definition** - Allows the user to define the display format for the terminal or printer. Maps are defined interactively with the capability to specify editing criteria for each field.
- **Application Definition** - Allows the user to define the logic flow of an application. Arithmetic operations, process logic, data retrieval, and the flow of terminal displays and printers are defined during this step.
- **Application Test** - Allows the user to exercise an application under DMS/DPCX on the host. This interactive Test Facility will support access to test data files on the host. It allows the user to trace the execution of his program and thus follow and validate its logic before it is generated and transmitted to the 8100/DPCX system. The Test Facility also provides a pre-processor capability which checks the syntax and usage of DMS statements.

**Application Generation** - The data from the application, map, and data definitions are stored in the MSL. The generation step uses the data to generate a source program. During generation, the user is prompted to specify any unique 8100/DPCX information. The program is then compiled and stored in the S/370 and subsequently sent to the 8100/DPCX program library.

- DMS/DPCX operates in either of two modes, TUTOR or PROMPT. TUTOR mode is an instructional or teaching mode for users who have no previous experience using DMS/DPCX. PROMPT mode is an input assistance mode for an experienced DMS/DPCX user. A HELP facility is provided for use in both of these modes to assist the user in becoming more self-sufficient without referring to a manual.

The user may change between TUTOR and PROMPT mode any time during processing. This allows the user to receive either explicit instruction (TUTOR mode) or minimal instruction (PROMPT mode) on the information required to define and generate application programs.

- DMS/DPCX provides the facilities to create and maintain application models. An application model is a DMS/DPCX

PROGRAM PRODUCTS

DMS/DPCX R1 (cont'd)

definition of a program stored in the MSL. Models can be used directly or can be customized by an end-user to fit specific requirements. This technique offers the customer programming staff the ability to define an application program as a model and subsequently permit end-user departments to customize the models to suit their needs. Once a model has been customized, the user will execute the generation step of DMS/DPCX to obtain the source for the DPCX application program.

A data entry application model to aid in design, implementation, and maintenance, is provided with the DMS/DPCX program product.

- **MSL Utilities** - Allows the user to maintain interactively data, maps, and application definitions by listing, copying, re-naming, deleting, or printing. It also allows library members to be imported or exported between MSL.

**EXECUTION TIME SERVICES**

DMS/DPPX includes the execution-time services of DMS/3790. These are:

- **Communications Interface Monitor (CIM)** which manages communications between user application programs and IMS/VS or CICS/VS.
- **Work Area Manager (WAM).**
- **Get Collection.**
- **Linkage Services.**

CIM and Linkage Services functions are invoked in DMS/DPCX generated applications for the purpose of host communications.

When applications are defined using DMS/DPCX, some of the DPCX services and facilities that will be invoked at execution time are:

**Data Set Services:** Read, write and update access to indexed and relative data sets. This support will include DPCX/DXAM as well as existing 3790 data sets.

**Transaction Services:** Transaction services will allow for creation of transactions for subsequent batch transfer to the host system.

**Queued Printer Services:** Queued printer service to produce printer output. The printer output is spooled to disk. DPCX print facilities are used to print the output on any attached printer. Directly attached, tertiary printers may also be specified.

**Panel Services:** Panel services are used to retrieve full screen processing (FSP) panels to be used in mapping data to the display printer. These panels will be used with the DPCX presentation services.

**Presentation Service:** The DMS/DPCX screen handler will use full screen processing (FSP) to manage the user display screen. This will allow DMS/DPCX to take advantage of all of the functional capabilities of a display device.

**Virtual Storage:** DMS/DPCX applications take advantage of 32K task virtual storage to hold records from DXAM data sets and a working storage area.

**CUSTOMER RESPONSIBILITIES**

**Installation**

The installation process for DMS/DPCX is designed to require minimal system programming or system operator time.

DMS/DPCX installation is the process of building libraries received from PID on a magnetic tape. The installation must be accomplished using standard DOS or OS facilities before DMS/DPCX is initialized and made operational.

To install and use the DMS/DPCX program product the user must:

- Acquire a knowledge of the functions provided by the different facilities.
- Provide the necessary data set and program IDs to be used.
- Provide the necessary host application programs for the host communications function.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

DMS/DPCX requires the following systems configuration:

- An IBM S/370 model 115 or larger with a minimum of 192K or an IBM 4300 or 3000 Series Processor with enough real storage to meet the combined operating requirements of CICS/VS, the operating system and the appropriate access method.
- Depending upon the operating system used, any direct access storage device supported by the Virtual Storage Access Method (VSAM) and OS/VS1, OS/VS2 or DOS/VSE.
- Any IBM magnetic tape drive supported by OS/VS, DOS/VSE or VM/CMS.

- A minimum of one display terminal with 1,920-character screen and twelve program function keys.
- An IBM 8100/DPCX with feature #6001.

DMS/DPCX has no unique requirements for the 8100/DPCX systems.

**SOFTWARE REQUIREMENTS**

Depending on the host operating system used, the following programs are required:

<b>8100</b>	
DPCX (with feature #6001)	5761-DS1
<b>OS/VS1 or OS/VS2</b>	
Host Prep Licensed Program	5735-XR3

In addition, there must be an operational TSO or CICS 1.4.1 (or greater) system to execute DMS/DPCX. Further, there must be some system in place for transporting the DPCX programs from the host system to the 8100. This can include host transmission through DSX, SSS or a user-written program or it can be by using BDES.

**DOS/VSE**

Host Prep Licensed Program	5735-XR3
VSE/Virtual Storage Access Method (VSAM)	5746-AM2

In addition, there must be an operational 1.4.1 (or greater) system to execute DMS/DPCX. Further, there must be some system in place for transporting the DPCX programs from the host systems to the 8100. This can include host transmission through DSX, SSS, a user-written program, or BDE diskettes.

**VM/CMS**

VM/CMS can be used for execution of DMS/DPCX and for assembly of generated programs if an 8100/DPCX macro library has been set up. For validation and transmission of programs to the 8100/DPCX and for use of the Communications Interface Monitor of DMS/DPCX, a DOS/VSE or OS/VS system is required.

In order to execute DMS/DPCX under VM/CMS, one of the full screen interfaces is required. These are:

VM/System Product	5669-167
VM/System Extensions Program Product	5748-XE1
VM/Basic System Extensions Program Product	5748-XX8
Full Screen Console Interface PRPQ	5799-AWP

**COMPATIBILITY and PORTABILITY**

**COMPATIBILITY with DMS/DPPX and DMS CROSS-SYSTEM PRODUCT:** DMS/DPCX, DMS/DPPX and DMS/CSP are conceptually the same in the definition phase. However, DMS/DPPX and DMS/CSP offer functions that are not available with DMS/DPCX. Applications developed on DMS/DPPX or DMS/CSP which use these unique capabilities may require redesign or redefinition if the application is also to be generated for a DPCX system.

Applications defined using DMS/DPCX are portable to DMS/DPPX or DMS/CSP environments within previously published restrictions. For more information about DMS portability, see the *General Information Manual* (GH20-5555).

**COMPATABILITY with DMS/3790:** A conversion aid is provided to assist in conversion of DMS/3790 maps and data definitions to DMS/DPCX MSL format.

DMS/DPCX will not affect the execution of existing DMS/3790-developed applications. DMS/DPCX will include the execution-time services now provided by DMS/3790.

**DATA SECURITY, AUDITABILITY AND CONTROL**

DMS/DPCX will support features that assist in preventing unauthorized use of the 8100/DPCX including the following:

- Operator ID codes and password checking in application codes.
- Application program access level assignments.
- Isolation of program definition and execution.
- Supports use of predefined symbols for program auditability.
- Host environment security controls are available to the application programmer.
- Supports use of 8100/DPCX to control access to application programs.

The user is responsible for the selection, use and adequacy of these controls.

**DOCUMENTATION**

(available from Mechanicsburg)

*DMS/DPCX General Information Manual* (GH20-2423) ... *DMS/DPCX Program Reference and Operations Manual* (SH20-2530) ... *DMS/DPCX Program Logic Manual* (LY20-2542) ... *DMS/DPCX Licensed Program Specifications* (GH20-5312) ... *Messages Manual* (SH20-2491) ... *Reference Summary* (GX20-2379).



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PP 5748-XC4.3  
Nov 83

PROGRAM PRODUCTS

**DMS/DPCX R1 (cont'd)**

**MVS SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index



## 5748-XE1 - VM/SYSTEM EXTENSIONS

### PURPOSE

VM/System Extensions provides performance and usability extensions to VM/370 as described in the VM/370 SCP section. This support is recommended primarily for users running MVS, SVS or VS1 under VM/370, users with the 2305-II fixed head storage device for paging, and/or CMS intensive users on S/370 mdls 155II or above. VM/System Extensions Release 1 Modification Level 1 requires VM/370 Release 5 as a base. VM/System Extensions Release 2 requires VM/370 Release 6 as a base.

### DESCRIPTION

**Improvements in Resource Management:** The functions of the VM/370 Resource Management PRPQ (5799 ARQ) are incorporated into the VM/System Extensions program product.

**Throughput Improvements:** Throughput improvements may be achieved in the following environments:

- Systems with real storage bottlenecks.

When a real storage bottleneck is indicated, the resource manager may reduce the effect and increase the level of multiprogramming. This is achieved through the use of improved scheduling and paging algorithms, which give rise to smaller working set size estimates and higher page steal ratios. The net result is that a given real storage size appears more able to contain the given load with improved throughput.

- Systems with many users logged on, some of which are idle.

The resource manager pages out swap tables and page tables of inactive users and frees up real storage for other purposes. This may increase the level of multiprogramming and improve throughput.

- Storage bound systems with long running non-interactive users and high multiprogramming levels.

Such systems devote a large part of their paging activity to swapping the long running users in and out of storage as each is given a timeslice. The resource manager reduces this paging overhead by swapping the longest running users into real storage less frequently but keeping them there for longer periods. This may lower the overall level of paging activity with accompanying reduction in supervisor overhead and some increased throughput.

- Systems that need more paging space than is available on preferred paging devices.

The resource manager maintains the active user pages on the high speed or primary paging devices using a page migration scheme. Pagewait due to slow access times of secondary devices is reduced and improved processor utilization and throughput may result.

**Improved Response to Trivial Interactions:** Improved response to trivial interactions may be achieved in the following environments:

- Terminal interactions occur for both single trivial commands and nontrivial transactions during terminal I/O.

The resource manager distinguishes between the two types of transactions by tracking the resource consumption rate and giving top priority to the smallest consumer.

- Transactions are characterized by a wide range of resource requirements.

The fair share algorithms of the resource manager, which are effective in both compute bound and paging bound environments, distinguish between the different resource requirements of the users. Consequently, a better interactive/noninteractive split is achieved with improved responsiveness to trivial transactions.

**Installation Management Control:** Installation management will have more control over the services provided in the following environments:

- Multiple users require a specified percentage of the processor.

The SET FAVOR command with percentage option may now be specified for more than one user.

- CMS batch facilities running non-interactively.

Directory priority controls may now be utilized to make CMS batch facilities either fully non-interactive to minimize impact on the system, or fully interactive to encourage its use.

- VM/370-ECPS

VM/370 on S/370 mdls 135-3, 138, 145-3 and 148 has been enhanced to accelerate the processing of the DIAGNOSE interface between a virtual machine and CP. Since CMS is a heavy user of DIAGNOSE, the CMS user may receive improved performance.

**Shadow Page and Segment Table Maintenance:** VM/370 will reduce the overhead associated with maintaining shadow tables used to run virtual systems.

Multiple shadow tables will be maintained to reduce the overhead associated with building shadow tables when a different address space within a virtual machine is dispatched.

Shadow table entries will be selectively invalidated when VM/370 steals a page from a virtual machine.

Shadow tables can be eliminated for V=R users running a production system.

Shadow table maintenance will be reduced for areas in a virtual system where the virtual address is equal to the real address.

**Extended Support:** VM/System Extensions will support operating systems that utilize the 370 Extended Facility of the 3031, 3032 and 3033 Processors, and the S/370 Extended Feature of the S/370 mdls 158 and 168 provided the host system has the S/370 Extended Feature installed. Thus MVS/Systems Extensions can be run on VM/System Extensions.

- **Dynamic SCP Transition To and From Native Mode:** An installation will have the ability to run another SCP in native mode on the same system used for running VM/370, with a minimum of disruption to the system's operation. It will be possible to switch from VM/370 to another SCP, run that SCP in native mode, and then switch back to VM/370 without IPLing the system. The other SCP must run in a V = R area. It can be MVS, SVS or VS1 in non-handshaking mode.

While running OS/VS in native mode, the installation is operating without VM/370. The performance of the OS/VS system will be equivalent to that OS/VS system running native with the same amount of storage and the same I/O configuration it was using in the VM/370 V = R area. When the installation again requires VM/370 services, the operator returns control to VM/370 and the installation again has all the advantages that result from using VM/370.

This will give an installation operational flexibility that it did not have before. It will be possible to run both VM/370 and OS/VS in native mode on the same system, without the disruption of an IPL when a switch is made between VM/370 and OS/VS. This capability will be valuable when running an application that cannot be shut down, such as DB/DC.

**Note:** This function is not supported for OS/VS2 on the 4331 or the 4341 Processor.

- **Single Processor Mode:** It will be possible to run VM/370 in Single Processor Mode (SPM). SPM will allow an installation to restrict VM/370 to a single processor of an AP or MP system, leaving the other processor for the exclusive use of a guest virtual machine running MVS. In SPM, when MVS is IPLed in a V = R area, MVS will initialize the other processor and run in AP or MP mode.

Using SPM, the throughput of MVS running on an AP system will be up to 1.65 times greater than without SPM. The throughput of an MP system will be up to 1.75 times greater.

With SPM, the Relative Batch Throughput of MVS on an AP system will be up to .75, and up to .85 on an MP system.

**CMS Support of Labelled Tapes:** CMS has been modified to process labelled tapes as follows:

#### VOL 1 Labels

- Processed by DOS or OS OPEN simulation routines.
- Processed by CMS TAPPDS or TAPEMAC Commands.
- Displayed or written by CMS TAPE command.

#### HDR Labels

- Processed by DOS or OS OPEN simulation routines: Exits are provided to allow access to user-written routines to process standard user (UHL) labels.
- Processed by CMS TAPPDS or TAPEMAC Commands.
- Processed by a new CMS Macro designed for use in Assembler language programs in conjunction with other CMS tape macros.

#### EOF/EOV Labels

- Processed by DOS or OS CLOSE simulation routines: Exits are provided to allow access to user-written routines to process standard user (UTL) labels.
- Processed by a new CMS Macro designed for use in assembly language programs in conjunction with other CMS tape macros.

#### Nonstandard Labels

- User exits are provided in DOS or OS OPEN and CLOSE simulation routines and in TAPPDS or TAPEMAC commands to allow access to user-written routines to process nonstandard labels.

**Limitations:** The following are not supported:

- Label processing for tapes which are read backwards.
- Multivolume files.
- ASCII labels.

## VM/System Extensions (cont'd)

**Spool Files To Tape:** This support will provide Class D commands for the spooling operator which will enable him to store to, or retrieve from tape those unit record output files which he wishes to schedule for real output at some later time on his VM/370 system. The restored files will retain the same characteristics as the original file, but will be assigned new spool-ids to avoid duplicate identification within the spooling system. The spooling operator can store or retrieve spool files selectively (by class or spool-id) or completely. An option is provided to allow the operator to scan the tape.

**Virtual Machine Storage Preservation:** VM/370's control program will be modified so that during a VM/370 warm start or an abnormal termination by VM/370 of specified virtual machines, the user's virtual storage will be preserved. Specifically, virtual machine IPL will be changed so that it no longer uses a page of the user's virtual storage, and the V = R area under VM/370 will be preserved during VM/370 warm start. In addition, specific virtual machines can be identified such that at VM/370 abend, or when that virtual machine is abnormally terminated by VM/370, the registers and main storage for that virtual machine will be saved.

This improved integrity of virtual storage is particularly beneficial to IMS/VS users running in a virtual machine who need to have storage preserved so that they can run a standalone program to recover IMS/VS log buffers. In addition, standalone dumps that are IPLed from an external storage device will now accurately reflect the user's virtual storage, because VM/370 will no longer use a page of that storage.

**Spooling of Accounting Records:** This support provides the installation with the ability to spool accounting data to a designated virtual machine with a designated class. The data can be spooled to provide punched output or spooled to a virtual machine's reader for additional processing. This eliminates the need to have a real card punch online at all times to get accounting records.

**Virtual Machine Interface to Allow Programs To Use The Full Facilities of a 3270 Type Terminal:** The diagnose interface has been extended to allow a virtual machine user to share a display terminal with CP. When the user has control of the screen he has available most of the facilities of the device.

**Support for the 3262 Printer Models 1 and 11:** The 3262 mdls 1 and 11 are, respectively, 650 and 325 line-per-minute printers.

**Support For The Enhanced 3270 Display Terminals:** The following enhanced 3270 terminals are supported:

3268/3287/3289 Printer (copy command support only)  
3274 Control Unit mdl 1B, 21B (3272 compatible)  
3274 Control Unit mdl 1C, 21C, 31C, 51C (TP - BSC only)  
3274 Control Unit mdl 1D, 21D, 31D (3272 compatible)  
3276 Control Unit/Display Station mdl 2 (1920 character screen)  
3276 Control Unit/Display Station mdl 3 (2560 character screen)  
3276 Control Unit/Display Station mdl 4 (3440 character screen)  
3278 Display Station mdl 2 (1920 character screen)  
3278 Display Station mdl 3 (2560 character screen)  
3278 Display Station mdl 4 (3440 character screen)

This includes support for the 96-character set (94 characters plus space and null), and PF keys 13 through 24.

The following functions are only available in VM/System Extensions Release 2:

- **Interactive help facility under CMS:** The help facility is an informational, online display service available at the CMS terminal to guide the user in using CP and CMS commands and reacting to CP and CMS messages. As a result, the user can, in most cases, avoid referencing manuals during CMS sessions.
- **CMS file system enhancements:** The file system enhancements will provide the user with a more efficient and flexible file system. Specifically, the enhancements are:
  - Removal of the current limitations on the size of CMS-disks and the number of files per CMS-disk.
  - Support for physical block sizes of 800, 1024, 2048 and 4096 bytes.
  - Efficient handling of variable length files.
  - Selective directory updating.
  - (FBA) device type support.
  - Concurrent open for read and write of CMS files.
- **CMS tape command performance improvement:** A large blocksize (4K) is supported for tape dump/load to decrease overhead.
- **CMS/DOS uplevel to DOS/VSE:** The CMSDOS DCSS provides DOS/VSE support in CMS. This segment processes all DOS/VSE requests. Since the CMSAMS and SMSVSAM DCSS have been updated to depend upon the DOS/VSE SVCs and to support VSE/VSAM and DOS/VSE files on FBA devices, the CMSDOS DCSS has been updated to support these SVCs and devices.

- **CMS use of CP page management interfaces:** CMS now takes advantage of the existing page control interfaces to better communicate the true working set of pages to CP, thus better utilizing the page frame resources of the real machine.
- **CP performance improvements:** The CP changes are:
  - The storage management algorithm for returning free storage to the dynamic area has been modified. A check is now made every hour and upon a user logging off to determine if any dynamic area pages obtained for free storage purposes can be returned to the dynamic area.
  - The set favored command has been changed to accept a percentage specification of 100. This specification will be handled as a special case by the scheduler where the user will be kept at the top of the run list.
  - CMS disk I/O (Diagnose 18) has been modified to take advantage of ECPS:VM/370 for CCW translation.
- **Small CP option:** Small CP option reduces real memory requirements for CP which makes more pageable storage available to virtual machines.
- **Enhanced support for the 3270 Information Display System.**

**APL Text Feature:** The 3270 APL-TEXT feature provides the 3270 user with access to the full APL, TEXT and EBCDIC character sets. This makes it possible for the user to interact with the VS APL program product as well as text processing applications which run under CMS. This support extends the APL-TEXT function to users with 3274 Controllers and 3278 Display Stations.

**Intensified Display:** VM/370 will take advantage of the intensified display feature of the 3270 Information Display System as follows:

- 1) The "Current Line" of the CMS Editor will be intensified.
  - 2) All CMS Edit messages will be intensified.
  - 3) An application program may supply a 3270 Start Field order and an attribute byte in a DIAGNOSE 58, CCW Code 19 (Virtual Console Interface) data stream. This provides an application program with the ability to define a field as normal intensity, intensified or non-display.
  - 4) Messages from the system operator or other user will be intensified.
  - 5) The redisplay of user input will be intensified so that it may be distinguished from output. The SET command will activate or deactivate intensification of input redisplay.
- **Support for the 3289 Printer Model 4:** The 3289 mdl 4 is a 150 or 400 line-per-minute printer and functionally compatible with the 3203 printer mdl 4 (except in the area of UCS buffer load).
  - **Support for the 8809 tape:** The 8809 is a two speed tape drive (12.5 ips and 100 ips). It will be supported at 12.5 ips in VM. The standalone dump-restore utility (DDR) supports the device at 100 ips to provide high-speed backup capability when executing on a standalone processor.
  - **Support for the 3310/3370 direct access devices:** The 3310/3370 are direct access devices that use Fixed Block Architecture. The Direct Access Storage Compatibility feature (#7901) of the IBM 4331 Processor for emulation of 2314, 3330 and 3340 format data on the 3310 or 3370 is supported. VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system other than VM/370 or CMS.
  - **Support for the 3880 Storage Control mdl 1.**

### CUSTOMER RESPONSIBILITIES

In addition to the responsibilities described in the VM/370 SCP section under the heading "Customer Responsibilities", the customer is responsible for ordering and installing the proper level of VM/370.

To run SVS under VM/System Extensions Program Product PTF UY77568 must be applied to the SVS system.

**ECPS:VM/370:** VM/System Extension is designed to operate with VM/370 Release 5 and to utilize ECPS:VM/370 with the following ECs with REAs as indicated.

EC #149136 with REA 01-17926 for mdl 135-3 or higher EC level  
EC #149136 with REA 01-17926 for mdl 138 or higher EC level  
EC #356901 with REA 01-18431 for mdl 145-3 or higher EC level  
EC #147710 with REA 01-18432 for mdl 148 or higher EC level  
EC #276270 for 3031 or higher EC level

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

VM/System Extensions is designed to run on IBM S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155II, 158, 158-3, 158AP, 158MP, 165II,

**VM/System Extensions (cont'd)**

168, 168-3, 168AP, 168MP and on the IBM 4331, 4341, 4381, 3031, 3031AP, 3032, 3033, 3033AP and 3033MP processors. IBM S/370 mds 158MP, 168MP and the 3033MP Processor are supported in UP mode, in MP mode with I/O on only one side and in MP mode with I/O on both sides when Single Processor Mode is used. To install VM/System Extensions on a 4331, 4341 or 4381 Processor, the hardware configuration must include a DASD device that is supported by VM/370 Release 6. It requires a minimum accessible main storage of 384K. This Program Product is designed for MVS, SVS or VS1 users who run under VM/370 for testing, conversion or production; for those who use the 2305-II fixed head storage device for VM/370 paging; and for CMS intensive users on S/370 mds 155II or above.

VM/System Extensions supports a cardless operating environment. By using the facility to spool accounting records and altering the system generation procedures to use tape devices, the requirement for a card reader/punch can be eliminated. Specific details are contained in the TNL update to the *VM/370 Planning and System Generation Guide* (TNL order number SN25-0757). Specific details relevant to the minimum configuration required for hardware maintenance should be directed to Field Engineering.

**Note:** Users running VM/Systems Extensions on a 135-3, 138, 145-3 or 148 with ECPS for VM/370 will not realize the full benefit of ECPS because new shadow table maintenance algorithms will be used in preference to some ECPS algorithms.

For the 4331 Processor, it is possible to run VM on a configuration without a block multiplexor channel (the 4331 does not have selector channels) if the appropriate Tape and DASD devices are selected. The 8809 Tape, the 3340 DASD, the 3310 DASD and the 3370 DASD can be attached via adapters. These devices are supported in SEPP Release 2.

The configuration requirement for channels is that the configuration contain either the channels or equivalent adapters to which the required DASD and Tape devices can attach. For SEPP Release 2 this requires a selector channel, a block multiplexor channel or appropriate adapters.



PROGRAM PRODUCTS

**VM/DIRECTORY MAINTENANCE  
RELEASE 1  
5748-XE4**

**PURPOSE**

The manual procedures to maintain the VM Directory have been cumbersome, time consuming and error prone. The objective of the VM/Directory Maintenance program product is to provide efficient, easy-to-use, and secure interactive facilities to address these problems.

**HIGHLIGHTS**

- Directory changes are made interactively using a set of general user and system administrator commands.
- Security is enhanced through the ability to enforce regular password changes.
- Directory integrity is improved through ownership by a strictly controlled service virtual machine which uses automatic backup/restore and journaling. Protection against I/O errors is achieved through the maintenance of Directory entry checksums, which are logical arithmetic sums of each entry's contents.
- Directory availability is maintained through automatic virtual machine re-initialization should a program interrupt occur or should some other condition occur which would otherwise have resulted in a disabled WAIT state being entered.
- CMS file integrity is improved through automatic command driven allocation of minidisk space. This prevents inadvertent overlaying of existing minidisk extents with new minidisks extents.
- User efficiency is improved by allowing him to perform certain directory changes himself (thereby bypassing the usual administrative bottleneck). Some such changes can be put into effect immediately through an update-in-place facility, thereby improving system efficiency by avoiding repetitive use of the nontrivial DIRECT utility.
- Usability of the program product is emphasized through an integrated HELP facility, and the use of prompting and full screen 'menus' where appropriate. The full screen menu feature is only available when the VM/Basic System Extensions Program Product (5748-XX8), the VM/System Extensions Program Product (5748-XE1) or the VM/System Product (5664-167) is installed.

**DESCRIPTION**

**Product Review:** The Directory Maintenance program product functions are largely performed by a disconnected service virtual machine which has exclusive ownership of the VM Directory. The function provided is invoked through the use of four classes of commands:

- Commands which allow the general user to change some of the statements in his own directory entry. For example he may change his logon or minidisk passwords, his minidisk access modes, his automatic LINK requests, account number or distribution code.
- Commands which allow the system administrator to define new virtual machines in the directory or to change statements in any existing entry. For example, he may change the userid or the passwords, minidisk definitions (space is automatically assigned if the appropriate definition file has been set up), virtual device addresses and dispatch priority.
- Commands to monitor and control the directory management process. For example, commands may be used to start the system up or shut it down, to review minidisk space allocation (and possible overlaps) and free space, to turn on or off automatic minidisk extent verification and to suspend or restore the automatic or manual placing of updated directory source online.
- Commands to facilitate the maintenance of the directory system. For example, these commands may be used for loading and activating versions of the system or control files, for sorting or initializing the directory source, for taking dumps and for emergency rebuilding of the directory source from backup and for the requesting of transaction logging for possible debugging purposes.

Directory maintenance commands are issued from the user's virtual machine and are transmitted, via the CP command SMSG, to the directory service virtual machine for processing. The resulting transactions may be processed immediately or they may be queued if the virtual machine is already busy. Some transactions which simply replace existing statements in a directory entry may be brought online immediately through an update-in-place capability in the VM Control Program. More complex transactions requiring expansion or contraction of an entry may only be brought online when the standard DIRECT utility is run. It is possible through the use of a control file, to request periodic automatic executions of this utility. Also via this file, an installation may specify input for the use of certain standard features, such as how often backup is to be performed, or how often the directory is to be brought online using the DIRECT utility, or the installation may specify the use of optional features such as menus.

**CUSTOMER RESPONSIBILITIES**

In addition to the responsibilities of the VM installation as defined in the VM pages, the customer has the following responsibilities with regard to the Directory Maintenance Program Product:

- To install Release 6 of VM.
- To optionally install the VM/Basic System Extensions Program Product, the VM/System Extensions Program Product or the VM/System Product if the full screen 'menu' is desired.
- To provide sufficient DASD space to accommodate the needs of the program product.
- To train the system administrator to operate the program product.
- To educate the general user on how to use the program product.

**SPECIFIED OPERATING ENVIRONMENT**

The Directory Maintenance Program Product may be used in any VM installation where CMS is available.

**HARDWARE REQUIREMENTS**

The same IBM products as those announced for VM/370 Release 6 and VM/System Product. In addition, when running with the VM/Basic System Extensions Program Product, the VM/System Extensions Program Product or the VM/System Product, the 3310 and 3370 Fixed Block Architecture devices are supported and when running with the VM/System Product, the 3380 DASD is also supported. The directory maintenance virtual machine requires a minimum of 716K virtual storage size and the following three minidisks:

- Virtual disk 191: 8 cylinders of IBM 3330 mdl 11 space (or equivalent) for the programming system.
- Virtual disk 195 containing the directory source, control files, history and log files: Approximately 15 cylinders of 3330 mdl 11 space (or equivalent) plus 1 cylinder for every 100 users in the directory. This is based on the assumption that there are an average of 10 statements in the typical directory.
- Virtual disk 193 containing the directory backup source, the spooled console log and a few other working files. Space requirements are the same as Virtual 195.

**SOFTWARE REQUIREMENTS**

The Directory Maintenance Program Product is designed to operate with Release 6 (PLC4) of VM/370 as a base with APARs VM09879 and VM10286 installed. If the full screen 'menu' support for command processing is desired, there is an optional dependency on the VM/Basic System Extensions Program Product, the VM/System Extensions Program Product or the VM/System Product.

The VM/System Product is also required to use:

- Support for the 3380 Direct Access Storage.
- Support for specifying the 3279 Display Station screen attributes in directory entries.
- Support for specifying an alternate path to the CP directory.

In addition, APAR VM12034 must be installed on the VM/System Product to use the ability to make screen modifications to the directory entry effective immediately.

**COMPATIBILITY**

The Directory Maintenance program product is compatible with the existing manual methods of directory maintenance. An installation may at any time change from one method to the other, or use both at the same time.

**DOCUMENTATION:** (available from Mechanicsburg)

The following publications are available in support of this new product: *Licensed Program Design Objectives ... General Information Manual ... Licensed Program Specifications ... General User's Guide ... Installation and System Administrator's Guide ... Program Logic Manual.*

PROGRAM PRODUCTS

**VM/DIRECTORY MAINTENANCE  
RELEASE 2  
5748-XE4**

**PURPOSE**

The manual procedures to maintain the VM Directory have been cumbersome, time consuming and error prone. The objective of the VM/Directory Maintenance program product is to provide efficient, easy-to-use, and secure interactive facilities to address these problems.

**HIGHLIGHTS**

- Directory changes are made interactively using a set of general user and system administrator commands.
- Security is enhanced through the ability to enforce regular password changes.
- Directory integrity is improved through ownership by a strictly controlled service virtual machine which uses automatic backup/restore and journaling. Protection against I/O errors is achieved through the maintenance of Directory entry checksums, which are logical arithmetic sums of each entry's contents.
- Directory availability is maintained through automatic virtual machine re-initialization should a program interrupt occur or should some other condition occur which would otherwise have resulted in a disabled WAIT state being entered.
- CMS file integrity is improved through automatic command driven allocation of minidisk space. This prevents inadvertent overlaying of existing minidisk extents with new minidisk extents and inadvertent destruction of minidisk files.
- User efficiency is improved by allowing him to perform certain directory changes himself (thereby bypassing the usual administrative bottleneck). Some such changes can be put into effect immediately through an update-in-place facility, thereby improving system efficiency by avoiding repetitive use of the nontrivial DIRECT utility.
- Usability of the program product is emphasized through an integrated HELP facility, and the use of prompting and full screen 'menus' where appropriate.
- Commands which provide the installation with information relative to the status of its users and the DATAMOVE virtual machine, the facility to control the flow of messages from DIRMAINT, and a command interface to the DATAMOVE virtual machine.
- IPL Control Statement extension to allow the user to add a PARM option followed by up to 48 characters in a user's directory entry.
- RAS enhancements include improvements in TOD interrupt and new day detection, resolution of several ABEND conditions, and disk full recovery.

**Product Review:** The Directory Maintenance program product functions are largely performed by a disconnected service virtual machine which has exclusive ownership of the VM Directory. The function provided is invoked through the use of four classes of commands:

- Commands which allow the general user to change some of the statements in his own directory entry. For example he may change his logon or minidisk passwords, his minidisk access modes, his automatic LINK requests, account number or distribution code.
- Commands which allow the system administrator to define new virtual machines in the directory or to change statements in any existing entry. For example, he may change the userid or the passwords, minidisk definitions (space is automatically assigned if the appropriate definition file has been set up), virtual device addresses and dispatch priority.
- Commands to monitor and control the directory management process. For example, commands may be used to start the system up or shut it down, to review minidisk space allocation (and possible overlaps) and free space, to turn on or off automatic minidisk extent verification and to suspend or restore the automatic or manual placing of updated directory source online.
- Commands to facilitate the maintenance of the directory system. For example, these commands may be used for loading and activating versions of the system or control files, for sorting or initializing the directory source, for taking dumps and for emergency rebuilding of the directory source from backup and for the requesting of transaction logging for possible debugging purposes.

Directory maintenance commands are issued from the user's virtual machine and are transmitted, via the CP command SMSG, to the directory service virtual machine for processing. The resulting transactions may be processed immediately or they may be queued if the virtual machine is already busy. Some transactions which simply replace existing statements in a directory entry may be brought online immediately through an update-in-place capability in the VM Control Program. More complex transactions requiring expansion or contraction of an entry may only be brought online when the

standard DIRECT utility is run. It is possible through the use of a control file, to request periodic automatic executions of this utility. Also via this file, an installation may specify input for the use of certain standard features, such as how often backup is to be performed, or how often the directory is to be brought online using the DIRECT utility, or the installation may specify the use of optional features such as menus.

**CUSTOMER RESPONSIBILITIES**

In addition to the responsibilities of the VM installation as defined in the VM pages, the customer has the following responsibilities with regard to the Directory Maintenance Program Product:

- To install VM/System Product Release 1 or VM/System Product Release 2.
- To provide sufficient DASD space to accommodate the needs of the program product.
- To train the system administrator to operate the program product.
- To educate the general user on how to use the program product.

**SPECIFIED OPERATING ENVIRONMENT**

The Directory Maintenance Program Product Release 2 may be used in any VM installation where VM/System Product Release 1 or VM/System Product Release 2 is installed and where CMS is available.

**HARDWARE REQUIREMENTS**

The same IBM products as those announced for VM/System Product Release 1 or VM/System Product Release 2. The directory maintenance virtual machine requires a minimum of 716K virtual storage size and the following three minidisks:

- Virtual disk 191: 8 cylinders of IBM 3330 mdl 11 space (or equivalent) for the programming system.
- Virtual disk 195 containing the directory source, control files, history and log files: Approximately 15 cylinders of 3330 mdl 11 space (or equivalent) plus 1 cylinder for every 100 users in the directory. This is based on the assumption that there are an average of 10 statements in the typical directory.
- Virtual disk 193 containing the directory backup source, the spooled console log and a few other working files. Space requirements are the same as Virtual 195.

The DATAMOVE virtual machine requires a minimum of 512K virtual storage size and a virtual 191 disk with 5 cylinders of 3330 mdl 11 space (or equivalent) for its related files.

**SOFTWARE REQUIREMENTS**

The Directory Maintenance Program Product is designed to operate with either VM/System Product Release 1 or VM/System Product Release 2.

In addition, APAR VM12034 must be installed on the VM/System Product Release 1 to use the ability to make screen modifications to the directory entry effective immediately.

**COMPATIBILITY**

The Directory Maintenance program product is compatible with the existing manual methods of directory maintenance. An installation may at any time change from one method to the other, or use both at the same time.

**DOCUMENTATION:** (available from Mechanicsburg)

The following publications are available in support of this new product:

*Licensed Program Design Objectives ... General Information Manual ... Licensed Program Specifications ... General User's Guide ... Installation and System Administrator's Guide ... Program Logic Manual.*

PROGRAM PRODUCTS

**5748-XP1 - VM/370 RSCS NETWORKING  
VM/370 REMOTE SPOOLING COMMUNICATIONS  
SUBSYSTEM (RSCS) NETWORKING**

**PURPOSE**

This product permits CMS users to transmit jobs to other systems for execution. Output may occur at the other system, or on the VM/370 System unit record devices. Remote users may transmit jobs for execution to a CMS batch virtual machine, and can specify that the output can be sent to any terminal or system defined on the network. This product can be used to submit jobs for execution in other batch systems (DOS/VSE, OS/VS) running in a virtual machine. If the other batch systems support the NJE/NJI protocol, output can be directed to any virtual machine or system defined in the network.

**DESCRIPTION**

RSCS is a multi-tasking supervisor supporting multiple concurrent remote spooling operations while running in a single VM/370 virtual machine. It is designed so that a separate task supports the specific characteristics of each remote terminal, workstation or node attached to the RSCS virtual machine via a teleprocessing line. The RSCS supervisor provides each task with a common access method to the VM/370 spool file system and an Execute Channel Program (EXCP) level interface for I/O to the teleprocessing line.

Printer or punch files that any VM/370 virtual machine user (e.g., a CMS user) wants to have transmitted to a supported remote destination need only be spooled to the RSCS virtual machine with the destination designated via the CP TAG command. The proper task for the remote destination will be initiated and the files will be sent. For file being transmitted from a remote destination, RSCS will read the data from the remote destination, produce a VM/370 spool file from the data and either forward it to another destination, spool it to a virtual machine's reader or spool it to the system depending upon what has been specified by the sender.

RSCS supports three general types of remote connections: NonProgrammable Terminal, Programmable Terminals and NJE/NJI systems.

RSCS provides asynchronous peer-to-peer communication capabilities between VM/SP systems. When used in conjunction with the programmable operator facilities of VM/SP Release 2, RSCS Release 2 or 3 provides communications capabilities for the remote operation of VM/SP systems in distributed data processing environments.

**Nonprogrammable Terminal Support:** RSCS provides support for the IBM 2770, 2780 and 3770 as a 2770. It also provides support for the IBM 3780 and 3776/3777-1 as a 3780 terminal. This support is provided through the IBM 3704/3705 Communications Controller in emulation mode, through the 2701 Transmission Control Unit, or through the Integrated Communications Adapter available on the IBM S/370 mdl 135, 135-3, 138 or the Communications Adapter on the 4331 processor. RSCS will also support the 2770, 2780 and 3780 terminal via the 2703 Transmission Control Unit.

RSCS provides support for 3270 Information Display System printers, which are either locally attached or on a remote cluster attached to the VM/370 processor on which this release is running. 3270 Information Display System printers are defined to be 3284, 3286, 3287, 3288 or 3289 printers attached to the appropriate 3271, 3272, 3274 or 3276 control unit. (The 3262 line printer, mdls 3 and 13 are compatible with the 3289.)

**Programmable Terminal Support:** RSCS supports communication with processors programmed to run as a HASP workstation. This includes the DOS/VS Job Entry Workstation Program (PRPQ WFO358). RSCS can assume the role of a HASP workstation and connect to any HASP, ASP, RES, JES2 or JES3 system running as a main processor. RSCS can connect to a VSE/POWER host system.

**NJI/NJE Systems:** RSCS supports communications to and from systems running NJI/NJE for JES2, RSCS Networking or the HASP, ASP or VM/370 Networking PRPQs over binary synchronous facilities or channel to channel attachment (CCA) using a common NJE protocol.

**HIGHLIGHTS**

The RSCS Networking Program Product is a superset of both the RSCS Component of VM/370 and the VM/370 Networking PRPQ. Significant new features as compared to the RSCS Component of VM/370 include:

**RELEASE 1**

**Release 1 Networking:** This product allows a VM/370 system to operate as a full member of an NJI/NJE job network. It includes those functions common to all NJI/NJE compatible systems such as:

**Compatible Network Protocol** - allows one system to transfer jobs and card or printer formatted data streams to another without requiring either system to assume a subordinate role.

**Store and Forward Facilities** - which complete transmission of a data stream from one node to another before any further action is taken on that data stream. As a result, the integrity and recovery facilities of each node's spool file system provides integrity and recovery of that file in the event of a network or system failure.

**Routing** - by means of destination tables, is provided by each node in the network. Until the node to which a spool file is directed is reached, each intervening node will enqueue the file for the link to the next node for proper routing to the specified destination. When the final destination is reached, the file is released to that system for processing.

**Operator Commands** - are provided to allow the network operator to reconfigure the network without interrupting normal networking operations.

**Simplified and Improved System Operation:** Additional operator commands are provided to make it easier for the RSCS operator to control the RSCS virtual machine operations. Note: The RSCS machine can run without operator intervention. The normal and recommended way to run an RSCS virtual machine is to run it disconnected (i.e., with no operator terminal) and to spool the console output.

VM/370 accounting records for each file transmitted or received are maintained. These records contain information that pertains to the origin, destination and record count of the file.

A simple EXEC function is provided that allows the RSCS operator to call out frequently used series of commands such as those needed to automatically start up communication links, or to automatically change a network configuration at a particular time of day.

A dynamic directory is provided that allows the RSCS operator to permanently update (add, delete, change) the RSCS link and route identifiers without having to re-sysgen RSCS. This directory can be changed by the RSCS operator using normal CMS editing facilities. The changes will take place at the next IPL of RSCS. Operator commands are provided to temporarily modify the link and route identifiers in storage so that changes can be made without having to re-IPL RSCS. These changes will only remain active until the next IPL of RSCS.

Files and jobs may be submitted through the VM/370 real card reader to RSCS for transmission. The data deck to be transmitted must be preceded by an ID card to direct it to the RSCS virtual machine and by a card that contain 'tagtext' to specify its destination.

CMS users can send special messages to the RSCS virtual machines requesting RSCS to send messages or commands to other nodes on the network.

**DASD Support:** The product supports the IBM 3310 and 3370 (Fixed Block Mode) DASD devices and the enhanced CMS file system, both of which are supported in the VM/Basic System Extensions Program Product Release 2.

**Enhanced Coexistence:** In addition to being able to communicate with NonProgrammable Terminals and Programmable Terminals, RSCS can now communicate with VSE/POWER, and can participate in NJE/NJI networks. This allows a VM/370 system running RSCS Networking to coexist and communicate with a diverse number of communications terminals and host systems as shown in the following chart:

**Remote System Nodes**

<b>NJI/NJE Hosts:</b>	<b>NonNJI/NJE Hosts:</b>
Any system capable of running:	Any system capable of running:
RSCS Networking	VSE/POWER
JES2 NJE	RES component of OS/VS1
VM/370 Networking PRPQ	JES2 component of OS/VS2
HASP Networking PRPQ	JES3 component of OS/VS2
ASP Networking PRPQ	HASP II Version 3.1 and 4
JES 3 Networking PRPQ	ASP Version 3.2

**Remote Terminal Nodes**

<b>Programmable:</b>	<b>Non-Programmable:</b>
Any system programmed to provide MULTI-LEAVING line protocol:	Any Data Communication Terminal or System that is compatible with:
S/360 mdl 20 and above	2770 Data Communication System with the 2772 Multipurpose Control Unit
S/370 mdl 115 and above	2780 Data Transmission Terminal mdls 1 and 2
4300 Processors	3770 Data Communication System in 2770 BSC Mode
System/3 mdl 6 and above	3780 Data Communication Terminal
3777 as a S/360 mdl 20	
System/32	
System/34	
System/36	
1130	
2922	
8100	

## PROGRAM PRODUCTS

## VM/370 RSCS (cont'd)

## RELEASE 2

Release 2 includes all of the functions provided in RSCS Networking Release 1 plus the following:

- **Spooling of files to 3270 Information Display System printers.**  
Files can be spooled to RSCS for printing on 3270 Information Display System printers which are either locally attached or on a remote cluster attached to the VM/370 processor on which this release is running. 3270 Information Display System printers are defined to be IBM 3268, 3284, 3286, 3287, 3288 or 3289 printers attached to the appropriate IBM 3271, 3272, 3274 or 3276 control unit. (The 3262 line printer, mdls 3 and 13, is compatible with the 3289.)
- **Transmission of Additional Spool File Attributes.**  
Spool file attributes associated with the IBM 3800 Printing Subsystem in VM/370 Release 6, and new spool file attributes in the VM/System Product, will be transmitted and preserved when a spool file is sent between VM/370 (RSCS Release 2) nodes and non-VM/370 NJI/NJE nodes.  
The RSCS command language is extended to allow the RSCS operator to change these spool file attributes for any spool file enqueued to the RSCS virtual machine.

## RELEASE 3

Release 3 provides all of the functions of RSCS Networking Release 2 plus the following:

- **Virtual 3800 Support:** RSCS will support the networking and transmission of virtual 3800 printer files created on one VM/SP system to another VM/SP system for printing. These files may be transmitted through intermediate VM/SP systems that are using Release 3 of RSCS or through NJI/NJE systems.
- **Extended 3800 Support:** RSCS will accept for printing on a VM/SP Release 2 system, 3800 print files that were created on a non-VM NJI/NJE system, and which have multiple Character Arrangement Tables specified, and contain print control and table reference characters preceding each data record.
- **Authorized Operator:** The RSCS virtual machine or individual links can now be controlled by an authorized operator on another virtual machine or at another node in the network. This permits greater user flexibility in operating an RSCS network.  
For example, since an authorized operator can now be specified for a particular link, an output-only workstation (such as the 3270 information display station printer) can be controlled from a terminal nearby the printer in a location that is remote from the central RSCS operator.
- **Improved Usability:** Installations may now specify that RSCS is to use the CP message No Header command to improve the readability of RSCS messages, by eliminating blank lines and CP message headers sent to a user on a local system. This option can be particularly useful when used in conjunction with the programmable operator facility of VM/SP Release 2 to eliminate unnecessary messages from the local RSCS machine to the remote operator of distributed machines.

When the new end user commands of VM/SP such as NAMES, and TELL are used, RSCS will become transparent to end-users. Users of these commands need no longer be aware of SPOOL, TAG, and PUNCH commands.

- **Improved Serviceability:** RSCS networking can now use the facilities of the VM/370 Interactive Problem Control System program product for RSCS problem determination and analysis. IPCS provides an interactive online facility for reporting and diagnosing program failures and for managing problem information and status.  
To aid in resolving problems related to communications links, the capability of the RSCS TRACE command will be extended to print details of each transmission that takes place over the link, optionally including the complete contents of the data buffer. The log output may optionally be routed to another user or another node.
- **Workstation Forms Control Support:** An RSCS operator (or an authorized operator) can now specify which print spool files, based upon their form name, are to be printed on a particular remote workstation printer. The form name can either be selected manually for each type of form to be printed, or selected automatically by RSCS as a function of the files in the queue for a particular link. Optionally, the operator may request setup pages to be printed to aid in forms alignment.
- **Distributed Data Processing:** When utilized in conjunction with the programmable operator facilities of VM/SP Release 2, the VM/370 Pass-Through Facility, Release 2, RSCS can be used for the remote operation and control of multiple VM/370 systems

from a central site. RSCS networking provides the vehicle for the asynchronous transmission of programs, data, messages, and commands between VM/SP systems. The new end-user commands of VM/SP Release 2 provide the facilities of RSCS to non-DP end-users in a simple and straight forward manner. Remote initialization of 4300 processors requires the ROCF feature on the 4300 processors.

## CUSTOMER RESPONSIBILITIES

The customer is responsible for installing this program product. In addition the customer is responsible for understanding the user interfaces to the systems and communications terminals that he wants to communicate with and with telling his users of these interfaces. The customer is responsible for assuring that all teleprocessing linkages are properly set up and is responsible for properly identifying links and routes to this program.

## SPECIFIED OPERATING ENVIRONMENT

This product is designed primarily to allow CMS users and RJE users connected to RSCS to transmit jobs to other systems for execution with the output produced either at the other system or returned for output on the VM/370 system unit record devices. Additionally, remote users can transmit jobs for execution in a CMS batch virtual machine. Because of the flexible interfaces within RSCS and the VM/370 spooling systems, this product can be used to submit jobs for execution in other batch systems (DOS/VSE, OS/VS, etc.) running in a virtual machine. If the other batch systems support the NJE/NJI protocol, output can be directed to any virtual machine or system defined in the network. This product is very useful for sending messages and data streams to CMS users on VM/370 systems communicating with each other through this product.

## HARDWARE REQUIREMENTS

**Processors:** RSCS runs on any IBM processor supported by VM/370 Release 6 and a virtual machine storage size of 384K or greater.

**Hardware Configurations:** The RSCS Networking program product is designed to run on the System/370 Models 135, 135-3, 138, 145, 145-3, 148, 155II, 158, 158-3, 158AP, 158MP, 165II, 168, 168-3, 168AP, and 168MP; on the 3031, 3031AP, 3032, 3033, 3033N, 3033S, 3033AP, 3033AP-2, and 3033MP processor complexes; 3081 and IBM 4300 Processors.

**3270 Information Display System Printers:** Release 2 supports the following 3270 Information Display System printers:

- IBM 3262 Printer mdl 3 or mdl 13 (IBM 3262 Line Printers mdls 3, 13 are compatible with the IBM 3289)
- IBM 3268 Printer mdl 2
- IBM 3284 Printer mdl 1 or mdl 2
- IBM 3286 Printer mdl 1 or mdl 2
- IBM 3287 Printer mdl 1 or mdl 2, mdl 1C or 2C Base Color Only)
- IBM 3288 Line Printer mdl 2
- IBM 3289 Line Printer mdl 1 or mdl 2

The above printers are supported when attached to the following control units:

- IBM 3271 Control Unit mdl 1 or mdl 2
- IBM 3272 Control Unit mdl 1 or mdl 2
- IBM 3274 Control Unit mdl 1B, mdl 1C, mdl 1D or mdl 51C (Base Color Only)
- IBM 3276 Control Unit Display Station mdl 1, mdl 2, mdl 3 or mdl 4.

## SOFTWARE REQUIREMENTS

RSCS is designed for, and requires, VM/System Product (VM/SP). (For RSCS Release 3, the Extended 3800 portion of the 3800 printer enhancements requires Release 2 of VM/SP, but the remainder of the new functions in Release 3 will run with Release 1 of VM/SP.) In addition, the RSCS support of IPCS requires the latest release of the VM/Interactive Problem Control System Extension (IPCS) program product. VM/SP Release 2 programmable operation capabilities are supported under RSCS Releases 2 and 3.

Adequate CMS formatted disk space must be provided to contain the RSCS system disk, the RSCS text staging area, and the RSCS source staging area. The approximate amount of DASD space required is shown in the following table:

## PROGRAM PRODUCTS

**VM/370 RSCS (cont'd)**

	SYSTEM	BASE TEXT	BASE SOURCE
DASD	DISK	STAGING AREA	STAGING AREA
2314	6 cylinders	7 cylinders	67 cylinders
3330	3 cylinders	4 cylinders	35 cylinders
3340	8 cylinders	9 cylinders	98 cylinders
3375	3 cylinders	3 cylinders	26 cylinders
3350/3380	2 cylinders	3 cylinders	18 cylinders
3310/3370	1536 blocks	1792 blocks	14592 blocks

**COMPATIBILITY**

RSCS Networking Release 3 is upward compatible with RSCS Networking Release 2.

Files can be successfully transmitted from an RSCS Release 2 system to a Release 3 system. However, when files are transmitted from an RSCS Release 3 system to either a Release 2 system or an RSCS Release 3 system that is running on VM/SP Release 1, any of the new spool file attributes that may be present will be lost. Virtual 3800 files cannot be successfully transmitted to an RSCS Release 2 system.

**DOCUMENTATION**

(available from Mechanicsburg)

*IBM Virtual Machine Facility/370 Remote Spooling Communications Subsystems Networking Program Product General Information Manual (GH24-5004) ... IBM Virtual Machine Facility/370: Remote Spooling Communications Subsystems Networking Program Product Specifications (GH24-5003) ... IBM Virtual Machine Facility/370: Remote Spooling Communications Subsystems Networking Program Product Reference and Operations Manual (SH24-5005) ... Reference Summary (CARD) for RSCS Networking Program Product (SX24-5119) ... IBM Virtual Machine Facility/370: Remote Spooling Communications Subsystem Networking Program Product Logic Manual (LY24-5203).*



PROGRAM PRODUCTS

**5748-XT3 - SPF/CMS  
VM/CMS - 3270 DISPLAY SUPPORT and  
STRUCTURED PROGRAMMING FACILITY**

**PURPOSE**

VM/CMS - 3270 Display Support and Structured Programming Facility (SPF/CMS) is functionally equivalent to Version 2.2 of the SPF/TSO program. The two programs are fully compatible in display formats and operation, except for those features which are explicitly oriented to the VS2/TSO or VM/CMS environment. SPF/CMS also includes a utility which permits transfer of SPF program libraries from VS2/TSO to VM/CMS.

**HIGHLIGHTS**

SPF/CMS is a program development tool designed to take advantage of the characteristics of IBM 3270 display terminals, and to increase programmer productivity in the VM/CMS environment. SPF supports both structured and conventional programming techniques. It can be used either by an individual programmer, or by many programmers working together on a project. SPF features which increase programmer productivity and simplify operation include:

- Display presentations and menus which prompt the user, reduce keystrokes and minimize the opportunity for error.
- Support for multi-level programming libraries, automatic collection of library activity statistics and printing of library contents.
- Full screen, context editing which allows additions and changes to multiple lines in a single interaction.
- Simple one-character edit commands for inserting, deleting, duplicating or rearranging lines of source data.
- Forward, backward and sideways scrolling of source data or listings, plus the ability to locate information by character string or line number.
- Split screen, allowing two SPF functions to be performed independently on the same display terminal.
- Use of program function keys for frequently performed SPF operations and commands.
- Menu-driven utilities for specification, maintenance and current status display of libraries and files.
- Menu interface to standard language processors (compilers and assembler) for execution in the foreground or CMS batch machine.
- Document preparation support, including text editing features and a menu interface to the SCRIPT/VS Document Composition Facility.
- Hardcopy log summarizing significant user actions during the session.
- Online tutorial for instruction and reference - especially valuable for the occasional or novice user of SPF.

**DESCRIPTION**

SPF operates as a VM/CMS application and is invoked simply by entering the command "SPF". It operates on a 24-line, 32-line or 43-line IBM 3270 display station, equipped with either 12 or 24 program function keys.

**DISPLAY FORMAT:** SPF uses four basic types of display presentations:

- **Option Selection Menus** - where the user selects from a list of options by typing a number and pressing the ENTER key.
- **Parameter Entry Menus** - where the user supplies parameters by filling in labeled fields. In many cases, SPF displays default values, based on what the user last entered. The user may overwrite the displayed defaults.
- **Member Selection Lists** - for displaying a list of members in a MACLIB or SPF library. The user may select a member by entering a one-character code in front of the appropriate member name.
- **Data Displays** - for displaying source code or listings for editing and browsing. The first two lines of the display include a title, message area, command input field and scroll amount field. The remaining lines contain the data.

**PROGRAM ACCESS AND FUNCTION KEYS:** The program access (PA2) and the 12 or 24 program function (PF) keys are used to request commonly used or special SPF operations, including:

- **RESHOW** - to redisplay the contents of the screen.
- **SCROLL** - to move the screen window up, down, left or right by the amount shown in the scroll amount field.
- **SPLIT SCREEN** - to enter split screen mode or to adjust the locations of the split based on the current cursor position.
- **PRINT** - to obtain a hardcopy snapshot of the current screen image.
- **HELP** - to obtain additional information about an error message or general information about SPF commands and options.

- **END** - to terminate the current operation and return to the previous display or menu.

Users may rearrange the assignment of SPF-defined PF key functions, and may equate additional PF keys to edit and browse commands.

**MAJOR FUNCTIONS:** The major functions provided by SPF are:

- **SPF PARMS** - to specify terminal type and user options.
- **BROWSE** - to display source data and output listings.
- **EDIT** - to create or change source data.
- **UTILITIES** - to perform SPF utility functions.
- **BACKGROUND** - to compile, assemble or debug.
- **BATCH PROCESSING** - to compile or assemble via a CMS batch machine.
- **CP/CMS** - to enter a CP or CMS command, or EXEC.
- **TUTORIAL** - to display information about SPF.
- **EXIT** - to terminate SPF.

**SPF PARMS:** The SPF parms function allows the user to specify terminal type, mono/dual case, number of program function (PF) keys, default options for list and log files and PF key definitions.

**BROWSE:** The browse option allows the user to display source programs, output listings, test data, etc., stored in SPF libraries, MACLIBs or DASD resident sequential CMS files with the following characteristics:

- Fixed or variable record formats.
- Records with or without printer control characters.
- Records with logical record length up to and including 32,767 bytes.

The screen window for browsing is 22, 30 or 41 lines deep depending upon terminal type. (Two lines are reserved at the top of the screen for title information, messages, command entry and display of the scroll amount.) Four-way scrolling is available via the scroll PF keys. In addition, FIND and LOCATE commands may be used to scroll to a designated character string, line number or symbolic label.

**EDIT:** The edit option allows the user to create, display and modify source data (program code, test data, documentation, etc.) stored in SPF libraries or DASD-resident sequential CMS files with the following characteristics:

- Fixed or variable record formats.
- Records with or without printer control characters.
- Records with logical record lengths of up to and including 255 bytes but not less than 10 bytes.

The edit display is similar to browse except that each line consists of a six-column sequence number field followed by a 72-column data field. Four-way scrolling is available via the scroll PF keys.

To modify information on the screen, the user simply moves the cursor to the desired location and enters the new information. Several lines may be modified before pressing the ENTER key. Lines may be deleted, inserted, shifted left or right (for indentation changes), duplicated or rearranged by overtyping the sequence number fields with line commands consisting of one or two characters (e.g., D for delete, I for insert, M for move). In general, several line commands as well as data modifications may be typed before pressing the ENTER key.

In addition, primary commands may be entered at the top of the screen to find and change designated character strings, to control sequence numbering and character translation, to submit the data to the job stream, to save the edited data or to cancel without saving.

**UTILITIES:** The SPF utility function allows the user to select one of the following options:

- **Library Utilities** - to compress a MACLIB, to print a file or to delete, rename or print selected members of a MACLIB or SPF library.
- **File Utility** - to specify a new SPF library, to rename or delete a file or SPF library or to display file or library information.
- **MOVE/COPY** - to move or copy an entire file or selected members of a MACLIB or SPF library.
- **Project Utility** - to print or display information about SPF libraries.
- **Reset SPF Statistics** - to create, update or delete statistics for an SPF library, and optionally reset sequence numbers.
- **Hardcopy Utility** - to initiate printing or punching of a sequential CMS file or member of a MACLIB or SPF library.

PROGRAM PRODUCTS

SPF/CMS (cont'd)

- Retrieve Utility - to transfer SPF libraries which have been dumped to tape (via IEHMOVE) from SPF/TSO to SPF/CMS.
- SCRIPT/VS Utility - to allow formatting, displaying and printing of documentation maintained in SPF libraries or sequential CMS files. Use of this feature requires that the SCRIPT/VS Document Composition Facility be installed.

**FOREGROUND PROCESSING:** The foreground option provides an interface with standard language processors for foreground compilation, assembly, CMS loading or debugging of programs stored in SPF libraries.

**BATCH PROCESSING:** The batch processing option provides an interface with standard language processors for CMS batch machine compilation or assembly of programs stored in SPF libraries. For other batch machine jobs, the CP SPOOL and PUNCH commands or some EXEC may be entered via the CMS command option (primary option 6).

**CP/CMS COMMAND:** The CP/CMS command option displays a menu on which any CP or CMS command or EXEC may be entered without leaving SPF.

**TUTORIAL:** The SPF tutorial provides immediate online reference and instruction on how to use SPF. It may be viewed sequentially from beginning to end, or randomly by selecting topics from a table of contents or index. It may be entered from the primary option menu, or from another SPF option by pressing the Help PF key.

**CUSTOMER RESPONSIBILITIES**

The customer must have installed the prerequisite programs and the appropriate processing programs described under compatibility for use of the SPF foreground and batch processing functions.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The computer system requirements are the same as needed for VM/370; that is an IBM S/370 mdl 135 and up with at least 384K real storage, or an IBM 4300 Processor.

The storage requirements for the user's VM machine will vary depending upon the size of the files being edited and the extent that "split-screen" will be used. The SPF programs are reenterable and should be placed in a discontinuous shared segment area. This will reduce the storage requirements for user machines and should also improve performance when there are multiple SPF users online.

The minimum virtual machine size is 512K if SPF resides in the discontinuous shared area. If SPF does not reside in the discontinuous shared area, a virtual machine size of 768K is recommended.

**Terminals:** SPF supports the following IBM 3270 Display Stations:

- 3275 mdl 2.
- 3276 mdls 2, 3 and 4.
- 3277 mdl 2 (local or remote attachment).
- 3278 mdls 2, 3 and 4 (local or remote attachment).

The following keyboards are supported:

For 3275 or 3277 display stations:

- 78-Key EBCDIC Operator Console (feature #4632).
- 78-Key EBCDIC Typewriter (feature #4633).
- 78-Key ASCII Typewriter (feature #4635).
- 78-Key EBCDIC Typewriter/APL (feature #4638 for 3277 only), when operated with APL switch OFF.

For 3276 or 3278 display stations:

- 75-Key EBCDIC Typewriter (feature #4621).
- 75-Key ASCII Typewriter (feature #4624).
- 87-Key EBCDIC Typewriter (feature #4627).
- 87-Key ASCII Typewriter (feature #4628).

The standard character set (94 graphics plus blank and null) is supported on 3276 and 3278 display stations.

The audible alarm (feature #1090) is supported, but not required. Installation of the audible alarm feature is strongly recommended to enhance usability. The alarm is sounded by SPF whenever a warning or error message is displayed.

**SOFTWARE REQUIREMENTS**

This licensed program is released to work with VM/370 Release 5 and subsequent releases and modification levels unless otherwise stated. Prerequisite is either the VM/ System Extension program product (5748-XE1) or the VM/Basic System Extensions program product (5748-XX8).

SPF/CMS is written in PL/S\* and translated into Assembler Language.

\*Programming Language/System (PL/S) is an IBM proprietary language.

**COMPATIBILITY**

SPF operates as a CMS command. SPF provides menu interfaces with the following IBM processing programs for foreground and batch execution:

VM/370 Assembler	
COBOL-OS/VS Compiler and Library	5740-CB1
COBOL Interactive Debug	
(foreground only)	5734-CB4
FORTRAN IV G1 Compiler	5734-FO2
FORTRAN Interactive Debug	
(foreground only)	5734-FO5
PL/I OS Checkout Compiler	5734-PL2
PL/I OS Optimizing Compiler	5734-PL1

All the program-numbered items above can be ordered separately under IBM program product licensing agreements. The appropriate processing programs must be installed to use the SPF foreground and batch processing functions.

SPF also provides a menu interface to SCRIPT/VS to allow formatting, display and printing of text maintained in SPF libraries or CMS sequential files. Use of this feature requires installation of the following IBM program product:

Document Composition Facility (SCRIPT/VS) (with the Foreground Environment Feature), 5748-XX9.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual ... Licensed Program Design Objectives.*

## PROGRAM PRODUCTS

**DISPLAY MANAGEMENT SYSTEM/CMS  
RELEASE 2  
DMS/CMS (5748-XXB)**

[ NO LONGER AVAILABLE, effective May, 1983. ]

**PURPOSE**

The Display Management System/CMS program product provides new display oriented interactive function to the CMS user. DMS/CMS requires VM/370 Release 6 and VM/Basic System Extension, VM System Extensions or VM/System Product as prerequisites.

**HIGHLIGHTS**

**Interactive Definition of Display Formats:** Utilizing the herein listed Display Stations, an application programmer or application user may interactively format the screen image as it will appear to the end user. This design includes not only definition of constant data but user input fields as well.

Field characteristics are captured when the field is established during the screen design. Field attributes include: Protected/not protected, alphameric/numeric, normal/high/dark intensity, extended color, highlighting, light-pen selectable and may be changed after the screen is designed.

Editing commands provide functions such as:

- DELETE lines.
- DUPLICATE line.
- MOVE and COPY lines.
- Shift LEFT AND RIGHT.
- CENTER.
- Scroll FORWARD and BACKWARD.
- DISPLAY the desired screen.

HELP panels are provided to guide the designer in the use of the functions, and PF keys provide easy manipulation of the various panels.

Screen images are stored under a symbolic name in CMS files for later reference by CMS applications programs.

**Communication/Manipulation of Display Formats**

**High Level Language:** The current releases of the following languages can communicate with screen images that were designed and stored under DMS/CMS.

- COBOL/VS (5740-CB1 and (5746-CB1).
- PL/I (5734-PL3 and 5736-PL1).
- RPG II (5746-RG1) (see Note 1).
- VM/370 Assembler.

**Note 1:** The following functions and capabilities of DMS/CMS Release 2 cannot be used from an RPG II program:

- Selector Light-Pen Support.
- "Data Entry" Options.
- Improved Cursor Management Capability.
- Change Data Field Protection, Color and Highlighting.

DMS/CMS provides the application programmer with facilities to:

- Move data from program to display.
- Move data from display into program.
- Determine fields selected.
- Change highlighting, color, or intensity.
- Change field intensities.
- Manage a cursor.
- Add a comment to bottom line of display.
- Sound the audible alarm.

**EXEC Language:** The DMS/CMS EXEC2 and DMS/CMS EXEC support provides full screen function to EXEC users. EXECs can be written to communicate to the screen images developed by the DMS/CMS Panel Formatter. All functions of DMS/CMS Release 1 will continue to be available through the DMS/CMS EXEC support. The full capability of DMS/CMS Release 2 is available through the DMS/CMS EXEC2 support.

**Support for Various Models of the 3270 Terminal Family:** The following 3270 Display Terminals are supported:

- 3275-2 Display Station.
- 3276-2, 3, 4, Control Unit Display Station.
- 3277-2 Display Station.
- 3278-2, 3, 4, 5 Display Stations
- 3279-2A, 2B, 3A, 3B Color Display Stations.

**CUSTOMER RESPONSIBILITIES**

In addition to the responsibilities in the VM/370 pages under the heading "Customer Responsibilities," the customer is responsible for ordering and installing VM/370 Release 6, VM/Basic System Extensions, VM/System Extensions or VM/System Product.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

DMS/CMS is designed to run on any IBM processor that is supported by VM/370. In addition, at least one of the following terminals must be in the configuration:

- 3275-2 Display Station.
- 3276-2, 3, 4 Control Unit Display Stations
- 3277-2 Display Station.
- 3278-2, 3, 4, 5 Display Stations
- 3279-2A, 2B, 3A, 3B Color Display Stations.

**SOFTWARE REQUIREMENTS**

DMS/CMS is designed to operate with VM/370 Release 6 and VM/Basic System Extensions, VM/System Extensions or VM/System Product and subsequent releases of each, unless otherwise stated. To display panels on the 3278-5 or 3279-2B, 3B, VM/System Product is required. To display panels using the DMS/CMS EXEC2 support, VM/System Product Release 2 is required.

**COMPATIBILITY**

Panels created under DMS/CMS Release 1 can be used with Release 2. They may be reformatted to take advantage of additional Release 2 functions, or used without reformatting. Panels created under DMS/CMS Release 2 can not be used with Release 1.

Application programs and EXECs running under DMS/CMS Release 1 will run without recompilation or change under Release 2. Panels formatted with extended color and highlighting, or for wide screen, or using the autoskip option may be displayed by existing programs and EXECs. Use of selector pen fields from an EXEC requires rewrite to use the DMS/CMS EXEC2 support.



## PROGRAM PRODUCTS

**VM/INTERACTIVE FILE SHARING  
5748-XXC****PURPOSE**

VM/Interactive File Sharing program product is designed primarily for CMS users. It provides (1) the capability of sharing user VSAM data sets among multiple CMS virtual machines in a single processor and (2) significant usability enhancements for VSAM/AMS users. VM/Interactive File Sharing requires VM/370 Release 6, VSE/VSAM Release 1 and VM/370 Basic System Extensions Release 2 as prerequisites.

**HIGHLIGHTS**

**VSAM Data Set Sharing:** VM/Interactive File Sharing runs as a virtual machine which allows a user to define and build VSAM data sets and then manages multiple CMS application requests against these data sets. VSAM is used to manage the physical storage of data but the application programmer need not be trained in VSAM.

Access to VM/Interactive File sharing is via DL/I CALL statements and can be from the current release of the following languages:

COBOL/VS (5740-CB1 and 5746-CB1)

PL/I (5734-PL3 and 5736-PL1)

RPG II (5746-RG1)

VM/370 Assembler

The same capability should also be available for earlier releases of these languages, but has not been tested.

The CALL statements are interpreted by VM/Interactive File Sharing and expanded into the appropriate VSAM request.

Data set security is provided at two levels -- normal VSAM password protection and VM/Interactive File Sharing security via a USERID authorization list.

Exits are provided for user written journaling routines.

**AMS Usability Feature:** VSAM/AMS functions are available to VM/Interactive File Sharing users but they are presented in a much more usable manner through the use of special modules. These modules prompt the CMS user with simple questions about the function needed and the data set characteristics. The module then expands the answers into the necessary VSAM parameters, by providing the appropriate VSAM defaults.

Although designed for the CMS user, this VSAM usability enhancement may be used to establish VSAM data sets that will be accessed by other SCPs, running as guests on VM/370 or natively. This capability is limited to the compatibility provided by VSE/VSAM, when running in a CMS environment. Detailed information is provided in the VSE/VSAM and VM/370 documentation.

**Support for New DASD:** Since it utilizes VSAM, VM/Interactive File Sharing provides support for all DASD devices included in the VSE/VSAM Release 1 Program Product.

**CUSTOMER RESPONSIBILITIES**

In addition to the responsibilities in the VM/370 pages under the heading, "Customer Responsibilities", the customer is responsible for ordering and installing VM/370 Release 6, VSE/VSAM Release 1 and VM/Basic System Extensions Release 2.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

VM/Interactive File Sharing is designed to run on any IBM processor that is supported by VM/370.

**SOFTWARE REQUIREMENTS**

VM/Interactive File Sharing is designed to operate with VM/370 Release 6, VSE/VSAM Release 1, VM/Basic System Extensions Release 2 and subsequent releases for each unless otherwise stated.



PROGRAM PRODUCTS

5748-XXE - DOCUMENT LIBRARY FACILITY R1

PURPOSE

The Document Library Facility (the library) is a service program that supports the storage of text documents and other types of data. It operates in a batch environment under OS/VS2 (MVS), OS/VS1 or DOS/VS and uses the Virtual Storage Access Method (VSAM). When installed with Document Composition Facility (5748-XX9), it enables the SCRIPT/VS Formatter to run as a batch job in these environments. The Foreground Environment feature of the Document Composition Facility is not required.

HIGHLIGHTS

The library is a repository of data managed in a variety of methods according to the needs of the user.

- Data from many sources can be stored in the library, such as:
  - Text edited and prepared on interactive systems such as VSPC, ICCF, CMS or TSO. The batch job entry functions available with those systems are used to submit the document as part of the job which invokes the library.
  - Text prepared by ATMS-III using the library as an archive facility.
  - Text prepared and edited by the 3730 Distributed Office Communication System with Host Communication Support Feature (#9285) installed. Batch transmission of 3730 created documents between the controller and a host system is available using the 3730 Document Transmission Facility. User programming in the S/370 system is needed to communicate with the 3730 Document Transmission Facility, and to collect the data and generate the JCL which invokes the Document Library Facility. See the *3730 System Description Manual* (GA33-3022) for an overview of the Host Communication capability of the 3730 System.
  - Text prepared and edited using a magnetic card II typewriter or Office System 6, and transmitted using the remote job entry (RJE) capabilities of the host system. See the *Office System 6 Programmer's Guide* (G544-1003) for data conversion considerations.
  - Input to or output from application programs.
- Operation of the ATMS III Archive.

ATMS-III allows the user to archive documents into the Document Library Facility library. Several functions of the library have been enhanced to support this use and are also available to other users of the Document Library Facility.

- Document names can be up to 16 characters long and can contain any character.
- Passwords may contain any character.
- A content attribute defining the type of data in the document can be specified such that documents of the same name but different content (e.g., source and formatted text) can be stored in the library.
- A user identifier (name and/or number) for another system (e.g., ATMS-III) can be mapped to a different user number in the Document Library Facility library.
- Control Statements and input data can be mixed in the same Document Library Facility input stream.
- Documents as well as users can now be locked.
- A user and all the documents in his library can now be purged.
- A document's name and content attribute can be changed.
- Up to 50 characters of user-specified information can be stored with a document on IMPORT and can later be listed.
- Multiple storage data sets of different VSAM control interval sizes can be specified for storing a document in the library.
- User exits are provided for selected control statement processors.
- On IMPORT, a user-written attribute processing program can supply all of the input data.
- Attribute processing programs can be invoked when a document is EXPORTED from the library.
- Data in the library can be accessed by means of commands.
- When the Document Composition Facility is installed, the library can invoke SCRIPT/VS:
  - To process documents that have been prepared directly for SCRIPT/VS
  - To process documents that have been prepared for ATMS-II processing
  - To process documents that require a user-provided data conversion routine

– As a subroutine of a problem program.

**Data Security:** Data stored in the library is protected by:

- VSAM data set password protection.
- A library structure which distinguishes private, project, and public libraries, by assigning different levels of document sharability.
- Passwords assigned to user libraries.
- Passwords assigned to user documents.

**Document Archiving:** Documents can be archived in a sequential data set for storage outside of the Document Library based on the document's content attribute, version number, user number, and date of IMPORT into the library.

**Version Control:** Multiple versions of the same document can be retained in the library.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

**Processors:** The Document Library Facility operates on all S/370 mdls 125 and above, the IBM 4300 processors, and the IBM 3031 and above Processors, supported by DOS/VSE, OS/VS1, or OS/VS2 (MVS). Floating-point hardware is required for library operation.

**Direct-Access Storage Devices:** The library uses VSAM to access data in its library and SAM to read or write to external data sets. Any direct-access devices supported by these access methods are supported by the library.

Storage Estimates Guidelines

**Real Storage:** The Document Library Facility uses the paging facilities of the operating system to run in less real storage than the amount of virtual storage required. The factors determining how much real storage they require are numerous and dependent on the installation. Therefore, no precise statement of real storage requirements can be made. The system programmer responsible for installing the programs will determine the amount of real storage to be used.

All storage estimates shown are in addition to that required for the prerequisite System Control Program.

**Virtual Storage:** When the Document Library Facility is used, 200K bytes of virtual storage is required. When SCRIPT/VS is used with the library, 215K bytes of virtual storage is required for the library.

**Direct-Access Storage:** The library load module requires 21 tracks of 3330 direct access storage. Additional storage is required for any data conversion routines, the exact amount required being determined by the individual program. The amount required for document storage is determined by the user. **SOFTWARE REQUIREMENTS**

The Document Library Facility can be installed to be used in the batch environments of the following virtual storage operating systems:

- OS/VS1 Release 7
- OS/VS2 (MVS) Release 3.8
- DOS/VSE.

In order for the library to be installed, the Virtual Storage Access Method (VSAM) and Access Method Services must be installed. In DOS/VSE, VSE/Advanced Functions Release 2 (5746-XE8) and VSE/VSAM Release 2 (5746-AM2) are required.

**Note:** This program is designed to work in the specified release levels and any subsequent releases and modifications unless otherwise stated.

Source code language is Assembler and is distributed as optional material. The DOS/VSE user will require the OS/VS Assembler XF in order to assemble the optional material.

DATA CONVERSION

The Document Library Facility provides an interface for converting a document's processing controls before it is stored or processed by SCRIPT/VS. With this interface you can have:

- Documents with ATMS text processing controls processed by SCRIPT/VS.
- Documents with other text processing controls processed by SCRIPT/VS, provided that you have supplied a data conversion program to translate the other text processing controls to those that are recognized by SCRIPT/VS.

DOCUMENT COMPATIBILITY and CONVERSION

The FILE option in the Document Composition Facility Release 2 SCRIPT command is now mutually exclusive with the PRINT and TERM keywords (where the DEV option should be used). The '.UD' control word will cause only blanks not to be underscored.

## PROGRAM PRODUCTS

**Document Library Facility (cont'd)****MVS SYSTEM INTEGRITY/SECURITY**

IBM will accept APARs describing any situation where the installation of this program product causes an exposure to the system integrity of MVS.

In MVS, system security facilities are available through use of the Resource Access Control Facility (RACF), 5740-XXH. The RACF program product or equivalent function can be used to protect data outside of document libraries. Document protection provided by the Document Library Facility is effective only within the context of the Document Library Facility. In addition, RACF can be used, in MVS, for additional security in checking a user's authority to access the library.

**DOCUMENTATION**  
(available from Mechanicsburg)

*General Information Manual* (GH20-9153) ... *Program Summary* (GH20-9170) ... *Guide* (SH20-9165) ... *Executive Overview and Product Summary* (GX20-2332).

One of the following publications will be required during the installation and reorganization of the storage used by the library: *OS/VS1 Access Method Services* (GC26-3840) ... *DOS/VS Access Method Services* (GC33-5382) ... *OS/VS2 Access Method Services* (GC26-3841).

**Reference Material:** *Document Composition Facility: General Information* (GH20-9158) ... *Program Summary* (GH20-9175) ... *User's Guide* (SH20-9161) ... *GML User's Guide* (SH20-9160) ... *User's Quick Reference* (SX26-3723) ... *GML Quick Reference* (SX26-3719).

PROGRAM PRODUCTS

5748-XXE - DOCUMENT LIBRARY FACILITY R3

PURPOSE

The Document Library Facility (the library) is a service program that supports the storage of text documents and other types of data. It operates in a batch environment under OS/VS2 (MVS) or VSE and uses the Virtual Storage Access Method (VSAM). When installed with Document Composition Facility (5748-XX9), it enables the SCRIPT/VS Formatter to run as a batch job in these environments. The Foreground Environment feature of the Document Composition Facility is not required.

HIGHLIGHTS

The library is a repository of data managed in a variety of methods according to the needs of the user.

- Data from many sources can be stored in the library, such as:
  - Text edited and prepared on interactive systems such as ICCF, CMS or TSO. The batch job entry functions available with those systems are used to submit the document as part of the job which invokes the library.
  - Text prepared by ATMS-III using the library as an archive facility.
  - Text prepared and edited by the 3730 Distributed Office Communication System with Host Communication Support Feature (#9285) installed. Batch transmission of 3730 created documents between the controller and a host system is available using the 3730 Document Transmission Facility. User programming in the S/370 system is needed to communicate with the 3730 Document Transmission Facility, and to collect the data and generate the JCL which invokes the Document Library Facility. See the *3730 System Description Manual* (GA33-3022) for an overview of the Host Communication capability of the 3730 System.
  - Text prepared and edited using a magnetic card II typewriter, 6580 Displaywriter or Office System 6, and transmitted using the remote job entry (RJE) capabilities of the host system. See the *Office System 6 Programmer's Guide* (G544-1003) for data conversion considerations.
  - Input to or output from application programs.
- Operation of the ATMS III Archive.

ATMS-III allows the user to archive documents into the Document Library Facility library. Several functions of the library have been enhanced to support this use and are also available to other users of the Document Library Facility.

- Document names can be up to 16 characters long and can contain any character.
- Passwords may contain any character.
- A content attribute defining the type of data in the document can be specified such that documents of the same name but different content (e.g., source and formatted text) can be stored in the library.
- A user identifier (name and/or number) for another system (e.g., ATMS-III) can be mapped to a different user number in the Document Library Facility library.
- Control Statements and input data can be mixed in the same Document Library Facility input stream.
- Documents as well as users can now be locked.
- A user and all the documents in his library can now be purged.
- A document's name and content attribute can be changed.
- Up to 50 characters of user-specified information can be stored with a document on IMPORT and can later be listed.
- Multiple storage data sets of different VSAM control interval sizes can be specified for storing a document in the library.
- User exits are provided for selected control statement processors.
- On IMPORT, a user-written attribute processing program can supply all of the input data.
- Attribute processing programs can be invoked when a document is EXPORTED from the library.
- Data in the library can be accessed by means of commands.
- When the Document Composition Facility is installed, the library can invoke SCRIPT/VS:
  - To process documents that have been prepared directly for SCRIPT/VS
  - To process documents that have been prepared for ATMS-II processing
  - To process documents that require a user-provided data conversion routine

– As a subroutine of a problem program.

**Data Security:** Data stored in the library is protected by:

- VSAM data set password protection.
- A library structure which distinguishes private, project, and public libraries, by assigning different levels of document sharability.
- Passwords assigned to user libraries.
- Passwords assigned to user documents.

**Document Archiving:** Documents can be archived in a sequential data set for storage outside of the Document Library based on the document's content attribute, version number, user number, and date of IMPORT into the library.

**Version Control:** Multiple versions of the same document can be retained in the library.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

**Processors:** The Document Library Facility operates on IBM S/370 mdls 138 and above, on the IBM 4300 Processors, and the IBM 3031 and above Processors, which are specifically supported by OS/VS2 MVS SP 1.3.0 and VSE AF3. Floating-point hardware is required for library operation.

**Direct-Access Storage Devices:** The library uses VSAM to access data in its library and SAM to read or write to external data sets. Any direct-access devices supported by these access methods are supported by the library.

Storage Estimates Guidelines

**Real Storage:** The Document Library Facility uses the paging facilities of the operating system to run in less real storage than the amount of virtual storage required. The factors determining how much real storage they require are numerous and dependent on the installation. Therefore, no precise statement of real storage requirements can be made. The system programmer responsible for installing the programs will determine the amount of real storage to be used.

All storage estimates shown are in addition to that required for the prerequisite System Control Program.

**Virtual Storage:** When the Document Library Facility is used, 200K bytes of virtual storage is required. When SCRIPT/VS is used with the library, 215K bytes of virtual storage is required for the library.

**Direct-Access Storage:** The library load module requires 30 tracks of 3330 direct access storage. Additional storage is required for any data conversion routines, the exact amount required being determined by the individual program. The amount required for document storage is determined by the user.

SOFTWARE REQUIREMENTS

The Document Library Facility can be installed to be used in the batch environments of the following virtual storage operating systems:

- OS: OS/VS2 MVS/SP Rel. 1.3.0
- VSE: VSE Advanced Functions Rel. 3 (5747-CC1) and VSE/VSAM Rel. 2 (5746-AM2).

In order for the library to be installed, the Virtual Storage Access Method (VSAM) and Access Method Services must be installed.

**Note:** This program is designed to work in the specified release levels and any subsequent releases and modifications unless otherwise stated.

DATA CONVERSION

The Document Library Facility provides an interface for converting a document's processing controls before it is stored or processed by SCRIPT/VS. With this interface you can have:

- Documents with ATMS text processing controls processed by SCRIPT/VS.
- Documents with other text processing controls processed by SCRIPT/VS, provided that you have supplied a data conversion program to translate the other text processing controls to those that are recognized by SCRIPT/VS.

DOCUMENT COMPATIBILITY and CONVERSION

Document Library Facility Release 2 is fully upward compatible to Document Library Facility Release 3 in the OS/VS2 MVS and VSE environments. The OS/VS1 environment is not supported in Release 3.

Release 3 of Document Composition Facility is required when formatting documents under Document Library Facility Release 3 in a batch environment. Document Composition Facility Release 2 is not supported under Document Library Facility Release 3, nor is Document



## PROGRAM PRODUCTS

**Document Library Facility R3 (cont'd)**

Composition Facility Release 3 supported under Document Library Facility Release 2.

**MVS SYSTEM INTEGRITY/SECURITY**

IBM will accept APARs describing any situation where the installation of this program product causes an exposure to the system integrity of MVS.

In MVS, system security facilities are available through use of the Resource Access Control Facility (RACF), 5740-XXH. The RACF program product or equivalent function can be used to protect data outside of document libraries. Document protection provided by the Document Library Facility is effective only within the context of the Document Library Facility. In addition, RACF can be used, in MVS, for additional security in checking a user's authority to access the library.

**DOCUMENTATION**

(available from Mechanicsburg)

*Document Composition Facility and Document Library Facility General Information Release 3 (GH20-9158) ... Document Library Facility Guide (SH20-9165) ... Document Library Facility Messages (SH35-0049) ... Document Library Facility Diagnosis Guide (SH35-0071) ... Document Library Facility Diagnosis Reference (LY35-0072).*

One of the following publications will be required during the installation and reorganization of the storage used by the library: *OS/VS1 Access Method Services (GC26-3840) ... DOS/VS Access Method Services (GC33-5382) ... OS/VS2 Access Method Services (GC26-3841).*

**Reference Material:**

*Document Composition Facility: Generalized Markup Language Starter Set User's Guide (SH20-9186) ... Document Composition Facility: Generalized Markup Language Starter Set Reference (SH20-9187) ... Document Composition Facility: Generalized Markup Language Starter Set Implementation Guide (SH35-0050) ... Document Composition Facility: Generalized Markup Language Concepts and Design Guide (SH20-9188) ... Document Composition Facility: Generalized Markup Language Starter Set Quick Reference (SX26-3719) ... Document Composition Facility: SCRIPT/VS Text Programmer's Guide (SH35-0070) ... Document Composition Facility: SCRIPT/VS Language Reference (SH35-0069) ... Document Composition Facility Messages (SH35-0048) ... Document Composition Facility Diagnosis Guide (SH35-0067) ... Document Composition Facility: SCRIPT/VS Text Programmer's Quick Reference (SX26-3723).*

PROGRAM PRODUCTS

**DISTRIBUTED SYSTEMS EXECUTIVE  
DSX RELEASE 2.2 (5748-XXG)**

[NO LONGER AVAILABLE, effective 11/83.]

**PURPOSE**

Distributed Systems Executive (DSX) is a set of programs and files that give 8100 Information System and 3790 network users a simple, comprehensive and effective means of data and network management. DSX combines, in one product, the host libraries, holding files and control files, and the transmission, formatting and reporting functions needed for library and transmission control in 8100 and 3790 networks.

**DESCRIPTION**

DSX consists of two major parts: Central Library Support and Transmission Control.

Central Library Support supplies the functions and facilities needed at the S/370 host to maintain an inventory of network and processor resources and to report on the status of these resources. Programs, panels, DSCBs (3790 and 8100/DPCX) and CLISTs (8100/DPPX) are maintained in two separate libraries; one for 3790 and 8100/DPCX resources, and one for 8100/DPPX resources.

Transmission Control supplies the functions and facilities needed to schedule and control the exchange of data between the S/370 host and one or more processors. These include:

Sending programs, panels, DSCBs (3790 and 8100/DPCX), CLISTs (8100/DPPX) and data sets (8100/DPPX).

Deleting programs, panels, DSCBs (3790 and 8100/DPCX), CLISTs (8100/DPPX) and data sets (8100/DPPX).

Sending messages, print data and file update data (3790 and 8100/DPCX).

Retrieving messages (3790 and 8100/DPCX), transactions (3790 and 8100/DPCX), programs, panels, data sets (8100/DPPX) and storage dumps.

Initiating execution of a user function at 8100/DPPX via CLIST sent from the host.

Sending power off commands (3790) to the clusters.

**HIGHLIGHTS**

**Central Library Support:** The DSX files contain complete 8100 and 3790 host libraries of programs, panels, DSCBs and command lists. The ability to assign version and modification levels to the 8100 and 3790 modules and flexible, accurate reports give a network administrator a means of eliminating redundancy and controlling accuracy in the 8100 and 3790 host libraries.

**Network Management Assistance:** Complete, orderly records of processor configurations, module assignments and session statistics, with automatic record entry and important cross-checks, plus records of problem incidents entered by the user at the hosts, give the 8100 and 3790 network administrators much of the information needed for effective network planning and control.

**Problem Determination Assistance:** Host access to dumps, and DPPX error logs, as well as information on other user-noted problems, helps in problem analysis.

**Unified Approach:** 8100 and 3790 users have a comprehensive set of effective data and network management functions in one IBM-supplied set of programs.

**Flexibility:** Users are given many options in scheduling the initiation of transmission by time, date, processor, groups of processors or combinations. Macros are provided for user-programmed reformatting of data.

**Means of Controlling Change:** With the network equipment and data resources defined in its files, DSX becomes a useful tool for controlling processor configurations and modifications. Since DSX checks the cluster master file before attempting transmission (to see if a program is assigned to a processor, for example), users are prevented from making some time-consuming mistakes. Study of system and user-noted problems occurring in the processors may help to identify and correct problems resulting from incorrectly assigned or implemented changes.

**Reports On Demand:** Users can obtain complete, current information on a specific processor, data library contents, scheduled transmission sessions, 3790 or 8100/DPCXabend dumps or recorded problems. Reports can be current summaries or full historical details. Reports are designed to be readable, useful and informative.

**Technical Sales Information:** This program is applicable to the 8100 and 3790 configuration #9431, #9165 or #9169 which have the capability to communicate with a S/370 host via SDLC communication lines.

**CUSTOMER RESPONSIBILITIES**

For the Cluster Master File, the customer must collect and load the required data, and set up a means within his organization to ensure that the information in this file is kept current and accurate.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

DSX may be used on any IBM S/370 mdl 125 or larger or 303x or 4300 processor capable of operating with:

OS/VS1 Release 7 with VTAM2 or ACF/VTAM and VSAM  
OS/VS2 Release 3.8 with VTAM2 or ACF/VTAM and VSAM  
DOS/VSE with ACF/VTAM or ACF/VTAME and VSE/VSAM  
OS/VS1 Release 7 with TCAM 10 or ACF/TCAM and VSAM  
OS/VS2 Release 3.8 with TCAM 10 or ACF/TCAM and VSAM

Minimum virtual storage requirements are 360K plus VSAM and VTAM requirements.

DSX can communicate with an IBM 3790 Communication System which must have one of the following feature codes:

#9431 (at EC 742035 or higher)

#9165 (at EC 742042 or higher)

#9169 (at EC 742051 or higher).

The host system must include IBM S/370 control units and features necessary for operation with the 8100 or 3790, as explained in the *IBM 8100 Installation Manual - Physical Planning*, (GA27-2877) and the *IBM 3790 Installation Manual - Physical Planning*, (GA27-2769).

**SOFTWARE REQUIREMENTS**

This licensed program is released to work with the following IBM programs and subsequent releases unless otherwise identified.

	Release	VTAM	TCAM	VSAM	S/370 Assem
DOS/VSE	-	*	-	**	X
OS/VS1	7	*	#	**	X
OS/VS2	3.8	*	#	**	X

\* VTAM Support:

DOS/VSE: ACF/VTAM Version 1 (5746-RC3), ACF/VTAM Version 2 (5666-280) and ACF/VTAME (5746-RC7)  
OS/VS: VTAM2, ACF/VTAM Version 1 (5735-RC2), ACF/VTAM Version 2 (5662-280) and ACF/VTAM Version 2 (5665-280)

# TCAM Support:

OS/VS: TCAM 10 and ACF/TCAM (5735-RC1 and 5735-RC3)

\*\* VSAM Support:

DOS/VSE: VSE/VSAM (Program Product 5746-AM2)  
OS/VS: VSAM

Program Validation Services (PVS) is required for preparing 3790 or 8100/DPCX programs, panels and DSCBs for processing by DSX.

For DSX use with 8100/DPPX, sequential data sets may originate on S/370 or on an 8100/DPPX system. Programs and panels originate on an 8100/DPPX system.

This licensed program is distributed in S/370 Assembler language source, and in load modules assembled from those source programs.

**COMPATIBILITY**

Existing input from 3700 functions are compatible for 8100/DPCX and will be accepted by DSX for 3790 and DPCX functions.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual* (GH20-2149).

**Reference Materials:** Pertinent publications addressing the 8100 Information System, 3790, OS/VS, DOS/VS and supported versions of VSAM, VTAM2 and ACF/VTAM.

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where installation of the Distributed Systems Executive (DSX) causes an exposure to the systems integrity of MVS.

RPOs ACCEPTED: No.



PROGRAM PRODUCTS

**GRAPHICAL DATA DISPLAY MANAGER (GDDM)  
RELEASE 3  
PRESENTATION GRAPHICS FEATURE (PGF) and  
INTERACTIVE MAP DEFINITION (IMD)  
5748-XXH**

**PURPOSE**

The term GDDM is used generically to include GDDM Base, IMD, and PGF, as appropriate. GDDM provides advanced function device support which reduces apparent complexity for the user who is creating screen and printer layouts.

**OVERVIEW**

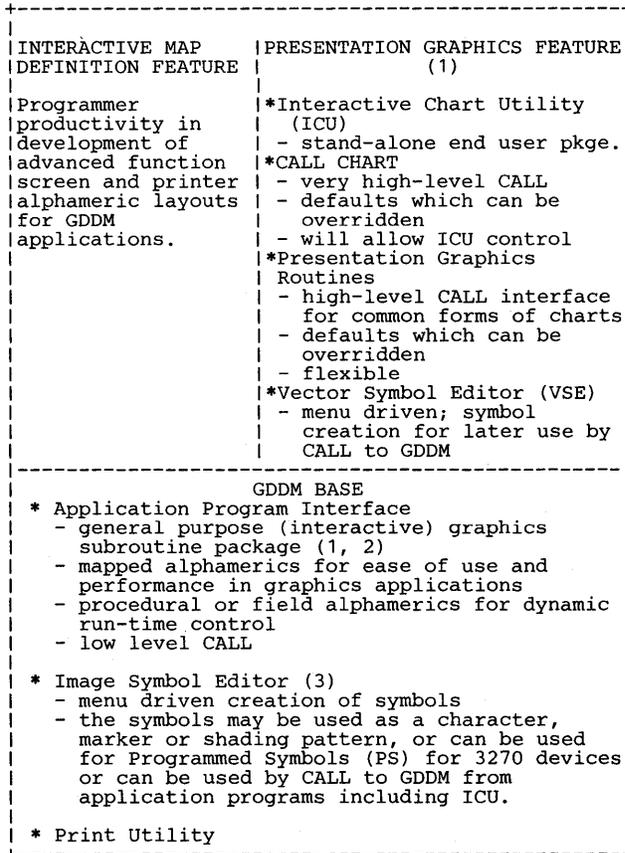
The USER may be either a programmer or (for certain interactive utilities) an end user or casual user, as appropriate.

The LAYOUTS can include color, text and simple schematics or more complex graphics; facilities include alphanumerics (either procedural or mapped), graphs and charts, special character sets, symbols, fonts and control of device attributes and partitions.

The DEVICES are those running on the 3270 extended data stream (the 3270 family including the 3279 color display, 3290 Information Panel, and the 3277 Graphics Attachment, and others such as 8775) plus system printers.

The SYSTEMS include most major programming system environments for S/370, 303X, 308X or 43XX.

Both GDDM Base and PGF (but not IMD) have multiple sub-components as illustrated in the following diagram:



- (1) Presentation graphics describes applications in which the programmer or end user does not interact directly with the displayed picture, but may interact with the application. Interaction is via menus or programmed function keys, program attention keys and the keyboard in ways which cause the application program to change the picture.
- (2) Interactive graphics describes applications in which the end user interacts directly with the system to change the picture, as in drafting. The end user enters graphic data using positioning devices such as light-pen, cross-hair control and cursor.
- (3) Image graphics is the building of pictures from non-coded information represented as a bit string or bit array. Support for this is limited. At execution time GDDM generates the device dependent data stream necessary to display the picture.

The application programmer is isolated as far as possible from the device and model characteristics of the display/printer for which the programming is being done.

**HIGHLIGHTS of RELEASE 3**

**Interactive Chart Utility (part of PGF):**

- The library management facility of the Interactive Chart Utility (ICU) allows the user to find out what charts and symbol sets are available, and to manage the charts and symbol sets that have been created. It is no longer necessary to exit the ICU and use subsystem facilities for this.
- In Release 2, the paired data facility was normally available only from applications that called the ICU. This facility is renamed free data, and is now also directly available to the end user.
- Scrolling on the ICU data panel now operates in steps covering four columns of data.
- The physical size and positioning of ICU printer output can be controlled by the end user.
- The ICU can use proportionally spaced symbol sets designed by the Vector Symbol Editor. Further, a given set can have some characters as filled (shaded) areas and some as lines (non-shaded).
- The 3277GA, with its high resolution and screen content, can be used advantageously with the Vector Symbol Editor to design symbol sets. The symbol sets can then be used with the ICU on 3278, 3279, 3290 and 8775 Programmed Symbol displays.

**GDDM Application Programming Interface (API):**

- The interactive graphics extensions cover two broad areas - handling operator input in terms of graphics constructs such as segments and world coordinates, and modifying the graphic output in response to operator input.
  - Logical devices for interactive graphic input on all GDDM-supported displays.
    - In GKS (Graphical Kernal System) terminology, this comprises CHOICE, PICK and LOCATOR input primitives working in EVENT mode.
  - Segment modification for Interactive Graphics:
    - A segment facility allows pictures to be sub-divided into parts. Segments may be created and deleted, and the segment attributes (intensity, position and detectability) can be dynamically modified.
  - The functions are offered on 3278, 3279, 3290 and 8775, and permit a wide range of simple interactive graphics applications to be programmed.
    - Additional support is offered in 3277GA to take advantage of the cross-hair cursor, joystick and high screen resolution available on this terminal. This permits graphics objects to be built via GDDM on the 3277GA for use later in 3278, 3279, 3290 and 8775 applications. The GDDM Vector Symbol Editor is an example of using the 3277GA for this.
  - Operator feedback such as the cross-hair cursor position if LOCATOR is enabled, or the pick window if PICK is enabled.
- The run-time mapping extensions in GDDM Base permit the maps generated by IMD to be used by applications. Maps are out-of-line objects which can contain:
  - The size and position of the graphics field.
  - The size, position and field attributes of the alphanumeric fields.
  - Constant alphanumeric data.
  - Rules for sending or receiving variable alphanumeric data.

This information can often be changed without the need to edit and recompile the programs that use the map. Further, separate versions of a map can be designed to exploit properties of different devices without the programmer having to use the device-specific logic. Finally, the mapping calls use less computing resources than the corresponding GDDM alphanumeric field calls.

- Proportional spacing for vector graphic text on all graphic displays and printers.

**Interactive Map Definition (IMD) Feature:**

- Used during program development of the end user screens (maps) for applications which mix alphanumerics and graphics. Modern design concepts facilitate programmer productivity. Screen layouts can be tested prior to application program completion. IMD generates the data structure for the application program, linking program variables to screen fields.

PROGRAM PRODUCTS

**GDDM V1R3 (cont'd)**

**Additional Device Support:**

- 3277GA (Graphics Attachment) RPO 7H0284.
- 3290 Information Panel:

Support for large screen, partitioning and vertical scrolling. All GDDM Base, Interactive Map Definition (IMD) and Presentation Graphics Feature (PGF) alphamerics and graphics are available for the 3290. Enhancements have been added to allow full utilization of the 3290 Information Panel's functional capabilities. GDDM, including IMD, will allow an application to create and manage up to 16 partitions, each with its own cell size and scroll buffer. Partition management functions will allow an application to create and delete partitions and to modify viewports associated with partitions.

GDDM Release 3 supports graphical output to 3278-compatible screen size configurations of the 3290. Note that, via GDDM Release 3, the support of full 3290 function is also available in current host environments. 3290 zoom is restricted to alphamerics only.

- 4250 Printer:

GDDM Release 3 produces rastered graphics image which enables GDDM-created graphics objects to be rastered, and placed on a file as a Composed Page Data Stream which subsequently can be printed on the 4250 using the Composed Document Printing Facility (5668-997). Similarly, the Interactive Chart Utility (ICU) can be used to create charts that can be printed later on the 4250. GDDM Release 3 also provides the capability to separate multi-colored pictures created on the 3279 Color Display into several monochrome print masters for color printing using standard offset litho techniques.

GDDM Release 3 rastered graphics image creation is available under MVS/SP TSO and VM/SP CMS only.

Graphics objects can also be passed to GDDM Release 3 in GDF (Graphics Data File) format for rastering.

Document Composition Facility Release 3 (5748-XX9) will allow merging of the GDDM rastered graphics image as a page segment into a DCF document at printing time.

- 8775 Enhanced Function:

Validation and partitions are now supported by GDDM. Partitioning provides the ability to display data in up to eight user-defined rectangular partitions, and for the host or user to interact individually with the data within each partition. The Interactive Display Text Facility licensed program is not supported.

- Removal of any limit to the content (data stream length) of a picture which is to be saved.

**Additional environments:**

- Access from IBM BASIC (but no data structure is generated by IMD).

- MVS/XA:

GDDM Release 3 under MVS/SP 2.1.1 supports applications using either 31-bit or 24-bit addressing mode (including 31-bit applications residing above 16 megabytes) in the CICS/VS Version 1 Release 6 and TSO environments.

Under CICS/VS Version 1 Release 6, TSO and IMS/VS, most of the GDDM modules reside above 16 megabytes, giving significant virtual storage constraint relief to all CICS/VS Version 1 Release 6 users of GDDM, and to TSO and IMS/VS users of GDDM if GDDM resides in the link pack area.

Approximately 1.5 megabytes of GDDM and its features PGF and IMD reside above 16 megabytes. Of the Interactive Chart Utility and parts of GDDM required by the ICU, approximately 0.75 megabytes resides above 16 megabytes.

- TSO Background:

A background job running under the TSO terminal monitor program using the TSO Extensions (TSO/E) (5665-285), or TSO Command Package (5740-XT6), may use GDDM.

**Print Utility Enhancements:**

- All Systems

- Print files are now fixed length, 80-byte records.
- Page eject can be controlled

- TSO

- Availability of printers and GDDM's TSO print utility is improved. The utility can be started before a printer is activated. Further, if a printer becomes inactivated due to an error or due to operator action, the printer will automatically become attached to the utility when the printer is reactivated. In both cases, the utility

must be identified as the VTAM controlling application for the printer.

- Multiple instances of the utility can be run within one system or VTAM domain, provided that each has its own VTAM ACB and print request queue data set.
- The print request queue name is no longer pre-defined. It can be set in the defaults module or by DD card.
- All resources are closed/de-allocated when the utility terminates.

- VM/SP CMS

Facilities have been added to GDDM's VM print utility to allow installations to better integrate the utility with other printer support.

- The installation or VM user can supply an EXEC, ADMQPOST, which GDDM invokes on completing a print request. The EXEC could route the GDDM print file to another VM machine for processing. Via such an EXEC, the installation could centralize processing for several printers in one VM batch machine.
- The print utility can output a punch file rather than sending directly to the printer. Installations with other facilities for driving 3270 printers via SIO can use this to extend these facilities to handle GDDM output.
- Print files are now fixed-length 80-byte records to facilitate customer programming of the above. This change has been made in all environments.

**Operational Enhancements:**

- Symbolic trace.
- FSSHOR is an extension to FSSHOW which, in addition to displaying the saved picture, returns the identity of the key used to terminate the display.

**National Language Support:**

Help and Menu panels in the Interactive Chart Utility are available in French, German, Italian, Katakana and Spanish languages, as well as English. Most diagnostic messages presented to the Interactive Chart Utility users are also available in these languages. These languages are provided as separately orderable modules, and the local language can be readily invoked, replacing the English language Help and Menu panels with those in the selected local language.

**HIGHLIGHTS of RELEASE 2**

- Provision of GDDM/PGF functions to customers working with VSPC and IMS/VS environments.
- Provision of S/370 and 303X system printer support in all environments.
- Improved usability in combination with CICS BMS alphamerics.
- Reduced alphameric path length. For more detailed information, see Product Announcement Letter.
- Enhanced interactive chart utility function and usability.
- Support for SCS terminal printers.
- Enhanced presentation graphics routines and functions.
- Curve fitting routines are provided in all environments in the presentation graphics routines.
- Support is provided which permits a picture developed by a GDDM application to be outputted as a Graphics Data File. The format of this file is documented, thus permitting users to process the file to develop a data stream for devices such as plotters which are not directly supported by GDDM.

**DESCRIPTION**

**GDDM Base**

**Hardware Functions**

- Field and Character Highlighting
  - Blink
  - Reverse Video
  - Underscore
  - Color (Base or Extended)
  - Protected/Unprotected
  - Intensified
  - Light-pen Selectable
  - Programmed Symbols
  - Partitions

**Software Functions**

- Display or Printing of:
  - Lines
  - Arcs
  - Areas
  - Annotation

PROGRAM PRODUCTS

**GDDM V1R3 (cont'd)**

- Attributes
  - Line Type (e.g., solid, thick, dashed)
  - Color Shading (64 unique GDDM-provided hues)
  - Patterns (26 unique GDDM-provided patterns)
- Graphics function
  - World Coordinate system
  - Two-Dimensional Windowing and Clipping
  - Interactive Graphics

GDDM Base includes a utility, the Image Symbol Editor, which enables a user to create, edit and save sets of images of user-specified size suitable for graphical annotation, special fonts or specialized symbol sets. These symbol sets may be loaded via GDDM at run time into the specified terminal provided it is configured with the PS feature and the cell size of the symbol set matches that of the terminal. The Image Symbol Editor facilitates Symbol Set definition by virtue of the following interactive design concepts:

- Menu-driven processes.
- Help facilities.
- Data presentation (that is, a selected symbol from the set may be permanently displayed as a reference symbol while designing or editing new ones).
- Target presentation (that is, the new symbol may be shown "life-sized" during the editing process).
- Device dependent prompts (that is, special printer symbols for the 3287 with the Programmed Symbols feature are checked to assist in optimizing printing speeds).
- Symbol browse (the total new symbol set may be displayed "life-sized" during the editing process).

The functions above are limited where the characteristics of the using display terminal do not match those of the terminal for which the symbol set may be targeted. (In particular, a symbol set may be designed with color on a monochrome display.)

GDDM Base provides a Print Utility Function for the printing of both alphanumeric and graphic data. Two types of printing are available:

1. Complete Screen copy  
The entire contents of the page as displayed on the screen are copied to equivalent positions on the printer page.
- 2) Graphics-only copy  
Only the graphics field will be printed. It may be repositioned on the printer page and changed in size if desired.

**Presentation Graphics Feature:** The Presentation Graphics Feature (PGF) is an optional feature available with GDDM. PGF is comprised of a set of high level graphic subroutines that extend the ease-of-use of GDDM to the presentation graphics user. In particular, it provides a set of high level presentation graphics subroutines to minimize the programming of applications involving presentation charts (pie charts, line graphs, surface charts, Venn diagrams, histograms or bar charts). Like GDDM Base, PGF is comprised of a set of callable subroutines which are reentrant and reusable. The subroutines may be invoked from applications written in APL, IBM BASIC, COBOL, PL/I, FORTRAN and S/370 Assembler language.

The business charting functions are designed so that an application programmer may use extensive defaulting rules to minimize his programming effort. Alternatively a user has the flexibility, by the specification of attributes on these functions, to "tailor" the graphical presentation. The defaulting rules will automatically generate various shading patterns and color selections without programming specification. Alternatively the application programmer is provided with extensive capabilities to override these default rules and to specify uniquely designed shading patterns, line types, etc.

**Interactive Chart Utility:** PGF also includes an easy to use Interactive Chart Utility designed to allow the non-DP professional to develop presentation charts by entering menu responses and data via the display keyboard. This facilitates chart production by eliminating the need for application program development. Chart Formats and Data may be stored and recalled by the terminal operator by name; a powerful library facility is provided in Release 3.

The Interactive Chart Utility is menu driven and provides a "Help" facility to provide additional guidance to the user should it be required.

The menus lead the terminal user through the various presentation options. A standard presentation is used by the utility to display the chart. All charts created may be printed upon command.

**Vector Symbol Editor:** PGF also includes the Vector Symbol Editor which allows a terminal user to generate and save symbol sets in which the individual symbols are described in terms of vectors. These vector symbol sets provide a further means to annotate graphical panels. Vector symbol strings may be used by GDDM and may be scaled or rotated when displayed by the application program.

**Overview of Mapping:**

GDDM Release 3 introduces mapped alphanumerics as an optional alternative to the existing procedural or field alphanumerics (retained to allow fully dynamic run-time control). Mapping provides:

- High-level interactive screen and printer layout.
- Separation of layout and program logic.
- Removal of device dependence from the application to the map.
- General performance improvements.
- Value to graphics applications (e.g., presentation of alphanumeric menus).

GDDM provides as an optional feature Interactive Map Definition (IMD), a program development time component. This feature is an online programming aid, enabling the application programmer to create and update a library of maps containing alphanumeric layouts for display devices. IMD provides a full screen context editing capability, scrolling, menu-driven processes, HELP, restart, defaults and utilities, and requires GDDM Base. Following the creation or modification of a map by IMD, before it can be used by an application program and GDDM Base, a special IMD generate process must be invoked, the result of which is:

- The structure of the Application Data Area in the appropriate application language (COBOL, Assembler language or PL/I) placed on a "source copy library"
- One or more map objects placed on a "map object library".

At compile time, the Application Data Area definition is copied into the application from the source copy library.

At run time, the application issues CALL statements to GDDM passing the name of a map and an Application Data Area. The functions required by the application are defined partly by previously defined maps, and partly dynamically at the API (Application Program Interface) by setting fields in the Application Data Area and by control-function calls.

The key to the transfer of data between application and GDDM Base is the map which GDDM Base loads from the map object library, and which contains the following information:

- The structure of the input and/or output data record as viewed by the application.
- A definition of the constant data in the layout.
- The size and position (row, column or floating), within the page, of the layout.
- The relative position and length of fields within the layout, including the graphics field.
- Device attributes to be associated with the defined field.
- Device control information (e.g., alarm, free keyboard).

Maps are grouped together into a map group, containing information required for a complete page. The map group includes device dependent information including screen size. At any instant during run time, several map layouts may appear on a screen.

GDDM provides screen and printer support for advanced functions:

Extended field attributes, via maps or dynamically via the Application Program Interface (API)

- Highlighting.
- Programmed symbols.
- Extended color.
- Field validation (Trigger, Mandatory Fill, Mandatory Enter).

Character attributes dynamically via the API

- Highlighting.
- Programmed symbols.
- Extended color.
- APL character set.

The GDDM Mapping API may be used in concert with most other GDDM calls, for example:

- Partitions (or software-emulated partitions) with or without scrolling (hardware or software) may be defined to contain pages laid out using maps.
- Graphic pictures are defined within an area reserved within a map or adjacent to a map.
- Device control functions (e.g., alarm, reply mode, position of cursor) may be used to augment those defined in maps.

**RELATIONSHIP between IMD and GDDM BASE**

Programmer at terminal (program development time)

uses IMD (GDDM Base is pre-requisite)

to create	Map Specifications
to generate	Application Data Area structures on source copy libraries
and	Maps on map object libraries

PROGRAM PRODUCTS

GDDM V1R3 (cont'd)

uses an interactive editor (e.g., ISPF/PDF) to create Source Program

uses COBOL, Assembler or PL/I compilers with copies to create Source program input and Application Data Area Structure Program modules

End-user at terminal (application run time) invokes Application (program modules) which in turn call GDDM Base passing the name of a map and an Application Data Area

interacts with Application through GDDM Base map

**Devices Supported By GDDM:** All terminal protocol management and support for specific features (i.e., switched/nonswitched) is under the control of the underlying subsystems. Consult your IBM *General Information Manuals* for the subsystem in use in your installation for detailed information relative to the specific feature support provided.

GDDM supported devices attach to the following control units:

3271, 3272, 3274, 3276 and 8100DSC\*

\* Either DPPX or DPCX 3270 Data Stream Compatibility program product enables the 8100 to look like a controller to the host.

Some operating systems/subsystems may not support all models of the control units. Consult the relevant system/subsystem specifications for further details.

Not all devices attach to all control units; some are loop attached. Consult the relevant device specification to determine the control unit and model and configuration support for any particular device.

GDDM provides alphameric support for the following terminals:

Note: The small screen (less than 1,920 characters) 3270 devices are not supported by the interactive utilities.

- 3104 Display mdl's B1, B2
- 3178 Display
- 3230 Printer mdl's 1, 2 supported as a 3287
- 3232 Keyboard Printer mdl's 1, 11 (output only)
- 3262 Line Printer mdl's 3, 13
- 3268 Printer supported as a 3287
- 3275 Display mdl's 2, 12
- 3276 Control Unit Display mdl's 1, 2, 3, 4, 11, 12, 13, 14
- 3277 Display mdl's 1, 2
- 3278 Display mdl's 1, 2, 3, 4, 5
- 3279 Color Display mdl's S2A, S2B, S3G, 3X, equivalent 8100-attached models
- 3284 Printer mdl's 2, 3
- 3286 Printer mdl 2
- 3287 Printer mdl's 1, 2, 1C, 2C
- 3288 Line Printer
- 3289 Line Printer mdl's 1, 2
- 3290 Information Panel
- 8775 display, all models

GDDM Release 3 provides graphics support on the following terminals, provided (except 3277GA) they have the Programmed Symbols feature:

- 3277GA Graphics Attachment mdl 2 with RPQ 7H0284 (not supported under IMS)
- 3278 Display mdl's 2, 3, 4
- 3279 Color Display mdl's S3G, 3X
- 3287 Printer mdl's 1, 2, 1C, 2C
- 3290 Information Panel
- 8775 Display mdl's 1, 2, 11, 12

All these devices (except 3277GA) use the 3270 Extended Data Stream, or the architected extensions to SCS (SNA character string). GDDM Release 3 will run on any further terminal or terminal-attached printer and provide graphics function if it is upward compatible with a supported device.

**Hardware Features for Graphics**

Device and Model	Feature
3274-31A, 31D, 31C, 51C	#9112 Configuration Support C
3274-41A, 41C, 41D, 61C	(Configuration Support D standard)
3277-2	RPQ 7H0284 Graphics Attachment
3278-2, 3, 4	#5790 Programmed Symbols
3279-S3G	
5279-3X	#5790 Programmed Symbols

- 3287-1, 2 #8750 Video Output
- 3287-1C, 2C #5781 Programmed Symbols - 2
- 3290 #5782 Programmed Symbols - 4
- #5783 Programmed Symbols - 4A
- Configuration D Support or Configuration T Support (T excludes 3278/9 graphics on the same controller)
- #5790 Programmed Symbols

GDDM supports the following system printers via system/subsystem spooling support for alphameric:

- 1403 Printer
- 3203 Printer mdl 5
- 3211 Printer
- 3262 Line Printer mdl 5
- 3800 Printing Subsystem mdl's 1, 2
- 4245 Line Printer

GDDM supports the following system printers via system/subsystem spooling support for alphameric and rastered graphics image files:

- 4250 Printer

**Accessory Support:** GDDM will support the data streams from the Magnetic Hand Scanners and Magnetic Slot Readers attached to the 3278, 3279 and 8775 Display Stations.

**CUSTOMER RESPONSIBILITIES**

To install and use GDDM the user must:

- Acquire a knowledge of the functions provided through reading the various GDDM *Programming References* and *User's Guides*.
- Understand the use of the appropriate Application Program Interface in APL, IBM BASIC, COBOL, PL/I, FORTRAN or S/370 Assembler in order to invoke GDDM.
- Understand the GDDM initialization and customization processes described in *GDDM Installation and System Management* (SC33-0152).
- Carry out approved Problem Determination procedures before contacting IBM for program service.
- Install PTFs as appropriate.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The storage requirements of GDDM are dependent upon various configuration and workload parameters including device type, screen size, PS storage available at the device, message rates and the general processing environment.

GDDM will run on any IBM S/370, 303X, 308X or 43XX processor with sufficient storage to meet the combined storage requirements of the host operating system, access methods, DB/DC or Interactive Subsystem and GDDM.

The floating point feature is required for GDDM.

**SOFTWARE REQUIREMENTS**

GDDM applications execute under the control of the following IBM subsystems:

	SUBSYSTEM					
	CMS	CICS/VS	IMS/VS	ACF/TCAM	ACF/VTAM	VSPC
DOS/VSE with VSE/AF		X				
MVS/370		X	X(1)	X	X	X(1)
VS1		X	X(1)			
VM/SP	X(2)					

- (1) excluding IMD and run-time mapping.
- (2) excluding the CMS DOS environment.

In IMS/VS only, the output functions of GDDM are available, except for the interactive utilities ICU, ISE, VSE.

PROGRAM PRODUCTS

GDDM V1R3 (cont'd)

The table that follows lists the earliest Version or Release under which GDDM Release 3 may execute. The subsequent columns list any later level which is required for 3290, 4250, 8775 and MVS/XA.

System/ Subsystem Access Method	Minimum Level for GDDM Release 3 support				Additional Requirements for			
	Sys- tem	Sub- syst	A/M (1)	Other Notes	GDDM support of 3290 & 8775 (13)	GDDM support of CDPF files	CDPF support of 4250	31-bit support (MVS/XA)
DOS/VSE/AF	AF R2				-		AF R3	N/S
CICS/DOS/VS		V1 R5			(10)	N/S		
BTAM/ES			(2)		-			
ACF/VTAME			(2)	(3)	-			
ACF/VTAM			V1 R2		V2 R1			
OS/VS1	R7				-		N/S	N/S
CICS/OS/VS		V1 R5			(10)	N/S		
BTAM			(2)		-			
ACF/VTAM			V1 R2		V2 R1			
ACF/TCAM			V2 R4		-			
IMS/VS		1.1.6		(4,5)	-	N/S		
BTAM			(2)		-			
ACF/VTAM			V1 R2	(6)	V2 R1			
ACF/TCAM			V2 R4	(6)	-			
OS/VS2 (MVS)	R3.8				-		SP1.3	SP2.1.1
CICS/OS/VS		V1 R5			(10)	N/S		V1 R6
BTAM			(2)		-			-
ACF/VTAM			V1 R2		V2 R1			V2 R1
ACF/TCAM			V2 R4		-			-
IMS/VS		1.1.6		(4,5)	-	N/S		V1 R3
BTAM			(2)		-			-
ACF/VTAM			V1 R2	(6)	V2 R1			V2 R1
ACF/TCAM			V2 R4	(6)	-			-
TSO		As OS		(7)	-	-		-
ACF/VTAM			V1 R2		(8)			V2 R1
ACF/TCAM			V2 R4	(9)	-			-
VSPC		V2 R1		(5,11)	-	N/S		N/S
ACF/VTAM		V1 R2			V2 R1			
VM/SP	R1				-		R3	N/S
VM/CMS		As VM		(12)	-	-		

Key to additional requirements:

- : Function supported without additional requirements.
- N/S : Function not supported.
- (blank) : Function not applicable.

Notes:

1. Later levels of access method other than those quoted may be necessitated by operating or subsystem requirements. Consult the specification for these programs for further details.
2. As required for CICS or IMS.
3. 3270 Extended Data Stream (Graphics, Color, etc.) is supported by ACF/VTAME for SNA devices only.
4. IMS does not provide a direct interface to a terminal. Instead, it uses message queues. This imposes a number of restrictions, described in *GDDM Installation and System Management*.
5. No mapping or IMD support.
6. Support for local or SNA devices only.
7. Either the MVS TSO Command Package (5740-XT6) or TSO Extensions (TSO/E.5665-285) is required for batch support.
8. ACF/VTAM V2 R1 and PTF UZ90213 are required for extended 3290 function on TSO/VCAM.
9. PTFs UZ90256, UZ90257, UZ90258 for APAR OZ69872 are required for support of GDDM in TSO/TCAM.
10. CICS/VS V1 R6 is required for full 3290 support. Under CICS/VS V1 R5, GDDM support of 3290 is limited to logical terminal definitions without partitions and with screensize less than 4,096.
11. PTF UP90038 is required for support of GDDM on MVS/VSPC. PTFs UP20877, UP28224 are required for correct operation of GDDM Release 3 chart enhancements.
12. No support in the CMS DOS environment. Where applicable, the VM/High Performance Option (5664-173) reduces the system overhead of the GDDM shared segment.
13. The 8775 requires downstream loading in order to support Enhanced Function, Enhanced Function with Magnetics, or Multiple Partitions and Scrolling. This loading can be performed by DPPX or DPCX (if attached via 8100), or by the Downstream Load Utility (DSLU, 5668-006) which is supported on DOS/VSE, OS/VS1 and OS/VS2 (MVS). Consult the specifications of this program for further details.

The use of certain features of displays or printers may also require later levels than quoted above. Consult the specifications for these products for further details.

**Programming Languages:** GDDM function is accessible via a standard OS/370 CALL interface from application programs using the following languages and compilers:

- S/370 Assembler language.
- PL/I (DOS and OS Optimizing Compilers and Libraries).
- COBOL (DOS/VSE, OS/VS, ANS Version 2, 3, 4 Compilers and Libraries)
- FORTRAN (G, H, VS and VSPC Compilers). (CICS/VS and IMS/VS do not in general support applications written in FORTRAN. GDDM IMD does not generate Application Data Structures in FORTRAN; this does not preclude use of mapping by FORTRAN applications where programmers create their own data structure.)

Other languages or environments do not support the direct use of the GDDM routines. In these environments, the products concerned have provided native interfaces to GDDM.

- VSPC provides access to the GDDM subroutines via the Foreground Processor interface. Some of the programs operating under VSPC allow their users access to this interface, and thus GDDM, excluding alphameric mapping.
- IBM BASIC in the VM/SP CMS environment provides a CALL statement which can be used to call GDDM. GDDM IMD does not generate Application Data Structures in IBM BASIC; this does not preclude use of mapping by IBM BASIC programs where programmers create their own data structure.
- VS APL Release 4 can utilize GDDM in CICS/OS/VS, CICS/DOS/VS, VM/SP CMS, VSPC and TSO environments to communicate with advanced function displays and printers; see APL documentation for the level of GDDM function supported. GDDM is prerequisite for:
  - The VS APL Session Manager under CMS and TSO (and optionally under CICS).

PROGRAM PRODUCTS

GDDM V1R3 (cont'd)

- The VS APL Session Manager Command auxiliary processor (AP120) under CMS and TSO (and optionally under CICS).
- The GDDM auxiliary processor (AP126) which gives full screen control and allows access by APL programs to the full functional capabilities of GDDM Base and PGF.
- The GRAPHPAK workspace which provides extensive support of graphics including functions for plotting, curve fitting, and drawing bar-charts, pie-charts, and histograms. Output can take advantage of color and GDDM functions.
- A workspace that uses AP126 to provide full screen support and takes advantage of GDDM including color on the 3279.
- IBM 3270 printers under VM/SP CMS.
- National Character Set support for Katakana and Canadian French under CICS, CMS and TSO.

GDDM IMD does not generate Application Data Structures for APL.

GDDM Base is a prerequisite for either or both of PGF and IMD.

COMPATIBILITY

Application programs written for use with Release 2 of GDDM Base and PGF will run under Release 3 without modification, but they must be link-edited again; it is not anticipated that this re-linkedit will be necessary for future releases. Data streams, chart formats and data, and symbol sets (but not print files) created under Release 1 and 2 can be used with Release 3.

Data streams, chart formats and data, print files and symbol sets created under Release 3 cannot be used with Releases 1 or 2.

CONVERSION

GDDM may be used in conjunction with most of the application support routines from the 3277 Graphics Attachment Support (GAS) program (5799-AXX PRPQ P09013). In particular, the subroutines for analytical geometry, three dimensional transformations, polygonal clipping and curve fitting may be used.

The GDDM interface, although functionally equivalent to the PRPQ interface, is syntactically different and therefore the transfer of application programs written for the PRPQ to GDDM will require structural changes to the program.

Note that the GAS PRPQ is a special purpose program and therefore has performance advantages over the more general GDDM, but applications written to the GDDM interface have more flexibility in terms of migration to other devices.

DATA SECURITY

GDDM does not depend on, augment or interact with, nor impede or detract from the security functions available in IMS/VS, CICS/VS, TSO (ACF/VTAM or ACF/TCAM), VSPC, VM/SP or other IBM programs. GDDM uses the system services within the subsystem in which it is invoked. Customer management is responsible for the selection, application and adequacy of such functions for its environment.

PERFORMANCE

For details of response time characteristics, see *GDDM Installation and Systems Management* (SC33-0152).

GDDM Release 3 continues to consolidate the performance improvements introduced in Release 2. Specific areas affected are:

- GDDM data streams for graphics output.
  - The average data stream for a range of 29 pictures has been reduced by 13%.
  - Graphic data stream structure has been changed and an average reduction of 10-20% in 3274 processing time is likely.
- GDDM data streams for procedural alphanumerics output which contain pad characters have been reduced, improving applications like APL and the Interactive Chart Utility.
- Using procedural alphanumerics, the GDDM path length to create and display some 50 to 200 fields is reduced in the range 40-80%.
- The ICU: Measured in a VM/SP CMS environment, a benchmark having 26 user interactions with the terminal (resulting in 5 graphic and 21 alphanumeric displays) showed the following changes compared with GDDM Release 2:
  - Total GDDM and CMS CPU utilization down 20%.
  - Total GDDM data stream length down 16%.
  - Total number of GDDM calls to output screen I/O down 16%.
- Alphanumeric mapping: Reduces CPU requirements at run time, e.g., 75%-85% reduction of the path lengths to produce the same benchmark using procedural calls on GDDM Release 3.

- To take full advantage of improvements, some installations may find an increase in main storage is required to compensate for the increase in the reference set of 10% to 20%. This is especially true for environments where the level of paging contributes significantly to total performance costs. (The reference set is the number of different pages actually referred to during execution.)

DOCUMENTATION  
(available from Mechanicsburg)

*Licensed Program Summary* (GC33-0106) ... *GDDM General Information* (GC33-0100) ... *GDDM Licensed Program Specifications* (GC33-0108) ... *GDDM Base Programming Reference* (SC33-0101) ... *GDDM PGF Programming Reference* (SC33-0102) ... *GDDM PGF Interactive Chart Utility User's Guide* (SC33-0111) ... *GDDM PGF Vector Symbol Editor User's Guide* (SC33-0145) ... *GDDM Application Programming Guide* (SC33-0148) ... *GDDM Messages* (SC33-0150) ... *GDDM Installation and System Management* (SC33-0152) ... *GDDM Base Image Symbol Editor User's Guide* (SC33-0153) ... *GDDM IMD User's Guide* (SC33-0154).

MVS SYSTEM INTEGRITY APPLIES: Yes

RPOs ACCEPTED: No

PROGRAM PRODUCTS

**SQL DATA SYSTEM (SQL/DS)  
VERSION 1 RELEASE 2  
5748-XXJ**

**PURPOSE**

SQL/DS provides relational data base management facilities for customers executing in the VM/SP Release 3, VSE AF Release 3, and SSX/VSE Release 2 environments. SQL/DS provides multi-user read/write sharing of a data base. It also provides online query/report writing facilities, and operates with, and extends the capabilities of IBM's data systems offerings.

Release 2 contains all of the functions currently available in Release 1 (which executes in the native VSE environment). See the *SQL/DS Concepts and Facilities* publication (GH24-5013-1). All functions (unless otherwise noted) will be available in all supported environments.

Users are provided a non-procedural language called SQL (Structured Query Language) with which they access and query the data. SQL is also the language used to define and manipulate the data which is maintained by SQL/DS in a relational format. SQL requests can be entered through an IBM-provided facility (ISQL) as input to the SQL/DS Data Base Services utility; or can be imbedded in application programs written in COBOL, PL/I, FORTRAN or Assembler.

SQL/DS supports multiple, concurrent access from CMS virtual machines, batch virtual machines or VSE partitions, online transactions, and interactive program execution environments. SQL/DS will typically operate in multiple user mode and will reside in a separate partition or virtual machine from the user's application. Security and authorization control facilities are included in SQL/DS to allow users to manage and control access to the data. Backup, restart and recovery, and inline catalog capabilities are an integral part of SQL/DS. The underlying data base manager is relational.

SQL/DS also provides a DL/I extract facility. This enables users of DL/I to selectively copy data from a DL/I data base into SQL/DS. The commands describing the extract request are entered interactively through the SQL/DS terminal.

**DESCRIPTION**

SQL/DS offers customers on intermediate processors a full function data base management system with a query and report writer capability. Existing DL/I DOS/VSE customers can use the extract facility to access the DL/I managed data. In addition, SQL/DS is an end-user-oriented data system using the relational storage concept. The major advantages of SQL/DS are:

- It provides an ability to begin to develop answers to a problem before all of the requirements are known, or before all of the data is defined and organized. When the data organization is evolving or unsettled, this often causes high maintenance activity. SQL/DS will minimize such activity because one can dynamically extend the tables without affecting existing applications. One can implement, test and change both the data structure and applications online.
- Much of the SQL language used can be learned and applied quickly. Data requirements can be defined with a minimum of preplanning. This allows the non-DP professionals to quickly implement solutions to many of their information needs.
- Many information needs can be satisfied by the SQL/DS ISQL query/report writer capability, thus eliminating the need for those "select, sort, report" types of application programs. Since both programmers and non-programmers can use ISQL, there should be a reduction in the application program backlog.
- Users can enhance the performance of both unplanned and preplanned applications by defining indexes while the data remains online and available to other users. Indexes are used only to improve performance; they are not necessary to provide alternate access paths to the data. Index creation and use can be performed outside of (i.e., independent of) the application program.
- Data access is independent of the physical organization of the data stored, the sequence of records, and the order of data elements within a record.

**Typical Uses of SQL/DS Include:**

- Unanticipated queries of the data, for example, retrieving all records satisfying certain conditions; finding the minimum (maximum, average, sum, count) of selected data elements; grouping or sorting the records.
- Reports, complete with user designated titles, formats, subtotals, and totals.
- Management of departmental or individual (as contrasted to corporate) data bases. This data may be manipulated in a variety of ways, often in a "one-time", iterative problem solving mode.
- Users may 'model' the eventual production system on SQL/DS. They could first use ISQL to develop the data structure and various approaches of organizing and presenting the data. After evaluating these different approaches, they could then implement the desired

data structure and solution in the formal corporate information system.

**Coexistence:** SQL/DS and DL/I DOS/VSE are complementary products designed to provide solutions to different customer needs (query data and operational data). Some customers will select DL/I, others SQL/DS, and still others, both DL/I and SQL/DS.

1. DL/I DOS/VSE is a fully supported DPMS program product for structured, operational applications. DL/I is particularly applicable to those environments requiring high performance and having very large stable data bases.
2. SQL/DS can be used both as an end-user query/report writer product for the DL/I DOS/VSE user, and as a separate query data base for non-DL/I data. With the extract facility, authorized users can request that DL/I data be copied into previously defined SQL/DS tables. Outstanding extract requests may be executed according to the installation's conventions (e.g., either when DL/I is online or when DL/I is not being heavily used - such as during third shift). Subsequently, end users can query the data copied from the operational DL/I data base. SQL commands may be used to analyze the data without impacting high performance DL/I operations. SQL/DS is particularly useful for situations which are 'one-time' or unanticipated; require searching through the data; or 'n' when reports and inquiries are adequate. In addition, users can answer 'what if' type questions by modifying the data and then analyzing the new results without affecting operational data.
3. SQL/DS and DL/I coexist with each other, and with other Data Systems offerings (e.g., CICS/DOS/VSE).

**RELEASE 2 HIGHLIGHTS**

- **SQL/DS Relational Data Base Support for VM SP Release 3:**
  - Multi-User Data Sharing. Data stored in SQL/DS can be shared by multiple users concurrently. Uses native VM SP Release 3 services for managing the data, instead of DOS Simulation, or a VSE Guest, or VSE/VSAM. SQL/DS uses Inter-User Communication Vehicle (IUCV) to communicate between the SQL/DS virtual machine and user CMS virtual machines.
  - Data Integrity. Users and applications can not access the SQL/DS code and data except by using the defined interfaces. The SQL/DS data is protected from accidental damage by user machine.
  - Data Recovery. The SQL/DS data is protected from application, system, and DASD failures.
  - Data Security. The SQL/DS data can be protected from unauthorized access.
  - Data Base size. SQL/DS supports up to 64 billion bytes per data base, and up to 32 billion bytes per table.
  - Allows Multiple SQL/DS Virtual Machines in a VM SP Release 3 environment, each capable of serving multiple users.
  - Uses the new facilities in VM SP Release 3 for Overlapped Data Base I/O to support concurrent processing of multiple user requests.
  - Provides online query/report writing facilities for the VM/CMS users.
- **Application Development:**
  - SQL statements can now be used in VS FORTRAN programs to access SQL/DS data bases. The new extensions to the dynamic SQL programming interface have been used to provide a Pre-Processor for the VS FORTRAN language.
  - The Pre-Processors have been improved to allow user-specified options for controlling printing of the output. Additionally, users can now INCLUDE a VSE Source library member or a VM/CMS file into an SQL/DS application.
- **ISQL Enhancements:**
  - ISQL is available in both the VM/CMS and VSE environments. Its capabilities have been enhanced to provide support for terminal printers and large screen display terminals. Additionally, users will now have the ability to retrieve previously entered commands and alter them by overtyping.
  - For any query, ISQL will display information that allows a terminal user to estimate the approximate work required for the query. With this information, the user could decide to wait for the query to complete, or could cancel the request.
  - Functional and usability improvements include:
    - Saving of Format Information for some Modified or Parametrized Stored Queries

PROGRAM PRODUCTS

SQL/DS (cont'd)

- Multiple Operands in FORMAT, PRINT, LIST, SET and ERASE Commands
- PF Key Usage Enhancements
- Error Handling Options in Routines
- Stored Query Protection
- WAIT on a POWER Printer
- Data Base Services Utility:
  - The DBS Utility operates in both the VM/CMS and VSE environments. It has been extended to support zoned and double-byte character set data, and now has the ability to create sequential output files in both environments.
- Resource Control:
  - Installations can now control ISQL usage via user priority classes in the VSE/CICS environment.
  - Users will be able to CREATE tables even if they do not have Resource authority. The installation can allocate DBSPACES to users for this purpose. Users can now also change their own passwords.
- Operational Enhancements:
  - Installations may trace attempts to access data, acquire resources, or execute applications. The trace tape data created may be printed with an SQL/DS-provided FORMAT program, or loaded into an SQL/DS table for further analysis.
  - SQL statements and ISQL commands can be stacked in VM/CMS EXECs.
- Performance Improvements:
  - In the VM/SP environment, SQL/DS will use the new DASD Block I/O facilities in Release 3 which allow overlapped data base I/O in multi-user environments.
  - Improvements have been made in the utilization of system resources in the internal optimizer, index operation, and memory allocation components of SQL/DS.
- Relational Data Model: SQL/DS supports the relational model of data. Data is defined and accessed in terms of simple, easy-to-comprehend data tables and operations on data tables. The relational model consists of a 2-dimensional table with a fixed number of columns, and a variable number of unnumbered rows. The SQL/DS implementation of the relational model provides a high level of data independence. Applications are not dependent upon the physical relationships among the data elements. Views may be defined on tables such that user/application logical tables need not conform to actual stored tables. Views may combine data from several stored tables (or other views), and may subset tables by rows and/or columns.
- Structured Query Language (SQL): Data definition, access, manipulation, and control operations are supported by the Structured Query Language (SQL). SQL is a high-level, non-procedural data language available to users through an interactive facility (ISQL), a batch utility (DBS Utility), and imbedded statements in application programs. SQL statements consist of command verbs, one or more optional clauses, language keywords, and parameter operands. The structured use of verbs and keywords in the SQL syntax allows precise specification of data requests in a readable fashion.
- Interactive query support: All SQL statements and commands (except those that are application program specific) can be entered from a terminal for query operations without first having to write an application program. These statements and commands are processed by the Interactive SQL facility of SQL/DS, ISQL. Specific parameters may be inserted at execution time. Frequently used ISQL queries may be saved for later use. Format information on stored queries can be saved for all queries except those whose SELECT or FROM clauses are parameterized or changed. Users may RETRIEVE a previously entered statement or a data line into the command input area and alter it by overtyping. Also, the user may submit multiple operands in many ISQL commands. Any valid SQL Statement or ISQL command may be entered while viewing a query result. There are additional PF Key enhancements. Larger screen display terminals are supported.
- Optimizer Cost Estimate: For any query, ISQL will display information that allows a terminal user to estimate the approximate work required for the query. With this information, the user could decide to wait for the query to complete, or could cancel the request.
- Report Writing: SQL/DS will provide the end user the ability to develop basic reports without writing an application program. The user can specify titles, column headings, and totals and subtotals. He can also make format changes and preview the report on a display device before requesting the printed report. The ISQL results may be printed on any system-supported printer using VSE/POWER Release 2 (or later) in a VSE System. Any 3270 Information Display System terminal printer supported by the BMS facility of CICS/DOS/VS or by RSCS Networking Release 2 (or later) can print the ISQL results. In a VSE environment, the VSE/POWER RJE feature Release 2 is required for remote POWER printer support.
- Application Program Avoidance: Many information needs can be satisfied using ISQL without requiring an application program. For example, one may update, delete or insert data, retrieve calculated data using the arithmetic expressions, use the built-in functions (minimum, maximum, average, count and sum), or use the internal sort and Boolean logic capability. These capabilities, together with the query/report writing facility, may eliminate the need for a large number of application program requests.
- Routines: A user can create, save, update and later execute a series of commands and/or SQL statements stored in a routine. These routines can be user or installation defined and can be used to define the terminal environment, issue a stored query, and execute one or more stored reports. A user may specify error handling options in these routines. An installation may also specify, save, and modify a profile of default characteristics for each authorized user.
- VM/SP EXECs: An Exec may be written to Stack any SQL or ISQL command, and invoke ISQL to process these stacked commands. These commands may be parameterized, and current values entered at execution time.
- VM/SP CMS Subset: ISQL users may invoke the CMS Subset capability to execute selected CP and CMS commands and EXECs.
- Ease-of-Installation: Although individual results may vary, initial customer experience with Release 1 has shown that it can be installed within one day; no system generation is required. There are few system parameters, and most of these can either be defaulted or specified later with little impact on the system or user applications.
- SIPO Support: SQL/DS Release 2 will be available on the VSE/System Installation Productivity Options. SQL/DS is also installable in an SSX/VSE Release 2 environment

RELEASE 2 DESCRIPTION

SQL/DS supports multiple, concurrent access from CMS virtual machines, batch virtual machines or VSE partitions, online transactions, and interactive program execution environments.

SQL/DS will typically operate in multiple-user mode, and will reside in a separate partition or virtual machine from the user's application. There may be many different applications simultaneously interfacing with SQL/DS using the operating system's cross-partition or inter-user communication facilities.

The above mode of operation allows multiple users to share the SQL/DS code and data base, and controls concurrent access to the data base. For faster performance and less system overhead (with no concurrent access and no data locking), SQL/DS can be executed in single user mode with a dedicated data base.

Users are provided an easy-to-use language called SQL (Structured Query Language) with which they access and query the data. SQL is also the language used to define and manipulate the data which is maintained by SQL/DS in a relational format. SQL requests can be entered through an IBM-provided transaction (ISQL); as input to the SQL/DS Data Base Services utility; or can be imbedded in application programs written in COBOL, PL/I, FORTRAN, or Assembler.

Many end users will be able to manipulate the data, formulate queries, and generate reports using ISQL without the need to write an application program.

SQL/DS had its origins in a relational data base prototype (referred to in the IBM Systems Journal, Volume Sixteen, Number Four, 1977, as System R) which was developed at the IBM San Jose Research Center.

The relational model provides a simple tabular view of the data to an end user. This data view is independent of actual storage structures and access techniques. A user can enter queries, generate reports and write application programs to process SQL/DS data without specifying access paths or predefined relationships, because these are managed automatically by SQL/DS. Users need only specify what data they want to use, not how to get it.

Security and authorization control facilities are included in SQL/DS to allow users to manage and control access to the data. Backup, restart/recovery and catalog capabilities are an integral part of SQL/DS.

- SCP: VM/SP Release 3; DOS/VSE AF Release 3; SSX/VSE Release 2.
- User Environments:
  - CMS Interactive
  - Online transactions
  - Batch (single and multiple user mode)
  - Interactive program development

## PROGRAM PRODUCTS

## SQL/DS (cont'd)

- **Ease-of-Use:** SQL statements are used to define, describe and access data in interactive environments and in preplanned application programs executing in either batch mode or as online transactions. Although individual results may vary, customer experience has shown that enough of the SQL language can be learned within a day to enable programmers and other professionals to effectively and productively use the system.
- **Application Programming language interfaces:** COBOL, FORTRAN, PL/I, and Assembly. The SQL/DS precompilers can INCLUDE a VSE Source library member or a VM/SP CMS file into an SQL/DS application. The Precompilers will allow user-specified options for controlling the printing of the output.
- **Documentation:** Task-oriented manuals and online reference text.
- **Online Help:** Upon request, SQL/DS will provide online reference information. This includes end-user-oriented explanations of SQL statements, terminal commands, SQL/DS messages, system catalog tables, etc.
- **Performance:** SQL/DS utilization of system resources has been improved. Improvements have been made in the internal optimizer, index operation, and in storage utilization. In the VM/SP environment, SQL/DS will use the new facilities in VM/SP Release 3 which will allow overlapped data base I/O in multi-user environments.
- **Catalog Support:** SQL/DS provides online maintenance of control information. Most of the data definition, access, and control can be done by an end-user without interrupting SQL/DS operations. This control information is stored in system tables (called catalogs) which can be accessed by any authorized user.
- **Bulk Data Entry:** SQL/DS provides several options to enable users to enter multiple records of data from existing non-SQL/DS formats into an SQL/DS table. These include online entry using the INPUT or INSERT commands of ISQL; the SQL/DS DBS Utility reading data from any sequential file (including CMS files); and the SQL/DS DL/I Extract facility in the VSE AF 3 environment.
- **Interactive program development:** The facilities of ICCF or VM/CMS may be used for interactive program development, compilation, testing, and execution of SQL/DS applications.
- **Data Conversion and Migration:** Existing Release One SQL/DS data bases will not have to be converted to SQL/DS Release 2 unless the installation is also migrating from SQL/DS on VSE to SQL/DS on VM/SP Release 3 (which uses a different physical storage structure than VSE/VSAM). SQL/DS procedures and utilities will be available for this conversion.
- **Recovery:** SQL/DS provides full recovery from application, system and media failures in all supported environments. In the VSE AF3 and SSX/VSE environments, CICS/DOS/VS coordinates recovery among DL/I, SQL/DS, and other CICS/DOS/VS controlled files for transaction, system and subsystem failures. In the VM/SP environment, similar recovery capability is provided by SQL/DS.
- **Data Sharing:** Multiple SQL/DS users may share access to the same data base simultaneously for both development and production uses. In a VM/SP environment, SQL/DS supports more than one SQL/DS Data Base Machine. Each SQL/DS Data Base Machine will be able to service requests from multiple concurrent CMS user virtual machines. However, a CMS user virtual machine can access only one such SQL/DS Data Base Machine at a time.
- **Data Locking:** Is at the DBSPACE, page (default), table, or individual row level. Locking granularity is automatic, but may be user-specified.
- **Data Base Services Utility (DBSU):** All SQL statements (but not ISQL Commands, DL/I Extract Commands, or application program specific statement) can be processed by the DBS Utility. DBSU obtains its input from a sequential control file which may contain both input data and commands. The control file may be a CMS file or a VSE file. The following capabilities are provided by DBSU: Data base table or DBSPACE unload/reload support for DB reorganization; support for loading of the data base from a user-defined sequential file; support for unloading of table or view data into a user-defined sequential file; support for optional data conversion when processing to or from user-defined sequential files (including zoned decimal data); support for logical input data records consisting of multiple DBS control file records.
- **Data types supported:** Fixed- and variable-length character, packed decimal, binary, double-precision floating-point, fixed- and variable-length double-byte character set.
- **Double-Byte Character Set (abbreviated DBCS):** The data types supported in SQL/DS have been extended in Release 2 to include double-byte character set (DBCS) data. This allows fixed, varying, and long varying data to be encoded as 2-byte characters. DBCS data can be stored as column data in SQL/DS tables or used as host variable data in SQL/DS PL/I and COBOL application programs. This support is required for portrayal of data in languages such as Kanji which require a 2-byte-per-character representation. The ability to process double-byte character data does not include the capability of using ISQL for inserting, displaying, or listing DBCS data. However, the Data Base Services (DBS) utility will accept commands and data records containing DBCS data. SQL/DS tables containing DBCS column data can also be loaded, unloaded or prepared for listing using the DBS utility.
- **DL/I DOS/VS Extract Facility:** Specific DL/I segments and fields can be defined online to the Extract facility of SQL/DS. The DL/I data definitions are presented in table format to the query user. Authorized users can request, via SQL-like Extract statements, that DL/I data be copied into previously defined SQL/DS tables.
- **Security, Auditability, Serviceability:** Users may trace attempts to access data, acquire resources, or execute applications. These attempts are written to a trace tape which may either be printed with an SQL/DS-supplied FORMAT program, or loaded into an SQL/DS table for subsequent analysis using ISQL.
- **Dynamic SQL Extensions:** The dynamic SQL programming interface is extended for Assembler language programs. The extension allows assembler programs to create access modules, and dynamically store prepared SQL statements in them. The extension also provides the capability to execute these stored SQL statements at a later time from other applications.

## RELEASE 1 DESCRIPTION

SQL/DS is designed to provide ease-of-access to data for both the new end-user and the experienced data base programmer. It provides query, report writer, end user data base management, and a DL/I extract facility. SQL/DS had its origins in a relational data base prototype (referred to in the IBM Systems Journal, Volume Sixteen, Number Four, 1977, as System R) which was developed at the IBM San Jose Research Center. The relational model provides a simple tabular view of the data to an end user. This data view is independent of actual storage structures and access techniques. A user can enter queries, generate reports and write application programs to process SQL/DS data without specifying access paths or predefined relationships because these are managed automatically by SQL/DS. Users need only specify what data they want to use, not how to get it.

SQL/DS will typically operate in multiple-user mode. It typically will be in a separate partition or virtual machine from the user's application; there may be many different applications simultaneously interfacing with SQL/DS using the operating system's cross-partition or inter-user communication facilities.

The above mode of operation allows multiple users to share the SQL/DS code and data base, and controls concurrent access to the data base. For faster performance and less system overhead (with no concurrent access and no data locking) SQL/DS can be executed in a single user mode with a dedicated data base.

Finally, SQL/DS can operate in an interactive environment. Users can develop, compile and execute SQL/DS applications using the interactive program development capabilities of ICCF or VM/CMS.

The SQL/DS partition will contain the control facilities to allow users to access the data base concurrently. The control component will also isolate the other components of SQL/DS from the environment and from the SCP's communication facility. This will provide a high degree of data integrity, and will insulate other partitions from user programming errors. SQL/DS data support is summarized by the following list of key facilities:

## 1. Relational Data Model

SQL/DS supports the relational model of data. Data is defined and accessed in terms of data tables and operations on data tables. The 2-dimensional tables, which are a structured part of the relational model, normally have a fixed number of columns, and a variable number of unnumbered rows. The relational model can effectively support a broad range of user data requirements. Views may be defined on tables such that user/application logical tables need not conform to actual stored tables. Views may combine data from several stored tables (or other views), and may subset tables by rows and/or columns.

## 2. Structured Query Language (SQL)

Data definition, access, manipulation and control operations are supported by the Structured Query Language (SQL). SQL is a high-level, non-procedural data language available to users through an interactive terminal interface, a batch utility and application programs.

## SQL/DS (cont'd)

SQL statements consist of command verbs, one or more optional clauses, language keywords and parameter operands. The structured use of verbs and keywords in the SQL syntax allows precise specification of data requests in a readable fashion.

SQL provides a set of statements which fall into four major categories: Query, Data Manipulation, Control and Data Definition. *Query* commands allow the user to retrieve data. *Data Manipulation* commands permit the user to insert, delete or update entries in the SQL/DS data. *Control* commands are used for transaction management operations such as restoring the contents of the data base to a previously-saved state. The *Data Definition* commands allow the user to create new tables, add columns to existing tables and create views. Also, SQL can be used to dynamically create indexes to provide quicker access to data.

### 3. Logical Storage Management

SQL/DS alleviates much of the preplanning and set-up required for data installation and maintenance by managing DASD storage in terms of logical space allocations (called DBSPACES). DBSPACES must be backed by real DASD space in the form of VSAM data sets, but this space need not be allocated until it is needed.

### 4. Terminal User Interface

In a CICS/DOS/VS or VM/CMS environment, a terminal user may directly interact with SQL/DS using an SQL/DS provided CICS/VS transaction ISQL (interactive SQL). The user can access data without writing an application program by invoking ISQL. ISQL utilizes CICS/DOS/VS or VM/CMS terminal control.

ISQL has user-oriented commands. The user enters both standard SQL statements to access the data base, or commands to control the terminal session. The SQL statements are passed on to SQL/DS for immediate compilation and execution. If the SQL statement is a query, the results of the query are immediately displayed at the terminal. Note that this facility allows the user to satisfy many of his information needs online, interactively, without writing an application program.

ISQL support allows terminal access for data administration and definition, data retrieval, data manipulation and data extraction from DL/I data bases.

There is an online help capability to assist the users in the use of the system and in error diagnosis. If errors are made, a more detailed explanatory text can be obtained. The user may request additional reference text regarding SQL/DS operations, SQL commands, etc.

ISQL provides a bulk online data entry capability. This allows the user to insert multiple rows easily into an existing SQL/DS table. Each input record must contain all the data destined for that row (null columns are allowed). Unless changed at insert time, the columns are entered in the order specified at table creation time. The user can save, cancel, end (commit), or reset (roll back to a previous commit).

PF keys are used for scrolling and shifting the display.

The user may save SQL statements and ISQL commands in an SQL/DS table. The user can create, store, recall, modify and execute sets of commands and statements as routines. Finally, the stored routines may be parameterized; the user can substitute at execution time variable information in a query routine which has been created to accept parameter input.

User profiles can be defined and saved. These describe the default characteristics (such as the decimal punctuation option for numbers).

### 5. Hard Copy Output

The user can issue simple and/or complex SQL statements via ISQL to retrieve columns or rows from an SQL/DS table. The result will be displayed on the screen. The user may then use ISQL commands to:

- Create report headings and footings.
- Change the column labels from the catalog to more descriptive labels in the report.
- Omit retrieved columns.
- Separate the query result into specified groups.
- Create subtotals and totals for all numeric columns, or for only those columns specified.
- Verify the format of the resulting report on the terminal prior to printing.
- Specify the output class, and number of copies.
- Request a hard copy print on the system printer or any system-supported printer. The date will appear on the top left, and the page number on the top right on every page.

- Save the ISQL commands and SQL statements in an SQL/DS table for later reuse and modification (as desired).

### 6. Extraction of Data from DL/I

The DL/I extract facility supports single processor operation. DL/I and SQL/DS must be licensed for the same processor. The DL/I data base may be offline when the user defines the desired DL/I data to the extract facility, and when an extract is requested. Both SQL/DS and DL/I must be active when the extract facility is executing.

The user may copy specific DL/I segment types and/or specific fields of a segment.

Execution of the extract request is asynchronous. Once the extract request is issued by an authorized user, he may perform other query operations (including "logging off" and "logging on" at a later time to get the results).

For more efficient operation, outstanding extract requests will be merged to allow multiple requests for the same PSB/PCB to be satisfied in a single pass through the DL/I data base.

### 7. Concurrent Access from Multiple Applications

SQL/DS will support concurrent access from multiple users and environments including CMS interactive, online transactions, batch, or interactive program development. SQL/DS will protect data access through internal locking mechanisms which prevent conflicting access from multiple users. Users need not explicitly issue lock requests.

Sharing of data is at the row level: Multiple applications can access data from the same table at the same time. SQL/DS will prevent application access to rows modified by other applications which have not completed. SQL/DS will also support protection of read operations, such that data read by one user cannot be modified by other users until the first one completes. Users may elect to explicitly acquire locks on data at the table or DBSPACE level.

In a VM/SP environment, SQL/DS will support a multiple virtual machine mode (MVMM) of operation. This will allow SQL/DS to be in one virtual machine, and user applications in other logical or physical machines. The SQL/DS Data Base Machine will be able to service requests from multiple concurrent CMS user machines. Multiple MVMM is also supported; that is, there may be multiple SQL/DS Data Base Machines, each machine sharing the same code, and each with its own data base.

### 8. Data Recovery Support

Data recovery facilities of SQL/DS help to protect data from three types of failure: User, system or media. All recovery is based on the concept of restoring data to a consistent state as defined by successfully completed logical tasks.

On user failure, SQL/DS is designed to isolate the work associated with the failing application and backout all uncommitted changes to data. This is done dynamically without impact to other activity on the system.

On system or SQL/DS failure, SQL/DS restart is designed to automatically restore data to a consistent state by backing out uncommitted changes and completely processing the committed changes.

SQL/DS supports media recovery by providing a data base archive facility and a recovery process which will restore a data base from this archive.

### 9. Data Security

There are two aspects of security; first a facility to control access to the SQL/DS system itself, and second, the facilities to control access to the data managed by SQL/DS.

#### a. System Access

SQL/DS provides flexible user-controllable security facilities. The SQL language is used to specify the authorization to the SQL/DS controlled resources (data, programs, etc.). The creator of the resource determines which users may access or change it. An application cannot access data that is beyond its authorized scope. Furthermore, non-authorized users can be recorded and audited.

Authorized passwords for SQL/DS usage are established by the installation and stored in the system catalogs. Once a user is verified by the terminal manager (CICS/DOS/VS or VM/CMS) then SQL/DS controls the access to its managed resources. Note that SQL/DS does not require an additional user-id and password for online access to it.

**SQL/DS (cont'd)**

**b. Data Security**

SQL/DS assists in providing data security by using a catalog mechanism for controlling user access to programs that access data. VIEWS can be used to subset a table of specific columns or rows or to combine parts of several tables. Authorization to data can be at the individual table, row, or column level. Also, data manipulation authority (INSERT, DELETE, etc.) can be separately controlled. The TRACE facility can be used to audit unauthorized attempts.

The security facilities are flexible in that security administration may be controlled by one individual or delegated to meet the needs of the customer installation.

User management is responsible for the proper selection, application, and adequacy of these controls and security features for his individual environment.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

SQL/DS is designed to operate on those IBM processors supported by DOS/VSE Advanced Functions Release 3 or later, SSX Version 1 Release 2 or later, and VM/SP Release 3 (see the VM/SP Release 3 Announcement Letter). The IBM CPUs must support conditional swapping, and extended precision floating-point. This, SQL/DS will not execute on IBM S/370 models 165, 155, 135 and models below 135. The minimum storage requirement is 2.0 megabytes for multiple-user mode operation. At least one 9-track tape drive is required for SQL/DS Trace or Archive facilities. SQL/DS will support all IBM devices supported by these operating systems through VSAM data management facilities (in VSE), or by VM/SP Release 3. Terminal support for preplanned SQL/DS applications will be provided through CICS/DOS/VS and VM/CMS. ISQL can be used with the following (or compatible) IBM terminals:

- a. IBM 3275 mdls 2, 12 CRTs
- b. IBM 3276 mdls 2, 3, 4, 12, 13, 14 CRTs
- c. IBM 3277 mdl 2 CRTs
- d. IBM 3278 mdls 2, 3, 4, 5 CRTs
- e. IBM 3279 mdls 2A, 3A, 2B, 3B CRTs

**SOFTWARE REQUIREMENTS**

In a VM/SP environment, SQL/DS is designed to operate with and requires VM/SP Release 3 or later. Neither DOS Simulation, nor VSE/VSAM nor a VSE Guest is required.

ISQL Results may be printed on any system-supported printer, using VSE/POWER Release 2 or later in a VSE system. Any IBM 3270 Information Display System terminal printer supported by the BMS facility of CICS/DOS/VS in VSE, or by RSCS Networking Release 2 or later in VM/SP Release 3, can print the ISQL results. In a VSE environment, the VSE/POWER RJE feature Release 2 is required for remote POWER printer support.

In a VSE environment, SQL/DS is designed to operate with and requires DOS/VSE Advanced Function Release 3 or later and VSE/VSAM Release 2 or later. The following related (or equivalent) products may optionally be used:

Component Name	Component Number	Release Level	Comment
CICS/DOS/VS	5746-XX3	1.5 or later	Note 1, 3
VSE/POWER	5746-XE3	2 or later	Note 1, 3
VSE/ICCF	5746-TS1	3 or later	Note 2
DL/I DOS/VS	5746-XX1	1.6 or later	Note 3

Note 1: For query/report writer, and for support of the IBM 3270 Information Display System printers.

Note 2: For interactive program development

Note 3: For extract facility

In an SSX environment, SQL/DS requires Version 1 Release 2 of SSX.

In a VM/SP environment, SQL/DS is designed to operate with and requires VM/SP Release 3.

**COMPATIBILITY**

**SQL/DS Release 1 to Release 2:**

A data base (and directory, log and system catalogs, etc.) generated under Release 1 will be supported under Release 2. The Release 2 installation process will support the installation of a system that already has a data base generated under Release 1.

Programs, access modules, stored queries and routines generated under SQL/DS Release 1 will be supported by Release 2.

**DATA CONVERSION to SQL/DS FORMAT**

Users will have several options to convert their data from their existing formats to SQL/DS. These include:

- VSAM AMS repro facility and the SQL/DS Data Load facility.
- Modifications to currently available user unload/reload programs.
- DBS utility to bulk load existing user-generated SAM files into SQL/DS tables.
- In the VSE AF 3 environment, the SQL/DS Extract facility will enable the user to copy selected DL/I data into SQL/DS tables.

**MIGRATION of SQL/DS between VSE and VM/SP ENVIRONMENTS**

Existing SQL/DS data bases (Release 1 level) will not have to be converted unless the user is converting from SQL/DS on VSE to SQL/DS on VM SP Release 3 (since VSE SQL/DS uses VSE/VSAM for DASD support, and VM SQL/DS does not). SQL/DS Archive and data unload/reload facilities can be used for this conversion.

**PERFORMANCE CONSIDERATIONS**

The primary objectives of SQL/DS are ease-of-installation and ease-of-use. SQL/DS provides the user an access language which eliminates the need to know the physical structure of the data base. This places additional requirements on the program product, which in turn may increase the system resource requirements processor cycles, real storage, I/O activity and DASD space). The increase in system resources should be compared to reductions in personnel effort. The relational model uses one familiar concept of tables; SQL/DS does not require a high skill level or extensive education in order to effectively use it. This situation is not dissimilar to the tradeoffs between the use of high level languages and assembler language.

The actual system resource requirements vary and depend on many factors (such as number of records searched, the complexity of the query and the availability of indexes). Response time and throughput depend on the allocated system resources, the priority of the executing task, and the nature of the transaction. An increase in the required system resources may be offset by the value of the increased function provided by SQL/DS, and reduced programmer effort.

**1. Unplanned Environments**

In the unplanned environment there are performance advantages due to the inherent nature of a relational data base system such as SQL/DS. A user may make many requests for data without having a detailed data processing background, knowledge of the stored data, or knowledge of the characteristics of the resulting answer. The basic SQL facilities for such requests can be easily learned and used, and can enhance end user productivity.

Using ISQL and the report writer capabilities, many of the one-time or simple application programs may be eliminated.

**2. Pre-Planned Environment**

Because SQL/DS allows reorganization of the data base, addition of new transactions or tables, and extension or deletion of tables without impacting existing application programs, a user can install the first application program without requiring that all pre-planning is complete. SQL/DS supports interactive addition, extension, or deletion of tables without requiring suspension of other processing or regenerating the entire data base. The pre-planned environment includes precoded online, shared batch, and single user batch application programs. These applications have varying performance characteristics. It is important to emphasize the following when comparing the SQL/DS performance relative to the other data base models.

In SQL/DS, the user only indicates *what* data is required. Because the user specifies less information (i.e., he does not indicate where the data is located) SQL/DS must determine where the data is before it can access the data. Consequently, it is not appropriate to restrict performance considerations to just system resources and throughput. One should also consider personnel productivity. This transferring of effort from the application programmer to SQL/DS can result in greater productivity for the person, at the potential expense of more system resources.



PROGRAM PRODUCTS

SQL/DS (cont'd)

DOCUMENTATION

(available from Mechanicsburg)

SQL/DS *General Information Manual* (GH24-5012) ... SQL/DS *Concepts and Facilities* (GH24-5013) ... SQL/DS *Planning and Administration - VSE* (SH24-5014) ... SQL/DS *Installation - VSE* (SH24-5015) ... SQL/DS *Terminal User's Guide - VSE* (SH24-5016) ... SQL/DS *Terminal User's Reference* (SH24-5017) ... SQL/DS *Application Programming* (SH24-5018) ... SQL/DS *Messages and Codes* (SH24-5019) ... SQL/DS *Operation* (SH24-5020) ... SQL/DS *User's Reference Summary* (SX24-5121) ... SQL/DS *Program Function Key Template* (SX24-5125) ... SQL/DS *Licensed Program Specifications* (GH24-5026) ... SQL/DS *Release 2 Planning Guide* (GH24-5042) ... SQL/DS *Planning and Administration - VM/SP* (SH24-5043) ... SQL/DS *Installation - VM/SP* (SH24-5044) ... SQL/DS *Terminal User's Guide - VM/SP* (SH24-5045) ... SQL/DS *Data Base Services Utility* (SH24-5046) ... SQL/DS *Logic Manual Volume 1* (LY24-5216) ... SQL/DS *Logic Manual Volume 2* (LY24-5217) ... SQL/DS *Logic Manual Volume 3* (LY24-5222).

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**5748-XXK - ELIAS-I/VM R1  
ENTRY LEVEL INTERACTIVE APPLICATION  
SYSTEM - ONE/VM RELEASE 1**

**PURPOSE**

ELIAS-I/VM is an interactive program which runs under the control of the Interactive Productivity Facility (5748-MS1). When correctly installed in its Specified Operating Environment (SOE), ELIAS-I/VM is designed to provide a system which is intended to facilitate the design, development and implementation of VSAM, DB, DC and/or DB/DC programs with CICS/DOS/VS, DL/I DOS/VS, and/or VSE/VSAM using COBOL or PL/I and, optionally, DMS/CICS/VS-DOS.

**HIGHLIGHTS**

ELIAS-I/VM provides:

- Interactive interface for definition of DL/I DOS/VS Data Bases.
- Interactive interface for definition of CICS/DOS/VS screens (using Basic Mapping Support or DMS/CICS/VS-DOS).
- Interactive program build facility for batch or online programs in COBOL or PL/I.
- Interactive facilities to enhance DMS/CICS/VS-DOS user exit programming.
- Data Base recovery and reorganization routines.
- Task-oriented documentation.
- Sample programs to illustrate how DB/DC programs may be structured.
- Ease-of-use for DB/DC programming.
- Dialogues and help functions available in the following languages: French, German, Italian, Katakana, Portuguese, and Spanish in addition to English.
- Standard program design and error recovery routines designed to provide easier and reduced maintenance.

**DESCRIPTION**

ELIAS-I/VM presents, via its optional documentation and with supporting education, a design methodology, especially oriented towards DB/DC applications, tailored to the user who is not experienced in DB/DC implementation and who has limited in-house skill. Hints and tips are provided to facilitate the use of improved programming techniques in the smaller system environment.

ELIAS-I/VM interactive procedures are designed to provide assistance with VSAM, DB, DC and/or DB/DC program implementation by providing a dialog capability for the programmer. ELIAS-I/VM bricks are also included in the product. These bricks are designed to be included in VSAM, DB, DC and/or DB/DC application programs and to provide assistance in utilizing standard CICS/DOS/VS and DL/I DOS/VS and VSE/VSAM facilities.

Procedures and bricks are provided for the following main functional areas:

- Assistance with DL/I data base definition. Procedures to generate DL/I nucleus, DBDs, PSBs, SSAs, and the associated VSAM files, together with the associated COBOL or PL/I structures. A procedure to transport ELIAS-I/VM defined DL/I control blocks and COBOL or PL/I structures into the DB/DC Data Dictionary DOS (5746-XXC) is provided.
- Assistance with PSB import. A procedure to make available to ELIAS-I/VM program generation procedure PSBs which have been defined without making use of ELIAS-I/VM facilities.
- Assistance with DL/I data base maintenance. A procedure for loading, reorganization and back-up/recovery of DL/I data bases.
- Assistance with CICS/DOS/VS screen map generation using BASIC Mapping Support. Interactive definition of application screens to ELIAS-I/VM design standards. These maps can be defined for use either with COBOL or PL/I application programs.
- Assistance with batch and online program creation and maintenance in COBOL or PL/I. Provision of skeleton programs with data areas, screen maps, linkage and error recovery code for DL/I (CALL or High Level Programming Interfaces), VSE/VSAM, and CICS/DOS/VS.

"Fetch a brick" capability for services requests related to DL/I (CALL or HLP interfaces), VSE/VSAM, and CICS/DOS/VS either in batch or online programs written in COBOL or PL/I. Simple use of full screen editor to enter user source statements and test the resulting program.

- Assistance for writing COBOL or PL/I user exits for DMS/CICS/VS-DOS (5746-XC4). For those customers who have DMS installed, ELIAS-I/VM provides support for writing user exits in either COBOL or PL/I, offering productivity improvements made available to the developers of traditional COBOL or PL/I programs.

- Assistance with "compile and link" jobstream creation. A procedure to generate a fully tailored jobstream in order to submit to batch for compiling and linking batch and/or online programs, as well as, CICS/DOS/VS screen maps.

ELIAS-I/VM has been designed to provide the maximum productivity benefits when used in a full DB/DC environment together with CICS/DOS/VS, DL/I DOS/VS, and either COBOL or PL/I and, optionally, DMS/CICS/VS-DOS.

**CUSTOMER RESPONSIBILITIES**

The customer should ensure that the functions of ELIAS-I/VM match their application requirements and that they have sufficient terminals and machine power to realize the benefits of an online programming environment.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

ELIAS-I/VM is designed to operate on any IBM S/370, 30X and 4300 processor supported by VM/SP.

ELIAS-I/VM runs under control of Interactive Productivity Facility, in a CMS machine with at least 1 megabyte of virtual storage allocated.

It requires a minimum of 4,000 CMS library blocks (1024 bytes) of auxiliary storage.

ELIAS-I/VM generated code supports the IBM 3310, 3330, 3340, 3344, 3350, and 3370 Disk Storage devices.

A typical minimum VM/VSE DB/DC environment where ELIAS-I/VM can be installed to support application programming development might be:

— IBM 4300 Processor: 2 megabytes of storage ... 3 spindles 3370 DASD\* ... 1 Console 3278-2A ... 1 Printer 3211 or 3203-5\* or 4245\* ... 1 Card or Diskette Reader ... 1 Tape Drive 3420\* ... 1 Terminal 3277-2 or 3278-2.

— IBM S/370: 2 megabytes of storage ... 8 Spindles 3340 DASD\* ... 1 Line Printer ... 1 Card or Diskette Reader ... 1 Tape Drive ... 1 Terminal 3277-2 or 3278-2.

\* = or equivalent devices supported by the operating system.

**SOFTWARE REQUIREMENTS**

This licensed program requires the functions provided by the Interactive Productivity Facility Release 3.0 (5748-MS1), running in conjunction with the following programs:

	Release
VM/370 SCP	5749-010 6.0
VM/SP	5664-167

The ELIAS-I/VM editors make use of the full screen editing facilities provided by the CMS editor of VM/SP. In addition, customers may want to install the Display Editing System Release 1.0 (5796-PJP), whose facilities can also be used by the ELIAS-I/VM editors.

The set of macros and application programs generated by ELIAS-I/VM may interface with the following programs:

	Release
VSE/POWER	5746-XE3 2.0
CICS/VS	5746-XX3 1.5
DL/I DOS/VS	5746-XX1 1.5
	ICR2
VSE/VSAM	5746-AM2 2.0
DMS/CICS/VS-DOS	5746-XC4 2.0
DOS/VS COBOL	5746-CB1 2.5
PL/I Optimizer Compiler and Libraries	5736-PL3 5.1
DB/DC DATA Dictionary	5746-XXC 3.0

Programs developed using ELIAS-I/VM can either be executed on a native VSE environment or on a VM/VSE environment.

**MIGRATION FROM ELIAS-I/VM RELEASE 1**

ELIAS-I/VM Release 1 is upward compatible with ELIAS-I/VM Release 2:

- Tables created by ELIAS-I/VM Release 1 can be used directly by ELIAS-I/VM Release 2 dialogs.
- Program skeletons generated using ELIAS-I/VM Release 1 facilities can be accessed by ELIAS-I/VM Release 2 editors.
- ELIAS-I/VM Release 2 bricks providing functions already existing in ELIAS-I/VM Release 1 can be included in any ELIAS-I/VM Release 1 generated programs, without regeneration of the framework.

Restriction: ELIAS-I/VM Release 2 editors can only use ELIAS-I/VM Release 2 bricks.



PROGRAM PRODUCTS

**ELIAS-I/VM (cont'd)**

**COMPATIBILITY Between ELIAS-I/VM (5748-XXK) and ELIAS-I (5746-XXV)**

ELIAS-I/VM is functionally equivalent to ELIAS-I. The data base definitions, structures, maps, and application programs created using the facilities of one of the products, are fully compatible with the related items created using the facilities of the other product. All bricks made available to the user are the same in both products. Therefore, all files generated by either of the two products are fully interchangeable.

**DOCUMENTATION**  
(available from Mechanicsburg)

The following documents will be available at ELIAS-I/VM availability time:

*Licensed Program Specifications (GH19-6187) ... Licensed Program Design Objectives (GH19-6205\*) ... General Information Manual (GH19-6157\*) ... Application Design Guide (SH19-6158) ... COBOL Application Programmer's Guide (SH19-6159) ... PL/I Application Programmer's Guide (SH19-6160) ... System Administrator's Guide (SH19-6161) ... COBOL Samples Handbook (SH19-6162) ... PL/I Samples Handbook (SH19-6163) ... Program Logic Manual (LY19-6121) ... Reference Card (GX11-6065).*

\* = will be available at announcement time

The Customer will receive all necessary instructions for installing ELIAS-I/VM on top of an installed system which contains the Interactive Productivity Facility Release 3.0, and the other prerequisite programs described under Programming Requirements.

**RPOs ACCEPTED: No**

PROGRAM PRODUCTS

**VS BASIC  
5748-XX1**

**DESCRIPTION**

VS BASIC is a language processor which provides a problem solving capability in both interactive and batch environments. The BASIC language is relatively easy to learn and easy to use. Its simplicity has broad appeal to non-computer professionals (business analysts, engineers, scientists, students, etc.) as well as to the professional programmer. The language is widely used as a problem solving tool across a broad range of scientific and business oriented applications.

VS BASIC is designed to operate in virtual storage systems. It will operate in the time-sharing environments CMS (Conversational Monitor System) of VM/370, TSO (Time Sharing Option) under OS/VS2 (SVS and MVS) and VSPC (Virtual Storage Personal Computing) under OS/VS1, OS/VS2 (MVS) and DOS/VS. It also operates as a batch compiler under control of OS/VS1, OS/VS2 (SVS and MVS), DOS/VS and CMS Batch.

**RELEASE 1 and 2 HIGHLIGHTS**

- Arithmetic capability in short- and long-precision, permitting arithmetic operations on variables and arrays.
- Character facilities, enabling the user to define character variables of different lengths, to concatenate groups of character data items and to locate and extract substrings within character strings.
- Array handling operations for both numeric and character one- and two-dimensional arrays.
- Record-oriented file facilities that allow record processing in direct or sequential fashion.
- Input-output facilities that provide great flexibility in accessing input data and in formatting output data.
- A set of intrinsic functions performing often-needed arithmetic and character operations.
- User-defined functions that can be defined in one statement or over a group of statements.
- Program segmentation capability that allows more than one BASIC program to be executed in sequential order.

In addition, the VS BASIC processor under CMS and TSO provides an interactive debugging facility to permit the user to dynamically debug a program at the terminal. VS BASIC under VSPC does not provide the debug facility.

**RELEASE 3 HIGHLIGHTS**

**Extended Input-Output Facilities:** PRINT TO allows the user to direct terminal output to a file. This file can subsequently be printed at the terminal or at a system printer, if available to the host system.

**INPUT FROM** permits data to be retrieved from either the user terminal or a user file.

**Additional Data File Support:** The VS BASIC language has been extended to include support for direct files accessed via relative record numbers. Support of files in the VSPC library has been extended to include support of VSPC direct files. Support of VSAM data sets has been extended to include support of relative record data sets. VSPC files and reusable VSAM data sets can now be opened for reuse.

**Program Error Handling:** Through the use of CN statements and read-only variables, VS BASIC error handling facilities now control and identify many more errors occurring at execution time.

**Operators/Mnemonics:** The addition of the character mnemonics to the relational, logical and character operators extends the use of the operators to terminal keyboards without special characters. The special characters and mnemonics can be used interchangeably for the operations noted.

**Buffered-Ahead Terminal Input:** This facility enables a user to enter on one input line, data which will satisfy more than one INPUT request, thus providing the ability to override the prompt for each of the entries.

**CUSTOMER RESPONSIBILITIES**

Each customer installing, operating or maintaining VS BASIC must have a working knowledge of the applicable operating system (OS/VS1, OS/VS2 (SVS or MVS), DOS/VS, VM/370). No customer should attempt to install VS BASIC until the installation has achieved proficiency in the use of the operating system.

The customer is responsible for providing adequate protection against accidental loss or misuse of data. This includes an adequate review of the system's security provision by the user.

It is the customer's responsibility to make the changes in the customer program necessary to run under VS BASIC. It is also the customer's responsibility to ensure type compatibility when exchanging data with programs written in other languages while using VS BASIC under VSPC.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The VS BASIC processor is designed to operate in a virtual storage system, in both time-sharing and batch environments. It is a single-pass compiler, which accepts up to 1000 source statements and produces executable code that can be run immediately after compilation, or that can be stored as an object program and run at some later time.

Under VSPC, the VS BASIC processor is reenterable in the OS/VS1, OS/VS2 (MVS) and DOS/VS environments. Under OS/VS Batch, the VS BASIC processor is reenterable. Under TSO, the VS BASIC processor is reenterable except for the interactive debug module. Under DOS/VS batch the processor is reenterable except for the executor module.

If reenterable, the processor may be placed in the link pack area or the shared virtual area so that many users can simultaneously refer to them.

Under CMS, the interactive debug and executor modules are not reenterable.

Because all environments in which VS BASIC operates can be virtual, real storage requirements are largely a function of performance desired. Under VSPC, the virtual storage required to run VS BASIC consists of the VS BASIC specific requirements and the VSPC requirements. VS BASIC requires 128K bytes in addition to the VSPC interactive environment requirements. In OS/VS2 (MVS), 128K bytes per VSPC dependent address space is required. If VS BASIC is placed in the system link pack area, only 128K bytes are required.

Under CMS, VS BASIC requires 300K bytes of virtual storage without the interactive debug facility.

In other environments VS BASIC requires 128K bytes of virtual storage without the interactive debug facility and requires 256K bytes with the interactive debug facility.

**SOFTWARE REQUIREMENTS**

VS BASIC, which is written in Assembler language, is designed to operate in virtual storage environments. It will operate in these time-sharing environments:

- VSPC under OS/VS1, OS/VS2 (MVS) and DOS/VS.
- CMS under VM/370 Release 3.
- TSO under OS/VS2 (SVS and MVS).

It also operates as a batch compiler under OS/VS1, OS/VS2 (SVS and MVS), DOS/VS and CMS batch. Program compatibility is thus offered for users who may decide at some later time to change environments.

Record-oriented file facilities or VSPC stream or record facilities use VSAM (Virtual Storage Access Method). VS BASIC Release 3 provides access relative record capability under OS/VS2 (SVS).

**COMPATIBILITY**

Programs: VS BASIC Release 2 programs (for which object programs were saved) must be recompiled with the Release 3 Processor.

Those few user programs which depend upon a PRINT USING statement with a reference to an IMAGE to force the preceding data to be printed, will need to be modified. One way is through the addition of a PRINT statement which will then cause the preceding data to be printed.

All correct BASIC programs running under ITF: BASIC (5734-RC3, 5734-RC4 and 5736-RC2) will run under VS BASIC as long as the maximum literal pool size is not exceeded. Note: In Release 3, PRINT literals are no longer stored in the literal pool.

All correct BASIC programs running under the BASIC processor currently supported by CMS (CALL-OS BASIC, 360A-CX-44X) will run under VS BASIC after adjustment of file input/output statements. CMS editing commands can be used to change these statements to conform to VS BASIC syntax.

Additionally, under CALL-OS BASIC, if an OPEN statement is issued for a file already open, the file is repositioned to its beginning. Under VS BASIC, an OPEN statement for a file already open is ignored. CALL-OS BASIC programs containing such OPEN statements should be converted by adding a CLOSE statement before the OPEN statement.

All correct programs running under VS BASIC (nonVSPC) will run under VS BASIC for VSPC after adjustment of file input-output statements and program names in CHAIN statements. These changes can be made using the VSPC editing facilities.

The MAT ZER and MAT CON functions, which exist in earlier BASIC processors, are replaced in VS BASIC by the facilities of the MAT assignment statement. However, as a compatibility convenience, these functions are available in VS BASIC so that existing BASIC programs containing references to them will not require change in order to run under VS BASIC.

## PROGRAM PRODUCTS

**VS BASIC (cont'd)**

Files: Files created under ITF: BASIC can be read by VS BASIC by specifying the filename in the form 'userid.DATA(name)', where name is the name of the file in input/output statements.

Files created under DOS ITF: BASIC must first be converted to conventional DOS files; the ITF CONVERT command may be used.

Files created under CALL-OS BASIC running under CMS can be used by VS BASIC after being converted to VS BASIC format.

NonVSPC VS BASIC files can be imported from sequential data sets to VSPC by using the VSPC service program.

**DOCUMENTATION:** (available from Mechanicsburg)

*VS BASIC General Information Manual (GC28-8302) ... VS BASIC Design Specifications (GC28-8311) ... VS BASIC Design Objectives (GH20-9118).*

PROGRAM PRODUCTS

**CHAINED FILE - DL/I BRIDGE  
DOS/VS and OS/VS (5748-XX3)**

**DESCRIPTION**

The Chained File - DL/I Bridge provides assistance in converting data base applications to Data Language/I (DL/I) from current chained file systems which include:

- 1) S/360 Bill of Material Processor (360A-ME-06X).
- 2) S/360 Data Base Organization and Maintenance Processor (5736-XX4).
- 3) S/360 Data Base Organization and Maintenance Processor with the CICS Feature of DBOMP (5736-XX4).
- 4) Chained File Management System of OS/360 Requirements Planning System (5734-M51).

This program product supports conversion of:

- (1) and (2) to DL/I DOS/VS (5746-XX1).
- (1), (2), (4) and Bill Processor Systems - IMS/360 Bridge (5734-XX9) to IMS/VS (5740-XX2).
- (3) to DL/I DOS/VS (5746-XX1) and to CICS/DOS/VS (5746-XX3).
- (3) to CICS/OS/VS (5740-XX1).

The Chained File - DL/I Bridge provides the necessary logic to:

- Unload the user's current chained file system data base.
- Load the DL/I data base.
- Provide flexibility for data base reformatting and structuring.
- Interface existing programs to the DL/I data base, thus permitting them to operate with few or no program changes against the DL/I data base.
- Support low-level code and perform continuity checking.
- Execute batch application programs in a batch message processing region of IMS.
- Improve chain file maintenance by optionally using a fast batch capability.

**HIGHLIGHTS**

This program product can minimize the conversion effort required to migrate from chained file systems to DL/I DOS/VS or IMS/VS.

The bridge interface module which replaces the FILEORG and IOPROCESS modules of the existing chained file system is file and application program independent and, as a consequence, must be generated by the user only once.

The Chained File - DL/I Bridge users describe their existing chained file data base to the bridge with a subset of those parameter statements used to describe the data base to their existing chained file system.

The bridge description generator supports the migration to DL/I DOS/VS or IMS/VS by providing:

- An audit list including diagnostics.
- A report describing the chained file system data base as defined in the input.
- A structuring report describing the mapping of existing chained file system records to DL/I segments and fields.
- A report describing the DL/I segments for each chained file system record type.
- The input statements for the DL/I DBDGEN and PSBGEN utility programs required for bridge operation.
- Macro instruction card image output which is used to produce the user's bridge data base conversion modules and bridge program modules.

**CUSTOMER RESPONSIBILITIES**

Customers planning to use this program product must first install DL/I DOS/VS or IMS/VS, and if online processing, CICS/DOS/VS or CICS/OS/VS.

Users must assemble and link-edit the description generator program. It is then executed, using existing parameter statements plus user-prepared parameter statements. The file description report is used to verify the accuracy of the statements entered. The user must execute the DL/I DBDGEN and PSBGEN utility programs, using control statements created by the description generator. They must assemble and link-edit the control blocks produced by the description generator. The unload module is assembled and link-edited together with the user's chained file system input/output module(s) and executed to unload the chained file system files.

The load program is assembled, link-edited as a DL/I application program, using the output of the unload program to create the converted DL/I data base. The bridge interface modules are assembled and link-edited replacing the existing chained file system FILEORG and IOPROCESS modules to perform maintenance and retrieval functions. User programs may require some changes prior to recompilation, especially if the user is migrating from DOS to OS.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The amount of virtual and real address space required for the Chained File - DL/I modules is almost independent of the type and level of the operating system.

The address space requirements for the bridge modules, control blocks, and working storage vary with the number of chained file system files, the record length, and the extent of file structuring. For unstructured bridging of a chained file system data base consisting of an item master file, a product structure chain file, a routing chain file, and a work center master file with a maximum record length of about 500 bytes each, the required virtual address space for bridge modules, control blocks, and working storage is approximately (rounded to the next higher 2K value):

Program name	Bridge modules		Control blocks and working storage	
	Virtual address space req'd	Real address space req'd	Virtual address space req'd	Real address space req'd
Description Generator Program	70K	22K	30K	20K
Unload Program	20K	20K	4K	4K
Load Program	14K	14K	2K	2K
Interface	24K	24K	6K	6K

Tables used by the load program and the bridge interface module vary in size, depending on the number of chained file system files in the data base and the extent of structuring used.

Additional address space is required for an operational system as follows:

Program Name	Space must be added for
Description Generator Program	Operating System
Unload Program	Operating System; Chained File System or Bill Processor Systems - IMS/360 Bridge
Load Program	Operating System; DL/I DOS/VS or IMS/VS; VSAM
Interface (batch)	Operating System; DL/I DOS/VS or IMS/VS; VSAM; Application Program
Interface (online)	Operating System; DL/I DOS/VS or IMS/VS; VSAM; CICS/DOS/VS or CICS/OS/VS Application Program(s)

The peripheral equipment consists of:

- Disk storage facilities as required by DL/I DOS/VS or IMS/VS
- 9-track tape units, as required by DL/I DOS/VS or IMS/VS
- One card read punch
- One printer
- Terminals as supported by CICS/VS (optional)

**SOFTWARE REQUIREMENTS**

The program product operates in virtual storage under the IBM Disk Operating System/Virtual Storage (DOS/VS), the IBM Operating System/Virtual Storage 1 (OS/VS1), or the IBM Operating System/Virtual Storage 2 (OS/VS2). The unload program operates as an application program within the installed chained file system environment. The converted DL/I data bases are organized using the Hierarchical Indexed Direct Access Method (HIDAM).

Supported release levels of the operating systems are as follows:



## PROGRAM PRODUCTS

**Chained File - DL/I Bridge (cont'd)**

Operating System	Type of Processing	Release Level
DOS/VS	Batch, online	31
OS/VS1	Batch	3.0
OS/VS1	Online	4.0
OS/VS2	Batch	1.6
OS/VS2	Online	3.0

Subsequent releases, versions and modification are also supported unless so stated in a future version of this document.

In the batch environment, the Chained File - DL/I Bridge requires DL/I DOS/VS (5746-XX1) Release 1.1, or IMS/VS (5740-XX2) Release 1.0. For online processing, this program product requires DL/I DOS/VS (5746-XX1) Release 1.1 and CICS/DOS/VS (5746-XX3) Release 1.0.1, or IMS/VS (5740-XX2) Release 1.0.1 and CICS/OS/VS (5740-XX1) Release 1.1. Subsequent releases, versions and modifications of the aforementioned program products are also supported unless so stated in a future version of this document.

The Chained File - DL/I Bridge will also run with the above systems under VM/370.

All chained File - DL/I Bridge programs are written in IBM S/370 Assembler language and one of the following Assemblers is required:

Program Number 5745-SC-ASM, for DOS/VS

Program Number 5741-SC1-03, for ZOS/VS1

Program Number 5742-SC1-03, for OS/VS2

Application programs being converted to the DL/I environment may be written in COBOL, PL/I or Assembler language.

The following must be used for COBOL programs: DOS Full American National Standard (ANS) COBOL Compiler Version 3 (5736-CB2) and Full ANS COBOL Library (5736-LM2), or DOS/VS COBOL Compiler (5746-CB1) or OS Full ANS COBOL Compiler Version 3 (5734-CB1) or Version 4 (5734-CB2).

DOS PL/I programs must be compiled by the PL/I Optimizing Compiler and Libraries (5736-PL3) or by the PL/I Optimizing Compiler (5736-PL/I) - PL/I Resident Library (5734-LM4), PL/I Transient Library (5734-LM5).

OS PL/I programs must be compiled by the PL/I Optimizing Compiler (5734-PL3) or by the PL/I Optimizing Compiler (5734-PL/I) - PL/I Resident Library (5734-LM4), PL/I Transient Library (5734-LM5).

All Assembler language programs must be reassembled. In the CICS environment, all COBOL and PL/I programs must be recompiled.

**DOCUMENTATION:** (available from Mechanicsburg)

*General Information Manual* (GH12-5116).

## 5748-XX8 - VM/BASIC SYSTEM EXTENSIONS

### PURPOSE

VM/Basic System Extensions is designed for use by DOS/VS, DOS/VSE, VS1 and MVS users running under VM/370, and/or CMS users running on S/370 mdls 135, 135-3, 138, 145, 145-3, 155II, 158, 158-3, 158AP, 158MP (in uniprocessor mode and in MP mode with I/O attached to only one side), 165II, 168, 168-3, 168AP, 168MP (in uniprocessor mode and in MP mode with I/O attached to only one side), 3031, 3031AP, 3032, 3033, 3033AP and 3033MP (in uniprocessor mode and in MP mode with I/O attached to only one side) and on the 4321, 4331, 4341 and 4381 Processors.

### HIGHLIGHTS

**Improvements In Resource Management:** A subset of the functions of the Resource Management PRPQ (5799-ARQ) is incorporated into the VM/Basic System Extensions program product. Specific improvements are:

**Throughput Improvements:** Throughput improvements may be achieved in the following environments:

- Systems with real storage bottlenecks
 

When a real storage bottleneck is indicated, the resource manager may reduce the effect and increase the level of multiprogramming. This is achieved through the use of improved scheduling and paging algorithms, which give rise to smaller working set size estimates and higher page steal ratios. The net result is that a given real storage size appears more able to contain the given load with improved throughput.
- Storage bound systems with long running non-interactive users and high multiprogramming levels.
 

Such systems devote a large part of their paging activity to swapping the long running users in and out of storage as each is given a timeslice. The resource manager reduces this paging overhead by swapping the longest running users into real storage less frequently but keeping them there for longer periods. This may lower the overall level of paging activity with accompanying reduction in supervisor overhead and some increased throughput.

**Improved Response to Trivial Interactions:** Improved response to trivial interactions may be achieved in the following environments.

- Terminal interactions occur for both single trivial commands and nontrivial transactions during terminal I/O.
 

The resource manager distinguishes between the two types of transactions by tracking the resource consumption rate and giving top priority to the smallest consumer.
- Transactions are characterized by a wide range of resource requirements.
 

The fair share algorithms of the resource manager, which are effective in both compute-bound and paging-bound environments, distinguish between the different resource requirements of the users. Consequently, a better interactive/noninteractive split is achieved with improved responsiveness to trivial transactions.

**Installation Management Control:** Installation management will have more control over the services provided in the following environments:

- Multiple users require a specified percentage of the processor.
 

The SET FAVOR command with percentage option may now be specified for more than one user.
- CMS batch facilities running non-interactively.
 

Directory priority controls may now be utilized to make CMS batch facilities either fully non-interactive to minimize impact on the system, or fully interactive to encourage its use.

**Addition To ECPS:** ECPS for VM/370 on S/370 mdl 135-3, 138, 145-3 and 148 has been enhanced to accelerate the processing of the DIAGNOSE Interface between a virtual machine and CP. Since CMS is a heavy user of DIAGNOSE, the CMS user may receive improved performance.

**CMS Support Of Labelled Tapes:** CMS has been modified to process labelled tapes as follows:

#### VOL 1 Labels

- Processed by DOS or OS OPEN simulation routines.
- Processed by CMS TAPPDS or TAPEMAC commands.
- Displayed or written by CMS TAPE command.

#### HDR Labels

- Processed by DOS or OS OPEN simulation routines: Exits are provided to allow access to user-written routines to Process standard user (UHL) labels.
- Processed by CMS TAPPDS or TAPEMAC commands.
- Processed by a new CMS macro designed for use in Assembler language programs in conjunction with other CMS tape macros.

### EOF/EOV Labels

- Processed by DOS or OS CLOSE simulation routines: Exits are provided to allow access to user-written routines to process standard user (UTL) labels.
- Processed by a new CMS macro designed for use in Assembler language programs in conjunction with other CMS tape macros.

### Nonstandard Labels

- User exits are provided in DOS or OS OPEN and CLOSE simulation routines and in TAPPDS or TAPEMAC commands to allow access to user-written routines to process nonstandard labels.

**Limitations:** The following are not supported:

- Label processing for tapes which are read backwards.
- Multi-volume files.
- ASCII labels.

**CMS Unlabeled Tapes:** CMS will process unlabeled tapes.

**Spool Files To Tape:** This support will provide Class D commands which enables the spooling operator to store to, or retrieve from, tape those unit record output files which he wishes to schedule for real output at some later time on the VM/370 system. The restored files will retain the same characteristics as the original file, but will be assigned new spool-ids to avoid duplicate identification within the spooling system. The spooling operator can store or retrieve spool files selectively (by class or spool-id) or completely. An option is provided to allow the operator to scan the tape.

**Virtual Machine Storage Preservation:** VM/370's control program will be modified so that during a VM/370 warm start or an abnormal termination by VM/370 of specified virtual machines, the user's virtual storage will be preserved. Specifically, virtual machine IPL will be changed so that it no longer uses a page of the user's virtual storage, and the V = R area under VM/370 will be preserved during VM/370 warm start. In addition, specific virtual machines can be identified such that at VM/370 abend, or when that virtual machine is abnormally terminated by VM/370, the registers and main storage for that virtual machine will be saved.

The improved integrity of virtual storage is particularly beneficial to IMS/VS users running in a virtual machine who need to have storage preserved so that they can run a standalone program to recover IMS/VS Log Buffers. In addition, standalone dumps that are IPL'd from an external storage device will now accurately reflect the user's virtual storage, because VM/370 will no longer use a page of that storage.

**Spooling of Accounting Records:** This support provides the installation with the ability to spool accounting data to a designated virtual machine with a designated class. The data can be spooled to provide punched output or spooled to a virtual machine's reader for additional processing. This eliminates the need to have a real card punch online at all times to get accounting records.

**Virtual Machine Interface To Allow Programs To Use The Full Facilities Of a 3270 Type Terminal:** The diagnose interface has been extended to allow a virtual machine user to share a display terminal with CP. When the user has control of the screen most of the facilities of the device are available.

**Support for the 3262 Printer mdls 1 and 11:** The 3262 mdls 1 and 11 are, respectively, 650 and 325 line-per-minute printers.

**Support For The Enhanced 3270 Display Terminals:** The following enhanced 3270 terminals are supported:

- 3274 Control Unit mdl 1B (3272 compatible)
- 3274 Control Unit mdl 1C (TP - BSC only)
- 3276 Control Unit/Display Station mdl 2 (1920 character screen)
- 3276 Control Unit/Display Station mdl 3 (2560 character screen)
- 3276 Control Unit/Display Station mdl 4 (3440 character screen)
- 3278 Display Station mdl 2 (1920 character screen)
- 3278 Display Station mdl 3 (2560 character screen)
- 3278 Display Station mdl 4 (3440 character screen)
- 3268/3287/3289 Printer (copy command support only)

This includes support for the 96-character set (94 characters plus space and null), and PF keys 13 through 24.

**Interactive Help Facility Under CMS:** The help facility is an informational, online display service available at the CMS terminal to guide the user in using CP and CMS commands and reacting to CP and CMS messages. As a result, the user can, in most cases, avoid referencing manuals during CMS sessions.

**CMS File System Enhancements:** The file system enhancements will provide the user with a more efficient and flexible file system. Specifically, the enhancements are:

- Removal of the current limitations on the size of CMS-disks and the number of files per CMS-disk.
- Support for physical block sizes of 800, 1024, 2048 and 4096 bytes.

PROGRAM PRODUCTS

**VM/Basic System Extensions (cont'd)**

- Efficient handling of variable length files.
- Selective directory updating.
- Fixed Block Mode (FBM) device type support.
- Concurrent open for read and write of CMS files.
- CMS may access one system disk and up to 25 minidisks concurrently.

**A CMS Tape Command Performance Improvement:** A large block-size (4K) is supported for tape dump/load to decrease overhead.

**CMS/DOS Uplevel To DOS/VSE:** The CMSDOS DCSS provides DOS/VSE support in CMS. This segment processes all DOS/VSE requests. Since the CMSAMS and CMSVSAM DCSS have been updated to depend upon the DOS/VSE SVCs, and to support VSE/VSAM and DOS/VSE files on FBM devices, the CMSDOS DCSS has been updated to support these SVCs and devices.

**CMS Use Of CP Page Management Interfaces:** CMS now takes advantage of the existing page control interfaces to better communicate the true working set of pages to CP, thus better utilizing the page frame resources of the real machine and improving performance.

**CP Performance Improvements:** The CP changes are:

- The storage management algorithm for returning free storage to the dynamic area has been modified. A check is now made every hour and upon a user logging off to determine if any dynamic area pages obtained for free storage purposes can be returned to the dynamic area.
- The set favored command has been changed to accept a percentage specification of 100. This specification will be handled as a special case by the scheduler where the user will be kept at the top of the run list.
- CMS disk I/O (Diagnose 18) has been modified to take advantage of ECPS:VM/370 for CCW translation. The improvement is available with the existing ECPS:VM/370 assist on the 3135-3, 3138, 3145-3 and 3148 Processors. The improvement is also available with the ECPS:VM/370 assist on the 4341 and 4381 Processors.

**Small CP Option:** Small CP option reduces real memory requirements for CP which makes more pageable storage available to virtual machines and is designed for the entry level system.

**Enhanced Support for the 3270 Information Display System**

**APL Text Feature:** The 3270 APL-TEXT feature provides the 3270 user with access to the full APL, TEXT and EBCDIC character sets. This makes it possible for the user to interact with the VS APL program product as well as text processing applications which run under CMS. This support extends the APL-TEXT function to users with 3274 Controllers/3278 Display Stations.

**Intensified Display:** VM/370 will take advantage of the intensified display feature of the 3270 Information Display System as follows:

- 1) The "Current Line" of the CMS Editor will be intensified.
- 2) All CMS Edit messages will be intensified.
- 3) An application program may supply a 3270 Start Field order and an attribute byte in a DIAGNOSE 58, CCW Code 19 (Virtual Console Interface) data stream. This provides an application program with the ability to define a field as normal intensity, intensified or nondisplay.
- 4) Messages from the system operator or other user will be intensified.
- 5) The redisplay of user input will be intensified so that it may be distinguished from output. The SET command will activate or deactivate intensification of input redisplay.

**Support For The 3289 Printer Model 4:** The 3289 mdl 4 is a 400 line-per-minute printer and functionally compatible with the 3203 Printer mdl 4 (except in the area of UCS buffer load).

**Support For The 8809 Tape:** The 8809 is a two-speed tape drive (12.5 ips and 100 ips). It will be supported at 12.5 ips in VM/370. The standalone dump-restore utility (DDR) supports the device at 100 ips to provide high-speed backup capability when executing on a standalone processor and 3310/3370 DASD.

**Support For The 3310/3370 Direct Access Devices:** The 3310/3370 are direct access devices that use Fixed Block Mode. The Direct Access Storage Compatibility feature #7901 of the IBM 4331 Processor for emulation of 2314, 3330 and 3340 format data on the 3310 or the 3370 is supported. VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system other than VM/370 or CMS.

**CUSTOMER RESPONSIBILITIES**

In addition to the responsibilities in the VM/370 SCP pages under the heading "Customer Responsibilities", the customer is responsible for ordering and installing the latest level of VM/370.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

VM/Basic System Extensions Program Product is designed to run on IBM S/370 Processors 135, 135-3, 138, 148, 155II, 158-3, 158AP, 158MP, 165II, 168, 168-3, 168AP and 168MP and on the IBM 3031, 3031AP, 3032, 3033, 3033AP, 3033MP and 4331, 4341 and 4381 Processors. On MP mdls, it runs in uniprocessor mode and in MP mode with I/O attached to only one side. VM/Basic System Extensions is recommended for DOS/VS, DOS/VSE, MVS, VS1 or CMS users who run under VM/370 for testing, conversion or production.

VM/Basic System Extensions requires a minimum user available main storage of 384K, which will support a mixed-mode environment.

VM/Basic System Extensions supports a cardless environment. By using the facility to spool accounting records and altering the system generation procedures to use tape devices, the requirement for a card reader/punch can be eliminated. Specific details are contained in the TNL update to the *VM/370 Planning and System Generation Guide* (TNL order number SN25-0499). Specific details relevant to the minimum configuration required for hardware maintenance should be directed to the Field Engineering Division.

**ECPS:VM/370 Support:** VM/370 Basic System Extensions Release 2 is compatible with ECPS:VM/370 Level 19 on the 4331, 4341 and 4381 Processors. This support will be included in the initial shipment of the 4321, 4331, 4341 and 4381 Processors.

VM/370 Basic System Extensions Release 2 is also compatible with ECPS:VM/370 Level 18 on the 3135-3, 3138, 3145-3 and 3148 Processors. On these processors, the Level 18 support is the same as the support needed for Release 5 of VM/370. The appropriate ECPS:VM/370 support is provided by the following ECs:

- EC #149136 and later for the mdl 3135-3.
- EC #149136 and later for the mdl 3138.
- EC #356901 and later for the mdl 3145-3.
- EC #147710 and later for the mdl 3148.

VM/370 Basic System Extensions Release 2 will execute on these S/370 processors at other earlier EC levels, but the hardware assist will not be used.

**SOFTWARE REQUIREMENTS**

VM/Basic System Extensions Release 1 requires VM/370 Release 5 as a base. VM/Basic System Extensions Release 2 requires VM/370 Release 6 as a base.

RPQs ACCEPTED: No

PROGRAM PRODUCTS

**5748-XX9 - DOCUMENT COMPOSITION FACILITY R2**

**PURPOSE**

Document Composition Facility is a text processing application that promotes the use of computers in the preparation of printed materials. The Document Composition Facility consists of two parts: A formatter and general purpose document processor called SCRIPT/VS, and an optional feature called the Foreground Environment Feature. This optional feature enables the base program, SCRIPT/VS, to be used with the OS/VS2 (MVS) Time Sharing Option (TSO), the Advanced Text Management System-III Release 1.0 under CICS/VS, and the VM/370 Conversational Monitor System (CMS). The use of SCRIPT/VS in a batch environment requires the Document Library Facility program.

**DESCRIPTION**

SCRIPT/VS is a text processing program that provides for markup, full-page makeup, printing of text documents and a number of other document processing functions. It runs in several computer system environments:

- VM/370 CMS (Conversational Monitor System).
- ATMS-III Release 1.0 in CICS/VS.
- OS/VS2 (MVS) TSO (Time Sharing Option).  
(TSO, ATMS-III and CMS operation require the Foreground Environment feature.)
- The batch environments of OS/VS1, OS/VS2 (MVS), and DOS/VS. (Requires the Document Library Facility program product 5748-XXE.) This environment can accept documents that have been communicated to the host system from standalone word-processing systems such as the Office System 6.

The text can be entered on terminals or displays using the editing facilities available for CMS, TSO, VSPC, ATMS-II, ATMS-III, ICCF or CICS systems. SCRIPT/VS can then be either run directly in the foreground environment of TSO or ATMS III or under CMS (with the Foreground Environment feature installed), or the text document can be submitted with JCL to invoke SCRIPT/VS in the batch environment of OS/VS2 (MVS), OS/VS1 or DOS/VS. In this case the Document Library Facility program product must be installed.

SCRIPT/VS formats text for printing on system printers such as the 3800 Printing Subsystem and on typewriter and display terminals with the Foreground Environment feature installed. With the 3800, SCRIPT/VS can format text in multiple character styles and sizes (called fonts). Thus, SCRIPT/VS provides flexible composition for printing on a computer printer as an alternative to using independent composition machines or sending composition jobs to an outside vendor.

SCRIPT/VS can also be used as a preprocessor to prepare documents for processing by other programs, such as formatters that support photocomposers.

**SPECIAL SALES INFORMATION**

The application area for these products is generally referred to as 'in-house publishing'. The type of users will range from end-users such as secretaries and problem solvers, to skilled DP users, to publications professionals. Many of these users currently handwrite their documents for secretarial typing.

For purposes of looking at how these different users may use the products, the application area of in-house publishing is described below in three segments which we have called: Application development documentation, office publishing and formal in-house publishing. The potential customer set in these three areas may overlap, but characteristics of each segment vary enough to warrant different approaches to marketing the Document Composition Facility and Document Library Facility program products.

**Application Development Documentation:** This segment represents the potential users of these products who are currently users of DP systems for either program development or problem solving purposes. Although they are using online terminals to interact with the processor for their current tasks, they often utilize offline secretarial typing services to document their programs or work. This documentation can now be produced effectively on the same system used for their online development work.

Potential customers include:

- Current users of SCRIPT/370 IUP (5796-PAF) or SCRIPT/370 Version 3 IUP (5796-PHL) in CMS, for whom SCRIPT/VS contains numerous enhancements.
- CMS users, especially the users of the Display Editing System for CMS IUP (5796-PJP), who will find additional benefit for text entry/edit by using full-screen 3270 support. The formatted text can be displayed back on the screen in either full screen or split screen mode.
- TSO users, especially those with the SPF (5740-XT2) or SPF-II (5740-XT8) full-screen editor program products, which ease the job of entering and editing the text document, and allow split

screen viewing of the formatted result along with the document source.

- VSPC users employing the VSPC editor facilities and the CICS users with the CICS Source Program Maintenance Online II FDP (5798-CFT) or ETSS/II FDP (5798-CLR) editor installed. They can enter and edit the document and then submit it with JCL to the Document Library Facility and SCRIPT/VS as a batch job. The formatted output can be directed back to the terminal for viewing.

In summary, the above mentioned interactive systems currently have editing facilities (some especially enhanced for text) making the users of these systems prime candidates to add document processing, complementing the other functions they are already performing on the terminal-based systems.

**Office Publishing:** There are a large number of potential users in office publishing who are generating pages for which SCRIPT/VS could be used. To identify these users is a little more time consuming than the application development documentation segment, because they may not be currently using their installation's DP equipment. Users of the ATMS-III (5740-XYL, 5746-XXU) program products can produce edited documents with ATMS and then invoke SCRIPT/VS directly, or submit the document to batch for formatting by SCRIPT/VS under the control of the Document Library Facility.

The current ATMS-II (5740-XXV, 5746-XXG) user may install SCRIPT/VS with the Document Library Facility in batch and send documents created on ATMS-II with its GML markup to SCRIPT/VS to benefit from the additional formatting functions and 3800 usage.

The other potential customers in this segment for these products are the users of word processing systems which can attach to the S/370 host computer.

One segment of potential users of these products are the 3730 Distributed Office Communication System customers. The 3730 System with Host Communication Support feature (#9285) provides support for a host-attached system that allows the 3730 System or 3730-3790 System to communicate with a user-written application program running in the host system. This application program can then invoke the Document Library Facility to store the document, and/or invoke the Document Composition Facility formatter to process the document. In this latter case, a document containing native Document Composition Facility controls will require some preprocessing by the user-written application. Documents containing other formatting controls (e.g., 3730 native controls) may require significant user-written conversion preprocessing. (See the 3730 System Description Manual (GA33-3032) for an overview of the 3730 text controls.)

In addition, the Office System 6 or a Communicating Mag Card Selectric® typewriter can be used for standalone entry and edit of a document containing GML, and that document can then be submitted to the host (the IBM Office System 6 via RJE support and the CMCSST via direct 2741 attachment.)

**Formal In-House Publishing:** The 3800 Printing Subsystem installed and on-order base can be used to identify SCRIPT/VS candidates for this segment. Text processing with SCRIPT/VS further enhances the capabilities of the 3800. The 3800 can print multiple character styles, has some proportional spacing capabilities, prints at high speed, and with quality and appearance quite acceptable for many documents; every copy is an original. With the marketing support focus on benefits of using the 3800 as an output device, sell these customers on installing SCRIPT/VS. Usage of the 3800 is governed by the system control programming (SCP) present in the environment.

In addition, alternate interpretation of GML allows SCRIPT/VS to act as a preprocessor to another formatting program's controls. This allows SCRIPT/VS to be marketed to existing users of composition programs that drive photocomposers. These users can continue to utilize their composition programs for final copies, and yet use SCRIPT/VS for proofs and realize the benefits of GML for their document markup.

**Application Benefits:** For all of the applications in the preceding segments, the use of SCRIPT/VS has several advantages. These advantages are particularly evident in the following instances:

- When SCRIPT/VS is used with interactive text editors or word processing systems, manuscript preparation can be easier and quicker than it is with other methods, because these systems provide text entry, editing, and storage facilities. Revisions require minimal rework. Only affected portions of the source document have to be updated. SCRIPT/VS produces the new version with no need for additional layout work, retyping, page numbering, or proofreading.
- Once the text is in machine readable form, it is available for other applications. It can be duplicated, rearranged, and selected to produce a variety of reports and other output documents.
- Copies of the work can be made quickly at each stage of the process:
  - Review copies for the preparation of the manuscript.
  - Proof copies for evaluating the layout.

## Document Composition Facility R2 (cont'd)

- Camera-ready copy for plate making (or multiple final copies, as printed by the computer).

The text originally entered in the computer with markup serves as the source for SCRIPT/VS preparation of printed output at every step of the process.

- When final copies as printed by the computer are used (for example, with the 3800 Printing Subsystem), copies can be printed in the precise quantities needed. In this case, the original quality is retained for each copy. Additional copies can be printed as needed, rather than stocked.
- SCRIPT/VS GML is helpful in publishing where consistency of publishing style is important. Besides standardization of style, these other GML benefits apply:
  - The ease and speed of marking up with GML.
  - The ready use of alternative sets of processing functions for producing copies for different purposes. For example, early review copies might be printed on an impact printer (or sometimes typed or displayed on a computer terminal), and proof copies and final copies might be printed on the 3800 Printing Subsystem, for use of different character styles and sizes.
- SCRIPT/VS itself can rearrange and select sections of a document for alternative outputs, when the document is marked up for conditional processing of the affected sections.
- Data from various documents can be included in one output document.

The various documents to be processed can be stored in the library of the system being used. They could also be stored using the Document Library Facility which provides document storage control and easy access by authorized users to the stored data.

### HIGHLIGHTS OF DOCUMENT COMPOSITION FACILITY

The formatting functions provided by SCRIPT/VS include:

**Page Layout:** The user may specify page dimensions and layout through the use of the following functions:

- **Line Formatting:** The user may control how input lines are processed for output.
- **Vertical Spacing:** The user may control the amount of space left between output lines, including the reservation of space on the page.
- **Paragraphing:** The user may control the style of paragraphing (spacing between paragraphs and indentation).
- **Fonts:** When using the 3800 Printing Subsystem, the user may control which font is used for different portions of text, both in the body and in running headings and footings. Sixteen upper and lower case fonts including bold, italic and overstrike characters in different pitches are included with SCRIPT/VS on an "as is" basis.
- **Columns:** The user may specify, from 1 to 9, the number of columns as well as the size of each column and its placement on a page.
- **Margins:** The user may control the size of the top, bottom, left, and right margins. Title lines can be defined that will be put into the top and/or bottom margins.
- **Indentation:** The user may control indentation; for example, hanging indents, left or right margin indentation, and indent one line only. The indent left and right functions can be specified to take effect after a given vertical distance and remain in effect for a given vertical distance.
- **Headings and Footings:** The user may specify running headings and footings with or without page numbers and separate treatment for odd and even pages. Running headings and footings can be suppressed.

**Head Levels:** The user may specify up to seven head levels for distinctive formatting of headings for different levels of topics.

**Table of Contents:** The user may control optional generation of a table of contents and where it will be placed.

**Back of the Book Index:** Indexes can be automatically generated from index entries specified within the text at points of reference. Page numbers for these index entries are automatically generated.

**Highlighting Phrases:** The user may control how phrases are to be highlighted for emphasis.

**Footnotes:** SCRIPT/VS will save text which the user may designate as a footnote and will place it at the bottom of the page.

**Hyphenation:** The user may optionally cause words to be hyphenated at the end of output lines. SCRIPT/VS provides a dictionary of more than 10,000 American English words. Dictionary and stem processing support has been added for Dutch, French, German, Italian, Spanish, UK English, Canadian English, and Canadian French languages. Words

may be added to a supplementary dictionary for possible hyphenation in a particular document. In addition, users can now build their own dictionaries which can be catenated together with the base dictionary in user defined order.

**Algorithmic Hyphenation:** A user provided algorithmic hyphenation routine can be invoked if a word cannot be hyphenated using the base dictionary. An algorithmic hyphenation for American English words is provided with the product.

**Printing of Portions of the Output Document:** The user may control selective printing of formatted text.

**Tab Handling:** The user may specify the values of tabs. When formatting output lines, SCRIPT/VS tabs to the right to the prescribed tab stop. Up to 99 tab positions can be specified.

**Box Drawing:** Boxes can be constructed around text (which can still be formatted in the usual ways). The user may also draw boxes within boxes and vertical lines to separate columns of text within a box and horizontal lines to separate rows.

**Keeping Text Together:** SCRIPT/VS processing includes a way of keeping related pieces of text together to improve the appearance of output. The ability exists to specify floated text that may appear at the top or bottom of the specified page or column.

**Use As A Subroutine:** In a batch environment, with the Library installed with SCRIPT/VS, an application programmer may code programs to call SCRIPT/VS as a subroutine (for example, to format reports).

**Production of STAIRS/VS Input:** SCRIPT/VS can now produce formatted output suitable for input to the STAIRS/VS program products (OS-5740-XR1 and DOS-5746-XR4). It can then be indexed and retrieved with STAIRS inquiries. (Alternatively, this formatted output can be produced for proofing in a printed form).

**Widow Control General Overstriking of Text:** A string can be overstruck with a specified character or with itself.

Output lines can be numbered relative to the start of a page.

**Character Translation:** A single input character can be translated to a string.

**Hexadecimal Character Processing:** A hexadecimal character attribute allows the user to specify non-keyable hexadecimal characters for input to the formatter.

The user can stop the formatter and keep it from typing output until the user signals with the Attention key. (This is functionally similar to a mag card stop code capability.)

The general document handling functions of SCRIPT/VS include

**Saving Input Lines for Subsequent Processing:** The user may control whether certain input lines will be written to a data set or file.

**Revision Codes:** The user may control the placement of up to nine distinct revision codes in the left margin to indicate lines revised since a previous version of the document. (Revision codes may be used to flag lines for any reason.) The space available for the revision code can be controlled.

**Spelling Verification:** The user may control whether or not words are checked for spelling. SCRIPT/VS uses the same dictionary as for hyphenation. The additional words that can be specified for a particular document for hyphenation can also be used for spelling verification.

**Imbedding of Separate Documents:** The user may control how separate source documents are brought together for processing as a single document. Any number of source documents can be imbedded in the base source document.

**Symbol and Macro Instruction Processing:** The user may define symbols and macro instructions for substitution during processing. Symbols have many uses. For example, in tests for conditional processing, for cross-references to pages or figure numbers, for entering characters unavailable on the entry keyboard, and as abbreviations for lengthy, repetitive phrases.

**Conditional Processing:** The user may imbed controls within the document which will cause SCRIPT/VS to alter processing depending on the setting of the conditional parameters.

**Destination of Output:** The output document can be: (1) Stored as a file for possible later editing, printing, or as input to another program (for example, a formatter that supports a photocomposer) or; (2) printed on the device specified, which includes both impact and nonimpact system printers and with the Foreground Environment feature, display and typewriter terminals.

**Tracing of Processing Actions:** SCRIPT/VS formatter control words and each step of symbol and macro substitution in input lines can be traced.

## Document Composition Facility R2 (cont'd)

### GENERALIZED MARKUP LANGUAGE

To mark up a source document is to add information to it that enables a person or system to process it in some way. Facilities are provided to allow markup of the document with Generalized Markup Language (GML) and interpretation of that markup by SCRIPT/VS.

Document markup is the primary means of instructing computerized text processing systems, such as SCRIPT/VS, how a document is to be processed. A document can be marked up in two ways: With specific markup, which limits text processing to a particular application, or with generalized markup, which describes the structure and content of a source document, without respect to particular processing. The language used for generalized markup (GML) is descriptive; it provides the syntax and usage rules for developing the user's own vocabulary of tags for describing the parts of a document.

A starter set of GML tags is distributed with the Document Composition Facility program product on an "as is" basis to act as a sample and aid users in defining their own sets of GML tags for their installation's documents.

There are benefits of generalized markup when the only application will be text processing with SCRIPT/VS, and others when additional applications are anticipated.

#### Benefits of GML

**Alternative GML Interpretation:** A GML tag need not be limited to a single SCRIPT/VS interpretation. Each application could be satisfied by alternative GML interpretations, with no change to the source document or to the markup. The user controls the way GML is interpreted.

**Ease of Document Markup:** GML tags are easy to remember because they can consist of terms and abbreviations commonly used to describe a document. GML generally requires fewer characters than a corresponding complex sequence of control words. The result is faster markup and keying of the document.

**Ease of Text Update:** It's easy to update text marked up with GML. With GML, such things as the numbering of items in an ordered list is usually left to the formatter, which numbers the items automatically. Thus, when an item is inserted or deleted resequencing is automatic.

**Uniformity of Formatting Style:** Use of GML for all documents of a particular kind results in a single format for all those documents -- without the people who do markup even having to think about format. Similarly, a change in format for all the documents could be accomplished simply by changing the way GML is interpreted -- without anyone having to be retrained to do markup in a different way.

**Alternative Text Processing Programs:** SCRIPT/VS could be used to interpret generalized markup into the processing controls of text processing programs other than SCRIPT/VS. For example, they might be interpreted into the controls of another composition program which can produce output on a photocomposer.

**Document Exchange:** Documents with generalized markup can be processed by different groups or locations more easily than documents with the specific markup of a particular text processing program, because everyone might not use the same formatting style or output devices.

**Data-base Applications:** GML describes the contents of documents, so that programs can identify information in them. Programs could be written alone, or in conjunction with SCRIPT/VS processing, to extract information from documents for data base construction or to retrieve information for data base sharing.

**Unique Customer Applications:** Precisely because GML is general, it leaves the door open for numerous applications unique for a particular customer. GML designed for this purpose could, for instance, be used both for formatting printed output and for information retrieval.

#### HIGHLIGHTS of FOREGROUND ENVIRONMENT FEATURE

**Terminal Support:** After editing the document, the user may immediately invoke SCRIPT/VS and direct the output for immediate display at the terminal or to a file for later printing or editing.

**Direct Interaction During Processing:** In an interactive environment (CMS or TSO), the user may affect SCRIPT/VS as it processes by entering text and/or markup at a terminal. In effect, the terminal can be treated as an input file.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

**Processors:** In the interactive environments, Document Composition Facility with the Foreground Environment Feature installed operates under any IBM processor on which CMS, ATMS-III or TSO is installed.

In the batch environments with the Document Library Facility installed, the Document Composition Facility operates on all IBM S/370 mds 125 and above, 4300 Processors, and 3031 and above Processors. Floating point hardware is required.

**Terminals:** In foreground environments, SCRIPT/VS can accept input from or format output for the IBM 2741 and 3270 terminals, or terminals which are functionally equivalent at the data stream level that can be used with CMS, ATMS-III or TSO. The customer is responsible for establishing equivalency.

**Printers:** SCRIPT/VS output can be printed on the IBM 3800 Printing Subsystem with the multiple font capabilities.

Output can also be printed on the IBM 1403 Printer, 3211 Printer, 3203 Printer or any printer functionally equivalent at the data stream level to the above. The customer is responsible for establishing equivalency.

**Storage Devices:** The Document Composition Facility device support is provided by the environment in which it is operating.

#### Storage Estimates Guidelines

**Real Storage:** The Document Composition Facility uses the paging facilities of the operating system to run in less real storage than the amount of virtual storage required. The factors determining how much real storage they require are numerous and dependent on the installation. Therefore, no precise statement of real storage requirements can be made. The system programmer responsible for installing the programs will determine the amount of real storage to be used.

All storage estimates shown are in addition to those required for the system control programming and the particular online system.

**Virtual Storage:** Document Composition Facility requires approximately 220K bytes of virtual storage for the load modules. Since the code is reentrant, all users can share the same copy and therefore additional users do not require additional load module storage space.

Document Composition Facility also requires working storage to format documents. The actual size of working storage required depends on the complexity of the document to be formatted, but at least 60K bytes should be available.

**Direct Access Storage:** The approximate amount of direct access storage for the Document Composition Facility is shown below.

	CMS (Blocks)	Other* (Tracks)
Load Module Size	300	28
GML Macro Library	182	22
GML Profile	14	2
Hyphenation and Spelling Verification Libraries	780	72

\* Estimates are based on a 3330-1.

#### SOFTWARE REQUIREMENTS

Document Composition Facility can be installed in:

- VM/370 CMS (Conversational Monitor System) Release 5.
- OS/VS2 (MVS) TSO (Time Sharing Option) with OS/VS2 (MVS) Release 3.8.
- ATMS-III Release 1.0 on CICS/VS Version 1 Release 4.

To run in these interactive environments, the Foreground Environment feature of Document Composition Facility is required.

The SCRIPT/VS Formatter of the Document Composition Facility can be installed with the Document Library Facility program product to allow batch formatting in the following virtual storage operating systems:

- OS/VS1 Release 7
- OS/VS2 (MVS) Release 3.8
- DOS/VSE

**Note:** This program is designed to work in the specified release levels and any subsequent releases and modifications unless otherwise stated. The 3800 Printing Subsystem requires the DOS/VSE 3800 Printing Subsystem Independent Release (5747-CC1) for operation with DOS/VSE.

Source code language is Assembler and is distributed as optional material. The DOS/VS user will require the OS/VS Assembler XF to assemble the optional material.

VSAM and Access Method Services are required when operating with the Document Library Facility.

#### DOCUMENT COMPATIBILITY and CONVERSION

Processing SCRIPT/370 Documents With SCRIPT/VS: Documents marked up for Installed User Program SCRIPT/370, Version 3 (5796-PHL), can be processed by the SCRIPT/VS formatter with little or no change to the source or in the output produced. If differences do occur, equivalent functions or results will usually be achieved by the use of user-written SCRIPT/VS macro processing functions. The long

## PROGRAM PRODUCTS

**Document Composition Facility R2 (cont'd)**

form of SCRIPT/370 control words are not supported by SCRIPT/VS. EASYSCRIPT "tags" will be processed.

**Processing ATMS Documents With SCRIPT/VS:** Document Composition Facility contains a routine for converting documents in the Advanced Text Management System-II (ATMS-II) (5740-XXV or 5746-XXG), or ATMS-III Release 1.0 (5740-XYL, 5746-XXU) format for processing by SCRIPT/VS. The interface to this routine will be in the \*Document Library Facility, which must be installed with SCRIPT/VS in a background environment for the routine to operate. The routine will convert most ATMS GML and control words into SCRIPT/VS GML, symbols and macros. The ATMS conversion macros are distributed on an "as is" basis.

**Processing Release 1 Documents:** The FILE option of the Document Composition Facility Release 2 SCRIPT command is now mutually exclusive with the PRINT and TERM keywords (where the DEV option should be used). The .UD control word will cause only blanks not to be underscored.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Document Composition Facility and Document Library Facility General Information Manual (GH20-9158) ... Program Summary (GH20-9169) ... User's Guide (SH20-9161) ... Generalized Markup Language (GML) User's Guide (SH20-9160) ... User's Quick Reference (SX26-3723) ... Generalized Markup Language (GML) Quick Reference (SX26-3719) ... Executive Overview and Product Summary (GX20-2332).*

**Reference Material**

*Program Summary (GH20-9170) ... Guide (SH20-9165) ... Introducing the IBM 3800 Printing Subsystem and Its Programming (GC26-3829) ... IBM 3800 Printing Subsystem Programmer's Guide (GC26-3846).*

**MVS SYSTEM INTEGRITY**

IBM will accept APARs describing any situation where the installation of this program product causes an exposure to the system integrity of MVS.

PROGRAM PRODUCTS

**5748-XX9 - DOCUMENT COMPOSITION FACILITY R3**

**PURPOSE**

Document Composition Facility is a text processing application that promotes the use of computers in the preparation of printed materials. The Document Composition Facility consists of two parts; a formatter and general purpose document processor called SCRIPT/VS, and an optional feature called the Foreground Environment feature. This optional feature enables the base program, SCRIPT/VS, to be used with the OS/VS2 (MVS) Time Sharing Option (TSO), the Advanced Text Management System-III Release 2.0 under CICS/VS, and the VM/370 Conversational Monitor System (CMS). The use of SCRIPT/VS in a batch environment requires the Document Library Facility program.

**DESCRIPTION**

SCRIPT/VS is a text processing program that provides for markup, full-page makeup, printing of text documents and a number of other document processing functions. It runs in several computer system environments:

- VM/370 CMS (Conversational Monitor System).
- ATMS-III Release 2.0 in CICS/VS.
- OS/VS2 (MVS) TSO (Time Sharing Option).  
(TSO, ATMS-III and CMS operation require the Foreground Environment feature.)
- The batch environments of OS/VS2 (MVS) and DOS/VSE. (Requires the Document Library Facility program product 5748-XXE.) This environment can accept documents that have been communicated to the host system from stand-alone word-processing systems such as the 6580 Displaywriter.

The text can be entered on terminals or displays using the editing facilities available for CMS, TSO, VSPC, ATMS-II, ATMS-III, ICCF or CICS systems. SCRIPT/VS can then be either run directly in the foreground environment of TSO or ATMS III or under CMS (with the Foreground Environment feature installed), or the text document can be submitted with JCL to invoke SCRIPT/VS in the batch environment of OS/VS2 (MVS) or DOS/VSE. In this case the Document Library Facility program product must be installed.

SCRIPT/VS can format documents for the 4250 Printer. The full range of typographic fonts for the 4250 can be used to produce fully composed, camera-ready pages. Raster images (e.g., as produced by GDDM Release 3) can be included. Thus, SCRIPT/VS provides flexible composition for printing on a computer printer as an alternative to using independent composition machines or sending composition jobs to an outside vendor.

SCRIPT/VS formats text for printing on system printers such as the 3800 Printing Subsystem and on typewriter and display terminals with the Foreground Environment feature installed. With the 3800, SCRIPT/VS can format text in multiple character styles and sizes (called fonts).

SCRIPT/VS can also be used as a preprocessor to prepare documents for processing by other programs, such as formatters that support photocomposers.

**SPECIAL SALES INFORMATION**

The application area for these products is generally referred to as 'in-house publishing'. The type of users will range from end-users such as secretaries and problem solvers, to skilled DP users, to publications professionals. Many of these users currently handwrite their documents for secretarial typing. For purposes of looking at how these different users may use the products, the application area of in-house publishing is described below in three segments which we have called: Application development documentation, office publishing and formal in-house publishing. The potential customer set in these three areas may overlap, but characteristics of each segment vary enough to warrant different approaches to marketing the Document Composition Facility and Document Library Facility program products.

**Application Development Documentation:** This segment represents the potential users of these products who are currently users of DP systems for either program development or problem solving purposes. Although they are using online terminals to interact with the processor for their current tasks, they often utilize offline secretarial typing services to document their programs or work. This documentation can now be produced effectively on the same system used for their online development work.

Potential customers include:

- Current users of SCRIPT/370 IUP (5796-PAF) or SCRIPT/370 Version 3 IUP (5796-PHL) in CMS, for whom SCRIPT/VS contains numerous enhancements.
- CMS users, especially the users of the XEDIT or ISPF editors, who will find additional benefit for text entry/edit by using full-screen 3270 support. The formatted text can be displayed back on the screen in either full-screen or split-screen mode.

- TSO users, especially those with the ISPF full-screen editor program product, which eases the job of entering and editing the text document, and allows split-screen viewing of the formatted result along with the document source.
- VSE users employing the ICCF editor facilities. They can enter and edit the document and then submit it with JCL to the Document Library Facility and SCRIPT/VS as a batch job. The formatted output can be directed back to the terminal for viewing.

In summary, the above mentioned interactive systems currently have editing facilities (some especially enhanced for text) making the users of these systems prime candidates to add document processing, complementing the other functions they are already performing on the terminal-based systems.

**Office Publishing:** There are a large number of potential users in office publishing who are generating pages for which SCRIPT/VS could be used. To identify these users is a little more time consuming than the application development documentation segment, because they may not be currently using their installation's DP equipment. Users of the ATMS-III (5740-XYL, 5746-XXU) program products can produce edited documents with ATMS and then invoke SCRIPT/VS directly, or submit the document to batch for formatting by SCRIPT/VS under the control of the Document Library Facility.

The current ATMS-II (5740-XXV, 5746-XXG) user may install SCRIPT/VS with the Document Library Facility in batch and send documents created on ATMS-II with its GML markup to SCRIPT/VS to benefit from the additional formatting functions and 3800 usage.

The other potential customers in this segment for these products are the users of word processing systems which can attach to the S/370 host computer.

One segment of potential users of these products are the 3730 Distributed Office Communication System customers. The 3730 System with Host Communication Support feature (#9285) provides support for a host-attached system that allows the 3730 System or 3730-3790 System to communicate with a user-written application program running in the host system. This application program can then invoke the Document Library Facility to store the document, and/or invoke the Document Composition Facility formatter to process the document. In this latter case, a document containing native Document Composition Facility controls will require some preprocessing by the user-written application. Documents containing other formatting controls (e.g., 3730 native controls) may require significant user-written conversion preprocessing. (See the 3730 System Description Manual, GA33-3032 for an overview of the 3730 text controls.)

In addition, the 6580 Displaywriter, Office System 6 or a Communicating Mag Card Selectric® typewriter can be used for stand-alone entry and edit of a document containing GML, and that document can then be submitted to the host (the 6580 Displaywriter via 3270 emulation or via RJE support, the Office System 6 via RJE support and the CMCST via direct 2741 attachment.)

**Formal In-House Publishing:** Any customers using photocomposition equipment, or vending page make-up outside their company, are candidates for this segment. Use of SCRIPT/VS with the 4250 Printer will, in many cases, provide a cost effective alternative to in-house or vended photo composition. The ability to electronically merge graphic data in raster image form (e.g., produced by GDDM Release 3) will allow the user to avoid the traditional and costly cut-and-paste step.

In addition, the higher quality (240 pel) resolution of the 3800 Printing Subsystem mdl 3 (in compatibility mode) can be used for text-only page composition. The new fonts on the 3800 allow it to be used more effectively, either alone or with the 6670 Information Distributor, for high volume proofing of pages which might ultimately be printed on the 4250.

**Application Benefits:** For all of the applications in the preceding segments, the use of SCRIPT/VS has several advantages. These advantages are particularly evident in the following instances:

- When SCRIPT/VS is used with interactive text editors or word processing systems, manuscript preparation can be easier and quicker than it is with other methods, because these systems provide text entry, editing, and storage facilities. Revisions require minimal rework. Only affected portions of the source document have to be updated. SCRIPT/VS produces the new version with no need for additional layout work, retyping, page numbering, or proofreading.
- Once the text is in machine-readable form, it is available for other applications. It can be duplicated, rearranged, and selected to produce a variety of reports and other output documents.
- Copies of the work can be made quickly at each stage of the process:
  - Review copies for the preparation of the manuscript.
  - Proof copies for evaluating the layout.

PROGRAM PRODUCTS

Document Composition Facility R3 (cont'd)

- Camera-ready copy for plate making (or multiple final copies, as printed by the computer).

The text originally entered in the computer with markup serves as the source for SCRIPT/VS preparation of printed output at every step of the process.

Camera-ready masters can be conveniently produced (e.g., on the 4250) avoiding the more costly and time-consuming photocomposition step, and also avoiding the cut-and-paste step by electronically merging rastered graphics.

- When final copies as printed by the computer are used (for example, with the 3800 Printing Subsystem or 6670 Information Distributor), copies can be printed in the precise quantities needed. In this case, the original quality is retained for each copy. Additional copies can be printed as needed, rather than stocked.
- SCRIPT/VS GML is helpful in publishing where consistency of publishing style is important. Besides standardization of style, these other GML benefits apply:
  - The ease and speed of marking up with GML.
  - The ready use of alternative sets of processing functions for producing copies for different purposes. For example, early review copies might be printed on an impact printer (or sometimes typed or displayed on a computer terminal), and proof copies and final copies might be printed on the 3800 Printing Subsystem, for use of different character styles and sizes.
- SCRIPT/VS itself can rearrange and select sections of a document for alternative outputs, when the document is marked up for conditional processing of the affected sections.
- Data from various documents can be included in one output document.

The various documents to be processed can be stored in the library of the system being used. They could also be stored using the Document Library Facility which provides document storage control and easy access by authorized users to the stored data.

HIGHLIGHTS OF DOCUMENT COMPOSITION FACILITY

The formatting functions provided by SCRIPT/VS include:

**Device Support for the 4250:** New functions in the SCRIPT/VS formatter allow page layout and composition functions to take advantage of the all-points-addressable, multiple fonts, and raster image-merge functions of the 4250 Printer.

**Page Layout:** The user may specify page dimensions and layout through the use of the following functions:

- **Line Formatting:** The user may control how input lines are processed for output.
- **Vertical Spacing:** The user may control the amount of space left between output lines, including the reservation of space on the page.
- **Intercharacter Space Control:** On the 4250, the user can specify the amount of additional space to be placed between characters.
- **Word Space and Line Space Control:** The user can control the amount of space to be inserted between words and lines. The ranges for word and interline spacing, used by the Document Composition Facility for horizontal and vertical justification, can be specified by the user.
- **Explicit Inline White Space Generation:** Additional white space can be inserted into the formatted line. The white space is treated as a single required blank.
- **Explicit Baseline Positioning:** On the 4250, the baseline can be offset by a positive or negative value, for example, for superscripting, subscripting, or setting of fractions.
- **Paragraphing:** The user may control the style of paragraphing (spacing between paragraphs and indentation).
- **Fonts:** Any of the numerous fully proportional or monospace fonts available with the 4250 Printer can be used when composing a document. Users can specify the font library from which the fonts are to be selected. When using the 3800 Printing Subsystem, the user may control which font is used for different portions of text, both in the body and in running headings and footings.
- **Proportional Spacing:** On the 4250, both horizontal and vertical spacing are fully proportional. Character widths and heights will be measured during composition, and multiples of the device's space units will be used for justifying lines and/or balancing columns of text.
- **Columns:** The user may specify, from 1 to 9, the number of columns as well as the size of each column and its placement on a page.
- **Format Vertical:** Text within columns can be centered, top-aligned, bottom-aligned or justified.

- **Page Segment Inclusion:** On the 4250, when requested by the user, information is placed in the composed output which will allow merging of a rastered graphic image (e.g., created by GDDM Release 3) or other raster image into the document at printing time.
- **Margins:** The user may control the size of the top, bottom, left, and right margins. Title lines can be defined that will be put into the top and/or bottom margins.
- **Indentation:** The user may control indentation; for example, hanging indents, left or right margin indentation, and indent one line only. The indent left and right functions can be specified to take effect after a given vertical distance and remain in effect for a given vertical distance.
- **Headings and Footings:** The user may specify running headings and footings with or without page numbers and separate treatment for odd and even pages. Running headings and footings can be suppressed.

**Head Levels:** The user may specify up to seven head levels for distinctive formatting of headings for different levels of topics.

**Input Line Prefixing:** Individual input lines can be prefixed with control words, macros, or any string, depending upon control characters found at the beginning of the input line.

**Named Areas:** Specified named areas (for inclusion of text or raster segment) can be located anywhere on the page, relative to the page, body or current section. Areas can be added to the top or bottom of an area, they can be replaced, or they can be deleted.

**Table of Contents:** The user may control optional generation of a table of contents and where it will be placed.

**Back of the Book Index:** Indexes can be automatically generated from index entries specified within the text at points of reference. Page numbers for these index entries are automatically generated.

**Highlighting Phrases:** The user may control how phrases are to be highlighted for emphasis.

**Footnotes:** SCRIPT/VS will save text which the user may designate as a footnote and will place it at the bottom of the page.

**Hyphenation:** The user may optionally cause words to be hyphenated at the end of output lines. SCRIPT/VS provides a dictionary of more than 10,000 American English words. Dictionary and stem processing support has been added for Dutch, French, German, Italian, Spanish, UK English, Canadian English, and Canadian French languages. Words may be added to a supplementary dictionary for possible hyphenation in a particular document. In addition, users can now build their own dictionaries which can be catenated together with the base dictionary in user-defined order.

**Algorithmic Hyphenation:** A user-provided algorithmic hyphenation routine can be invoked if a word cannot be hyphenated using the base dictionary. An algorithmic hyphenation for American English words is provided with the product.

**Printing of Portions of the Output Document:** The user may control selective printing of formatted text.

**Tab Handling:** The user may specify the values of tabs. When formatting output lines, SCRIPT/VS text can be centered, right or character-aligned, as well as left-aligned, at specified tab positions within a line. Up to 99 tab positions can be specified.

**Box Drawing:** Boxes can be constructed around text (which can still be formatted in the usual ways). The user may also draw boxes within boxes and vertical lines to separate columns of text within a box and horizontal lines to separate rows.

**Vertical and Horizontal Rules:** Rules (of varying thickness on the 4250) can be defined for use with automatically-generated boxes, or for use as manually-placed horizontal and vertical lines.

**Keeping Text Together:** SCRIPT/VS processing includes a way of keeping related pieces of text together to improve the appearance of output. The ability exists to specify floated text that may appear at the top or bottom of the specified page or column.

**Use As A Subroutine:** In a batch environment, with the Library installed with SCRIPT/VS, an application programmer may code programs to call SCRIPT/VS as a subroutine (for example, to format reports).

**Production of STAIRS/VS Input:** SCRIPT/VS can now produce formatted output suitable for input to the STAIRS/VS program products (OS, 5740-XR1 and DOS, 5746-XR4). It can then be indexed and retrieved with STAIRS inquiries. (Alternatively, this formatted output can be produced for proofing in a printed form.)

**Widow Control General Overstriking of Text:** A string can be overstruck with a specified character or with itself.

Output lines can be numbered relative to the start of a page.

**Character Translation:** A single input character can be translated to a string.

## Document Composition Facility R3 (cont'd)

**Hexadecimal Character Processing:** A hexadecimal character attribute allows the user to specify non-keyable hexadecimal characters for input to the formatter.

The user can stop the formatter and keep it from typing output until the user signals with the Attention key. (This is functionally similar to a mag card stop code capability.)

**The general document handling functions of SCRIPT/VS include:**

**Saving Input Lines for Subsequent Processing:** The user may control whether certain input lines will be written to a data set or file.

**Revision Codes:** The user may control the placement of up to nine distinct revision codes in the left margin to indicate lines revised since a previous version of the document. (Revision codes may be used to flag lines for any reason.) The space available for the revision code can be controlled.

**Spelling Verification:** The user may control whether or not words are checked for spelling. SCRIPT/VS uses the same dictionary as for hyphenation. The additional words that can be specified for a particular document for hyphenation can also be used for spelling verification.

**Imbedding of Separate Documents:** The user may control how separate source documents are brought together for processing as a single document. Any number of source documents can be imbedded in the base source document.

**Symbol and Macro Instruction Processing:** The user may define symbols and macro instructions for substitution during processing. Symbols have many uses. For example, in tests for conditional processing, for cross-references to pages or figure numbers, for entering characters unavailable on the entry keyboard, and as abbreviations for lengthy, repetitive phrases.

**Conditional Processing:** The user may imbed controls within the document which will cause SCRIPT/VS to alter processing depending on the setting of the conditional parameters.

**Destination of Output:** The output document can be: (1) Stored as a file for possible later editing, printing, or as input to another program (for example, a formatter that supports a photocomposer) or; (2) printed on the device specified, which includes both impact and nonimpact system printers and with the Foreground Environment feature, display and typewriter terminals.

**Tracing of Processing Actions:** SCRIPT/VS formatter control words and each step of symbol and macro substitution in input lines can be traced.

### GENERALIZED MARKUP LANGUAGE

To mark up a source document is to add information to it that enables a person or system to process it in some way. Facilities are provided to allow markup of the document with Generalized Markup Language (GML) and interpretation of that markup by SCRIPT/VS.

Document markup is the primary means of instructing computerized text processing systems, such as SCRIPT/VS, how a document is to be processed. A document can be marked up in two ways: With specific markup, which limits text processing to a particular application, or with generalized markup, which describes the structure and content of a source document, without respect to particular processing. The language used for generalized markup (GML) is descriptive; it provides the syntax and usage rules for developing the user's own vocabulary of tags for describing the parts of a document.

A starter set of GML tags is distributed with the Document Composition Facility program product to act as a sample and aid users in defining their own sets of GML tags for their installation's documents. The GML starter set is now included in the program service coverage for the Document Composition Facility Release 3 product. This service applies only to the unmodified starter set. To simplify translation, all literal text strings inserted by the GML starter set into the document, and all messages, are each consolidated into a single macro.

There are benefits of generalized markup when the only application will be text processing with SCRIPT/VS, and others when additional applications are anticipated.

### Benefits of GML

**Alternative GML Interpretation:** A GML tag need not be limited to a single SCRIPT/VS interpretation. Each application could be satisfied by alternative GML interpretations, with no change to the source document or to the markup. The user controls the way GML is interpreted.

**Ease of Document Markup:** GML tags are easy to remember because they can consist of terms and abbreviations commonly used to describe a document. GML generally requires fewer characters than a corresponding complex sequence of control words. The result is faster markup and keying of the document.

**Ease of Text Update:** It's easy to update text marked up with GML. With GML, such things as the numbering of items in an ordered list is usually left to the formatter, which numbers the items automatically. Thus, when an item is inserted or deleted, resequencing is automatic.

**Uniformity of Formatting Style:** Use of GML for all documents of a particular kind results in a single format for all those documents -- without the people who do markup even having to think about format. Similarly, a change in format for all the documents could be accomplished simply by changing the way GML is interpreted -- without anyone having to be retrained to do markup in a different way.

**Alternative Text Processing Programs:** SCRIPT/VS could be used to interpret generalized markup into the processing controls of text processing programs other than SCRIPT/VS. For example, they might be interpreted into the controls of another composition program which can produce output on a photocomposer.

**Document Exchange:** Documents with generalized markup can be processed by different groups or locations more easily than documents with the specific markup of a particular text processing program, because everyone might not use the same formatting style or output devices.

**Data-base Applications:** GML describes the contents of documents, so that programs can identify information in them. Programs could be written alone, or in conjunction with SCRIPT/VS processing, to extract information from documents for data base construction or to retrieve information for data base sharing.

**Unique Customer Applications:** Precisely because GML is general, it leaves the door open for numerous applications unique for a particular customer. GML designed for this purpose could, for instance, be used both for formatting printed output and for information retrieval.

### HIGHLIGHTS of FOREGROUND ENVIRONMENT FEATURE

**Terminal Support:** After editing the document, the user may immediately invoke SCRIPT/VS and direct the output for immediate display at the terminal or to a file for later printing or editing.

**Direct Interaction During Processing:** In an interactive environment (CMS or TSO), the user may affect SCRIPT/VS as it processes by entering text and/or markup at a terminal. In effect, the terminal can be treated as an input file.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

**Processors:** In the interactive environments, the Document Composition Facility formatter (SCRIPT/VS) with the Foreground Environment feature installed operates under any processor which IBM has announced as specifically supporting ATMS-III, VM/CMS SP 1.1 or MVS/TSO SP 1.3.0.

In the batch environments with the Document Library Facility installed, the Document Composition Facility operates on IBM S/370 mdls 138 and above, 4300 Processors, and on the 3031 and above Processors, as specifically supported by OS/VS2 MVS SP 1.3.0 and VSE AF3. Floating-point hardware is required.

**Terminals:** In foreground environments, SCRIPT/VS can accept input from or format output for the IBM 2741 and 3270 terminals, or terminals which are functionally equivalent at the data stream level that can be used with CMS, ATMS-III or TSO. The customer is responsible for establishing equivalency.

**Printers:** SCRIPT/VS can format output for the IBM 4250 Printer taking advantage of its unique functions. SCRIPT/VS output can be printed on the IBM 3800 Printing Subsystem mdl 1 and mdl 3 (in Compatibility Mode under MVS only) with the multiple font capabilities.

Output can also be printed on the IBM 1403 Printer, 3211 Printer, 3203 Printer or any printer functionally equivalent at the data stream level to the above. The customer is responsible for establishing equivalency.

**Storage Devices:** The Document Composition Facility device support is provided by the environment in which it is operating.

#### Storage Estimates Guidelines

**Real Storage:** The Document Composition Facility uses the paging facilities of the operating system to run in less real storage than the amount of virtual storage required. The factors determining how much real storage they require are numerous and dependent on the installation. Therefore, no precise statement of real storage requirements can be made. The system programmer responsible for installing the programs will determine the amount of real storage to be used.

All storage estimates shown are in addition to those required for the system control programming and the particular online system.

**Virtual Storage:** Document Composition Facility requires approximately 245K bytes of virtual storage for the load modules. Each spelling verification dictionary included in the SCRIPT/VS load module increases its size by an additional 65K bytes. Dictionaries that are not included in the SCRIPT/VS load module are dynamically loaded as needed in all environments. Since the code is reentrant, all users can share the same copy and therefore additional users do not require additional load module storage space.

Document Composition Facility also requires working storage to format documents. The actual size of working storage required depends on the

PROGRAM PRODUCTS

**Document Composition Facility R3 (cont'd)**

complexity of the document to be formatted, but at least 100K bytes should be available.

**Direct Access Storage:** The approximate amount of direct access storage for the Document Composition Facility is shown below.

	CMS* (Blocks)	Other** (Tracks)
Load Module Size	450	45
GML Macro Library	400	65
GML Profile	75	20
Hyphenation and Spelling Verification Libraries	2,200	200

\* Based on CMS 800-byte block formatted DASD.

\*\* Estimates are based on a 3330-1.

**SOFTWARE REQUIREMENTS**

Document Composition Facility can be installed in:

- **ATMS** ATMS-III Release 2.0 with CICS/VS Version 1.5 under MVS and VSE.
- **CMS** VM/SP Release 1.1 (VM/High Performance Option, 5664-173 is required for hardware environments that required this extension to VM/SP).
- **TSO** OS/VS2 MVS SP Release 1.3.0.

To run in these interactive environments, the Foreground Environment feature of Document Composition Facility is required.

The SCRIPT/VS Formatter of the Document Composition Facility can be installed with the Document Library Facility program product to allow batch formatting in the following virtual storage operating systems:

- OS/VS2 MVS/SP Release 1.3.0.
- VSE/Advanced Functions Release 3 (5747-CC1) and VSE/VSAM Release 2 (5746-AM2).

**Note:** This program is designed to work in the specified release levels and any subsequent releases and modifications unless otherwise stated. The 3800 Printing Subsystem requires the DOS/VSE 3800 Printing Subsystem Independent Release (5747-CC1) for operation with DOS/VSE.

VSAM and Access Method Services are required when operating with the Document Library Facility.

**DOCUMENT COMPATIBILITY and CONVERSION**

**Processing SCRIPT/370 Documents With SCRIPT/VS:** Documents marked up for Installed User Program SCRIPT/370, Version 3 (5796-PHL), can be processed by the SCRIPT/VS formatter with little or no change to the source or in the output produced. If differences do occur, equivalent functions or results will usually be achieved by the use of user-written SCRIPT/VS macro processing functions. The long form of SCRIPT/370 control words is not supported by SCRIPT/VS. EASYSCRIPT 'tags' will be processed.

**Processing ATMS Documents With SCRIPT/VS:** Document Composition Facility contains a routine for converting documents in the Advanced Text Management System-II (ATMS-II, 5740-XXV or 5746-XXG), or ATMS-III Release 1.0 (5740-XYL, 5746-XXU) format for processing by SCRIPT/VS. The interface to this routine will be in the Document Library Facility, which must be installed with SCRIPT/VS in a background environment for the routine to operate. The routine will convert most ATMS GML and control words into SCRIPT/VS GML, symbols and macros. The ATMS conversion macros are distributed on an 'as is' basis.

**Processing Release 1 Documents:** The FILE option of the Document Composition Facility Release 2 SCRIPT command is now mutually exclusive with the PRINT and TERM keywords (where the DEV option should be used). The .UD control word will cause only blanks not to be underscored.

**Processing Release 2 Documents:** With Release 3 of the Document Composition Facility:

- Existing documents created for processing with Release 2 of SCRIPT/VS will, with few exceptions, produce comparable results when formatted with Release 3.
- The improved vertical distribution algorithm may cause differences in the placement of lines in a column.
- Documents created for processing with Release 1 of SCRIPT/VS may require markup changes when formatted with Release 3.
- The OS/VS1 environment is not supported in Release 3 of the Document Composition Facility.
- The algorithms for horizontal justification have been improved. This may cause differences in the placement of words on a line.

- Several restrictions regarding the use of widow zones with inline keeps and footnotes have been removed. This may cause differences in the placement of lines in a column.
- Changes to the logical device table (LDT) macro have resulted in a reorganization of the logical device table format. This requires users who have defined local logical devices to recode and recompile their logical device definitions.
- Trailing colons in SCRIPT/VS macro definitions should no longer be used when storing the definitions in a macro library. The extra colon will be treated as text.
- The DUMP option of the SCRIPT/VS command and the .ZZ control word are no longer provided.
- The .RD (Read Terminal) control word no longer performs a break or a section break.
- The .RH (Running Heading), .RF (Running Footing), and .FN (Footnote) control words no longer pre-execute any control words or tags when the running headings and footings and footnote leader are defined. Definitions are saved in their entirety and executed completely on each subsequent output page. Running headings and footings can include most valid control words, macros or GML tags. Under certain conditions, user-written macros with running headings and footings may need to be modified to support this enhancement.
- The .HY (Hyphenation) control word has new parameters whose defaults may disqualify hyphenation points that were used in Release 2. The same frequency of hyphenation can, however, be achieved in Release 3 with proper parameter settings.
- Reference numbers, as well as the UNFORMAT and NUMBER options of the SCRIPT command, are ignored on the 4250 Printer.
- The initial (default) values have changed for several existing control words relating to top and bottom margins, heading and footing margins, heading and footing space, and the binding margin.

**DOCUMENTATION**  
(available from Mechanicsburg)

*Document Composition Facility and Document Library Facility General Information Manual (GH20-9158) ... Document Composition Facility: Generalized Markup Language Starter Set User's Guide (SH20-9186) ... Document Composition Facility: Generalized Markup Language Starter Set Reference (SH20-9187) ... Document Composition Facility: Generalized Markup Language Starter Set Implementation Guide (SH35-0050) ... Document Composition Facility: Generalized Markup Language Concepts and Design Guide (SH35-9188) ... Document Composition Facility: Generalized Markup Language Starter Set Quick Reference (SX26-3719) ... Document Composition Facility: SCRIPT/VS Text Programmer's Guide (SH35-0070) ... Document Composition Facility: SCRIPT/VS Language Reference (SH35-0069) ... Document Composition Facility Messages (SH35-0048) ... Document Composition Facility Diagnosis Guide (SH35-0067) ... Document Composition Facility: SCRIPT/VS Text Programmer's Quick Reference (SX26-3723).*

**Reference Material**

*Program Summary (GH20-9170) ... Guide (SH20-9165) ... Introducing the IBM 3800 Printing Subsystem and Its Programming (GC26-3829) ... IBM 3800 Printing Subsystem Programmer's Guide (GC26-3846).*

**MVS SYSTEM INTEGRITY**

IBM will accept APAR's describing any situation where the installation of this program product causes an exposure to the system integrity of MVS.

## PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
DPPX ASSEMBLER  
DPPX/ASM (5760-AS1)****PURPOSE**

DPPX Assembler is a licensed program that translates source programs written in DPPX Assembler language into 8100 Information System machine language and processes macro instructions, both user-written and those that are included with Distributed Processing Programming Executive (DPPX/BASE), Program Number 5760-010, or Distributed Processing Programming Executive/System Product (DPPX/SP), Program Number 5660-281.

**HIGHLIGHTS**

The input to the assembler is a source program that may be created by entering source statements either through the DPPX/BASE or DPPX/SP interactive editor or through a data set creation utility. Coding conventions for the assembler and the macro processor are similar to those of the S/370 DOS/VS assembler.

The output from the assembler is a relocatable load module suitable for link editing by the DPPX/BASE or DPPX/SP linkage editor.

The macro processor included with DPPX/ASM is a multi-pass interpreter that provides for macro definition, macro generation, and conditional assembly. System macros are included as part of the DPPX/BASE and DPPX/SP licensed programs. Approximately fifty system macros are available to support calls to facilities such as I/O services (for example: SEND, RECEIVE and CONNECT) and supervisor services (for example: GETMAIN, FREEMAIN and FETCH).

User-written macros may have as many as 50 symbolic parameters on a macro type. As many as 31 character positions in a macro instruction operand are available.

The assembler employs a multi-pass scanning process. In the first pass of the output of the macro processor, it collects symbol definitions in the symbol table and assigns a location address value to each instruction. The second pass creates the load module output, creates and lists the external symbol dictionary (ESD), and lists reporting options (for example, cross-reference report, relocation dictionary and diagnostic messages).

As many as 255 external symbol definition identification numbers (ESD IDs) are possible. There are 112 machine instructions that provide for arithmetic, comparisons, branches and jumps, shifting, logic (AND, OR, EXCLUSIVE OR, count leading zeros, test and set, etc.), and general control (store, load, control, etc.). Additionally there are 30 floating-point instructions for the 8140 mds A41 through A44.

The user invokes the assembler by using the ASSEMBLE command. Several optional parameters describe the assembler run (for example, creating and naming load modules and producing or suppressing assembler listings).

**CUSTOMER RESPONSIBILITIES**

Obtain formal education in Assembler language programming, if needed ... ensure understanding of the basic documentation for the DPPX/BASE or DPPX/SP and DPPX/ASM licensed programs ... ensure understanding of the DPPX licensed program installation process and install the DPPX Assembler licensed program ... provide sufficient storage and system capability to execute the assembler ... implement user applications ... carry out approved problem determination procedures before contacting IBM for program service ... update DPPX/ASM and DPPX/BASE or DPPX/SP with fix packages and service level updates as appropriate.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

DPPX/ASM requires DPPX/BASE or DPPX/SP for installation and use. DPPX/ASM also requires a minimum of 32K bytes of main storage during execution. This storage requirement is in addition to the DPPX/BASE or DPPX/SP main storage required for an application program. DPPX/ASM requires approximately 500K bytes of disk space for program load modules and other permanent data sets. In addition, disk space is required for licensed programs installed, for user-defined data sets, and for work space.

**SOFTWARE REQUIREMENTS**

DPPX Assembler runs under the control of the DPPX/BASE and DPPX/SP licensed programs. No other licensed programs are required for its use. This licensed program is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX Assembler language with most of the original PL/DS statements shown as comments.

**COMPATIBILITY**

Coding conventions are similar to those of the S/370 DOS/VS assembler, but the source code is not compatible.

**PERFORMANCE CONSIDERATIONS**

The performance of the assembler is affected primarily by the amount of storage available during an assembly, especially the amount of storage allocated for the symbol table manager.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX Assembler General Information (GC27-0411) ... DPPX Assembler Programming: Language Reference and Guide (SC27-0412) ... DPPX Assembler Licensed Program Specifications (GC27-0513).*

**SYSTEM INTEGRITY:** Refer to section GI 23.2.

**RPQs ACCEPTED:** No



PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
COBOL COMPILER and RUNTIME LIBRARY  
DPPX/COBOL COMPILER (5760-CB1)  
DPPX/COBOL RUNTIME LIBRARY (5760-LB1)**

**PURPOSE**

DPPX/COBOL offers a COBOL compiler and a runtime library containing reentrant routines which support arithmetic, logic, and data conversion, as well as input and output operations.

DPPX/COBOL Compiler is a key, but optional, complement to Distributed Processing Programming Executive Base (DPPX/BASE) and the Distributed Processing Programming Executive/System Product (DPPX/SP). In DPPX, the COBOL Runtime Library is also an optional licensed program. In DPPX/SP, the Runtime Library is an integrated component. COBOL has become the mainstay of commercial application development. DPPX COBOL provides the user a powerful programming language for application development. DPPX COBOL includes IBM language extensions which allow DPPX COBOL applications to utilize DPPX Data Base and Transaction Management System (DPPX/DTMS, 5760-TD1). Input/output subroutines are provided to allow interactive applications to use DPPX Distributed Presentation Services (DPPX/DPS) Version 1 or Version 2.

Operating environments which do not support compilation activities do not require the DPPX COBOL Compiler license. The DPPX/COBOL program can be compiled and linked on one system, and the generated modules may be executed on another system on which the DPPX/COBOL Runtime Library is installed.

**HIGHLIGHTS**

- Includes input/output subroutines to provide the facilities to pass data to DPPX/DPS, which offers device independence and format management facilities for interactive applications.
- Supports data base integrity features of DPPX/DTMS and DPPX/SP with IBM language extensions.
- Facilitates, through common COBOL source language, transfer of applications using DPPX or DPPX/SP indexed data sets to DPPX/DTMS. Data sets are simply redefined as DPPX or DPPX/SP/DTMS managed data bases.
- Produces sharable application programs, by creating reentrant code at user option.
- Includes IBM language extensions which allow the use of structured programming.

DPPX/COBOL simplifies the design and implementation of applications through IBM language extensions and input/output subroutines designed to utilize DPPX/DTMS and DPPX/DPS and the DTMS and FM components of DPPX/SP. In addition, the use of the COBOL language reduces the educational requirements for application programmers with COBOL programming experience on other systems.

Although some DPPX COBOL application programs which are initially implemented without DPPX/DTMS may execute in a DPPX/DTMS or DPPX/SP operational environment without change to the programs, other programs may need changes. In addition, some changes to fully utilize DPPX/DTMS or the DTMS component of DPPX/SP may be desirable. The indexed data sets of application programs shifted to DTMS can become resettable/recoverable data bases managed by DTMS. However, sequential and relative data sets accessed by the DPPX COBOL programs remain unchanged. Additional control over the synchronization of data recovery can be obtained by adding the statements COMMIT and ROLLBACK (IBM language extensions) to the application programs. The COMMIT statement commits changes to auxiliary storage when processing is successfully completed, and the ROLLBACK statement resets data to prior values when an abnormal condition occurs. If these additions are made, the programs must be recompiled for the DTMS environment, thus utilizing the data base integrity facilities of DTMS.

The user can specify that the object code generated by the DPPX/COBOL Compiler be reentrant. This reentrant code and the reentrant modules which comprise the routines of the DPPX/COBOL Run-Time Library can be shared by numerous application users, increasing the utilization of the main storage resource.

Implementation of the EVALUATE statement, the inline PERFORM statements, and the explicit scope terminators for conditional statements allows the implementation of structured programming. (These enhancements are included in the CODASYL COBOL Journal of Development language specifications.)

**INDUSTRY STANDARDS**

DPPX/COBOL is designed according to the specifications of the following industry standards, as understood and interpreted by IBM as of September, 1978: American National Standard (ANS) COBOL, X3.23 - 1974. ANS COBOL is identical to the International Organization for Standardization (ISO) 1989 - COBOL, approved by ISO in February 1978. The following ANS processing modules are included:

1 NUC 1,2	(Nucleus)
1 TBL 1,2	(Table Handling)
1 SEQ 1,2	(Sequential I-O), except the RERUN clause, STANDARD-1 alphabet-name referred to in the CODE-SET clause, and the optional words REEL and UNIT in the CLOSE statement (Relative I-O), except the RERUN clause and a data restriction*
1 REL 0,2	(Indexed I-O), except the RERUN clause and a data restriction*
1 INX 0,2	(Indexed I-O), except the RERUN clause and a data restriction*
1 SEG 0,2	(Segmentation)
1 LIB 0,2	(Library)
1 DEB 0,2	(Debug)
1 IPC 0,2	(Inter-Program Communication)

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level in the American National Standard (0 implies that the module may be completely missing from some standard compilers); the third digit represents the highest level of the American National Standard.

It is anticipated that the DPPX/COBOL Compiler will meet the: December 1975 Federal Information Processing Standard (FIPS) PUB 21-1, low-intermediate level, with the exception of the following

RERUN clause  
STANDARD-1 alphabet-name referred to in the CODE-SET clause  
The optional words REEL and UNIT in the CLOSE statement  
The FIPS flagger  
A data restriction\* for Relative and Indexed I/O

\* Data restriction: The user of DPPX/COBOL cannot write a relative or indexed record with hexadecimal 'FFFF' in the first two bytes. DPPX/BASE access methods use this to indicate a deleted record.

**CUSTOMER RESPONSIBILITIES**

To install and use DPPX/COBOL the user must: Take education courses, as necessary ... Acquire a knowledge of the functions documented in *DPPX/COBOL Application Development Guide* and *DPPX/COBOL Application Development Language Reference*. ... Understand the DPPX installation processes, described in *DPPX Installation: Guide*, as they relate to DPPX/COBOL ... Provide disk storage space for the DPPX/COBOL Compiler object code ... Install the DPPX/COBOL Compiler ... Provide for adequate DPPX/COBOL Compiler disk storage work space ... Become familiar with DPPX/COBOL operating procedures ... Become familiar with the facilities provided by DPPX/DPS and DPPX/DTMS and DPPX/SP, if they are to be used with DPPX/COBOL ... Design and implement user applications ... Carry out approved problem determination procedures before contacting IBM for program service ... Install fix packages and service level updates as appropriate.

Additionally, for the DPPX/COBOL Runtime Library, the user must: Provide disk storage space for the DPPX/COBOL Runtime Library ... Install the DPPX/COBOL Runtime Library.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The DPPX/COBOL Compiler operates under the control of DPPX/BASE or DPPX/SP. The DPPX/COBOL Compiler requires DPPX/BASE or DPPX/SP for installation, and support the IBM I/O devices supported by DPPX/BASE. For information concerning IBM 8100 Information System configurations see *DPPX/BASE General Information (GC27-0400)*, *DPPX/SP General Information (GC23-0600)* and *IBM 8100 Information System Configurator (GA27-2876)*.

The DPPX/COBOL Compiler requires a minimum of 40K bytes of main storage, excluding storage required for DPPX/BASE or DPPX/SP for environment overhead. (For further discussion of the storage requirements for the DPPX/COBOL Compiler, see *Distributed Processing Programming Executive COBOL Application Development Guide SC26-3922*.) Application programs generated by the DPPX/COBOL Compiler will require approximately 16K to about 34K bytes (typically around 28K bytes) of main storage for DPPX/COBOL Runtime Library routines. The required storage is dependent upon the functional content of the application program. The DPPX/COBOL Runtime Library routines may be shared by DPPX COBOL application programs executing in other DPPX/BASE or DPPX/SP user environments at the user's option.

The DPPX/COBOL Compiler requires approximately 850K bytes of disk space for program load modules and other permanent data sets, and the DPPX/COBOL Run-Time Library requires about 150K bytes.

In addition, disk space is required for any other licensed program installed, for user-defined data sets, and for work spaces.



PROGRAM PRODUCTS

DPPX/COBOL (cont'd)

SOFTWARE REQUIREMENTS

The DPPX/COBOL Compiler and the DPPX/COBOL Runtime Library routines are written in Programming Language for Distributed Systems (PL/DS) and in DPPX Assembler language. Source code is available on magnetic tape and program listings on microfiche as related optional material. They are distributed in DPPX Assembler language with most PL/DS statements included as comments.

The following licensed program is required:

DPPX/BASE	5760-010
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DPPX/COBOL has been designed to operate with and complement the following licensed programs although they are not required:

DPPX/SP	or	5660-281
DPPX/DTMS		5760-TD1
DPPX/DPS V1		5760-XR1
DPPX/DPS V2		5660-264

DATA SECURITY

DPPX/COBOL provides an application programming language compiler and runtime library for applications which run under control of DPPX/BASE or DPPX/SP. Data security is provided by DPPX/BASE or DPPX/SP and/or DPPX/DTMS.

PERFORMANCE CONSIDERATIONS

The performance of the DPPX/COBOL Compiler and the generated object code is very much a function of program size and application program content. Beyond this, throughput is affected by system configuration and processing activity from sources of concurrent workload.

DOCUMENTATION

(available from Mechanicsburg)

*Distributed Processing Programming COBOL: Compiler and Library General Information (GC26-3914) ... Compiler and Library Licensed Program Specifications (GC26-3921) ... Application Development Guide (SC26-3922) ... Language Reference (GC26-3923) ... Language Reference Summary (GX26-3726)*

SYSTEM INTEGRITY: Refer to section GI 23.2.

RPQs ACCEPTED: No

## PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
PARAMETER TABLE GENERATION FACILITY  
FOR THE 3644 AUTOMATIC DATA UNIT  
DPPX/GEN3644 (5760-ED1)****PURPOSE**

The DPPX Parameter Table Generation Facility (DPPX/GEN3644), executing on an 8100 Information System with the Distributed Processing Programming Executive Base (DPPX/BASE) or Distributed Processing Programming Executive/System Product (DPPX/SP), provides an efficient means for customizing the 3644 Automatic Data Unit. This customization consists of selecting 3644 functions and specifying the initial values of stored data items. DPPX/GEN3644 translates the customization data (developed on worksheets) into the format necessary for transmission to the 3644. Translation is performed by editing the source data and converting it into a parameter table format for loading into the 3644. The resulting parameter table works with the 3644 microcode provided by IBM.

DPPX/GEN3644 also produces a listing of the source data entered by the user. Extensive edits are performed both on a record basis and on an overall table basis. In most cases, editing continues despite errors, but the parameter table is not usable if any errors are found. Errors noted on the 3644 program listing are corrected by changing the original input and resubmitting the job.

The output of DPPX/GEN3644 is a sequential file containing the parameter table load (PTL) data as required for transfer to the 3644. The records on the sequential file are 256 bytes long.

**HIGHLIGHTS**

Worksheets are used to guide the customer through the procedure of defining the 3644 PTL. The worksheets are distributed as a set of reproduction masters for use in the customer's office copier or similar equipment.

Messages identify errors encountered during the processing of the source statements.

Symbolic naming of 3644 channels and common data items is supported.

A program listing is produced in a format similar to the source worksheets.

A parameter table load (PTL) is produced that is usable with the IBM-supplied control storage load (CSL) to customize the operation of the 3644.

The PTL is placed in a relative sequential data set. The plant communication support of the DPPX/BASE or DPPX/SP licensed program can be used to transfer both the CSL and PTL to the 3644 at the required times.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for installing the DPPX/GEN3644 licensed program.

The customer is also responsible for creating and managing the libraries of source statements and parameter tables for the 3644 through the use of DPPX or DPPX/SP system facilities. The source statements must be sorted into ascending sequence based on columns 1 to 9.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

DPPX/GEN3644 is designed to operate on the IBM 8100 Information System. The minimum configuration must include an IBM 8100 Processor with a disk, diskette, and console. A printer is recommended. The minimum real storage size required by DPPX/GEN3644 is 45K bytes.

**SOFTWARE REQUIREMENTS**

The DPPX/GEN3644 licensed program is designed to run with the DPPX/BASE and DPPX/SP licensed programs.

DPPX/GEN3644 is written in DPPX Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX assembler language with most of the original PL/DS statements shown as comments. Source code is available on magnetic tape with program listings available on microfiche as related optional material.

The following components of the DPPX/BASE and DPPX/SP licensed programs and other licensed programs can be used in conjunction with DPPX/GEN3644:

- Entry of source statements from the worksheets: The interactive editor of the DPPX/BASE or DPPX/SP licensed program.
- Sorting of source records (if required): The DPPX Sort/Merge licensed program or the Sort component of DPPX/SP.
- Printing of the program listing and error messages: The printer sharing component of the DPPX/BASE and DPPX/SP licensed programs.
- Transfer of the PTL (and the CSL) to the IBM 3644: The plant communication support of the DPPX/BASE and DPPX/SP licensed programs.
- Control over the 3644 PTL preparation procedure: The command facility of the DPPX/BASE and DPPX/SP licensed programs.

**COMPATIBILITY**

The input source statements (from the worksheets) and the output PTL records of the DPPX/GEN3644 licensed program are compatible with the input and output of the 3630 Plant Communication System - 3644 Translation Services system control programming when the two programs are at the same functional level.

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual (GC24-5179) ... DPPX/GEN3644 User's Guide (SC31-0004) ... DPPX/GEN3644 Licensed Program Specification (GC31-0007)*

**SYSTEM INTEGRITY:** Refer to section GI 23.2.



## PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
FORTRAN COMPILER and LIBRARY  
DPPX/FORTRAN COMPILER (5760-FO1)  
DPPX/FORTRAN LIBRARY (5760-LM1)****PURPOSE**

DPPX/FORTRAN is a high-level mathematically-oriented programming language suited to manipulations of numerical data and formatted input/output operations on the 8100 Information System with Distributed Processing Programming Executive Base (DPPX/BASE) licensed program or DPPX/SP. DPPX/FORTRAN provides high-level language support for scientific and engineering applications. DPPX/FORTRAN can also be used in a wide range of other application areas for general problem solving.

The DPPX/FORTRAN language is supported by two licensed programs:

- DPPX/FORTRAN Compiler (5760-FO1), which performs syntax checking and compilation of FORTRAN source programs.
- DPPX/FORTRAN Library (5760-LM1), which provides data handling, data conversion, mathematical and system service subroutines to support the execution of FORTRAN application programs. The library may be used on the same system as the compiler or may be used independently on a non-development system to support FORTRAN program execution.

**HIGHLIGHTS**

DPPX/FORTRAN is designed according to the specifications of American National Standard (ANS) Basic FORTRAN, X3.10-1966, as understood and interpreted by IBM as of July, 1978. DPPX/FORTRAN is also designed according to the specifications of ANS FORTRAN, X3.9-1966, as understood and interpreted by IBM as of July, 1978, except for the following language elements:

- Adjustable (object-time) dimensions.
- G edit descriptor on FORMAT statement.
- Nesting of groups in format specifications.
- Complex numbers.
- Reading of format specification at execution.

DPPX/FORTRAN provides the following features not included in either standard:

- Direct access I/O statements - READ, WRITE, DEFINE FILE, FIND.
- ENTRY and PROGRAM statements.
- IMPLICIT statement.
- Length specifications on INTEGER (2 or 4 bytes), REAL (4 or 8 bytes) and LOGICAL (4 bytes) statements.
- PAUSE statement with a character constant.
- Alternate return (RETURN i).
- DEBUG, AT, UNIT, TRACE ON and TRACE OFF statements.
- Character constants.
- Hexadecimal constants.
- Z edit descriptor on FORMAT statement.
- Mixed-type expressions.
- END= and ERR= in READ statements.
- ERR= in WRITE statements.
- List-directed I/O operations.
- 7-dimensional arrays.
- Multiple exponentiation in expressions.

**DPPX/FORTRAN Compiler:** The DPPX/FORTRAN Compiler checks source program statements written in the DPPX/FORTRAN language for proper syntax, and translates the statements into machine language. As a part of compilation, the compiler allows the programmer to specify options that affect certain compiler operations, the content of the listing produced by the compiler, and the machine instructions generated by the compiler. Two of these options are:

- The compiler can be directed to generate either real or simulated floating-point machine instructions. Therefore, floating-point hardware is not required for arithmetic with real numbers.
- The compiler can be directed to generate a reenterable object program.

**DPPX/FORTRAN Library:** The DPPX/FORTRAN Library is designed according to the specifications of American National Standard (ANS) FORTRAN, X3.9-1966, as understood and interpreted by IBM as of July 1978, except for those elements dealing with complex numbers. Many additional functions are provided that are not specified by the standard. All routines in the library are reenterable. Included in the library are the following functions and subroutines:

- Data type conversion functions.
- Mathematical functions: Truncation, nearest whole number, nearest integer number, absolute value, modulo arithmetic, transfer of sign, positive difference, choosing largest and smallest value, square root, exponential, natural log, common log, sine, cosine, tangent, arc sine, arc cosine, arc tangent, hyperbolic sine, hyperbolic cosine and hyperbolic tangent.
- Service subroutines: Overflow, divide check, fetch, call command, time and date.
- Bit manipulation functions.

In addition to functions and subroutines, the DPPX/FORTRAN Library contains routines necessary to execute a FORTRAN program. For example, it contains routines that are automatically invoked to execute READ and WRITE statements.

The DPPX/FORTRAN Library may be installed on a DPPX or DPPX/SP system along with the compiler for the execution of programs on that system, or on a system without the compiler for the execution of programs that were compiled on another DPPX or DPPX/SP system.

**CUSTOMER RESPONSIBILITIES**

Obtain formal education in FORTRAN programming, if needed ... ensure understanding of the basic documentation for the DPPX/BASE or DPPX/SP and DPPX/FORTRAN licensed programs ... ensure understanding of the DPPX or DPPX/SP licensed program installation process and install the DPPX/FORTRAN licensed program ... provide sufficient storage and system capability to execute DPPX/FORTRAN ... implement user applications ... carry out approved problem determination procedures before contacting IBM for program service ... update DPPX/FORTRAN and DPPX/BASE or DPPX/SP with fix packages and service level updates as appropriate.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

Both DPPX/FORTRAN licensed programs can be used on the minimum IBM hardware configuration supported by DPPX/BASE or DPPX/SP licensed programs.

The DPPX/FORTRAN Compiler requires a minimum of 24K bytes of main storage in addition to the main storage occupied by the DPPX/BASE or DPPX/SP and any other licensed programs or application programs resident in main storage at the time of execution of a DPPX/FORTRAN compilation.

The DPPX/FORTRAN Compiler requires approximately 275K bytes of disk space for program load modules and other permanent data sets, and the DPPX/FORTRAN library requires approximately 450K bytes.

In addition, disk space is required for any other licensed programs installed, for user-defined data sets and for work space.

**SOFTWARE REQUIREMENTS**

The DPPX/FORTRAN licensed programs are written in assembler and Programming Language for Distributed Systems (PL/DS) source code.

Executing the DPPX/FORTRAN Compiler requires an installed and running DPPX/BASE or DPPX/SP licensed program. Executing compiled DPPX/FORTRAN programs also requires an installed DPPX/FORTRAN Library.

**COMPATIBILITY**

DPPX/FORTRAN can be run in the same environment as other DPPX or DPPX/SP licensed programs, if sufficient storage is available.

A very large set of FORTRAN language elements is accepted and processed consistently by the DPPX and OS/VS FORTRAN compilers and libraries. Source programs written for one of these systems will need little revision in order to compile and execute successfully on one of the others if the following restrictions are taken into account:

- DPPX FORTRAN does not contain all the elements available in OS/VS FORTRAN. For example, DPPX FORTRAN does not allow complex numbers.
- OS/VS FORTRAN products do not contain all the elements available in DPPX FORTRAN. For example, the OS/VS FORTRAN



PROGRAM PRODUCTS

**DPPX/FORTRAN (cont'd)**

products do not support the PROGRAM statement, bit handling functions, or two-byte intrinsic function arguments.

- There are some differences in compiler-defined limitations. For example, the number of nested expressions allowed in an assignment statement differs between the DPPX/FORTRAN compiler and the OS/VS FORTRAN compilers.

Differences are documented in *DPPX/FORTRAN Programming: Language*.

**DOCUMENTATION**  
(available from Mechanicsburg)

- IBM DPPX/FORTRAN General Information* (GC27-0417) ...
- DPPX/FORTRAN Programming: Language* (GC27-0418) ...
- DPPX/FORTRAN Programming: Guide* (GC27-0419) ...
- DPPX/FORTRAN Licensed Program Specification* (GC27-0514).

**SYSTEM INTEGRITY:** Refer to section GI 23.2.

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
PL/I COMPILER and LIBRARY (DPPX PL/I)  
DPPX PL/I COMPILER (5760-PL1)  
DPPX PL/I LIBRARY (5760-LM2)**

**PURPOSE**

DPPX PL/I offers a compiler and library to support the use of the PL/I language with 8100/DPPX or DPPX/SP.

PL/I is a programming language designed for applications that involve the manipulation of numerical and non-numerical data.

The program compiled by the DPPX PL/I Compiler and the DPPX PL/I Library routines they invoke are reentrant, and can be used with other DPPX or DPPX/SP programs to give access, for example, to interactive, data base, and presentation services provided by DPPX program products.

**HIGHLIGHTS**

The main features of DPPX PL/I include the following:

- DPPX PL/I offers a large selection of American National Standard (ANS) PL/I language elements.
- Program modularity is provided by the PL/I block structure and scope rules.
- Extensive input/output capabilities are provided.
- STATIC, AUTOMATIC, and BASED storage class attributes are supported, giving the programmer control over storage usage.
- Data manipulation capability is provided by a comprehensive set of operators and built-in functions.
- Program checkout facilities are available, including ON-units and condition built-in functions.
- Separately written PL/I code can be included from a PL/I source statement library into the source program at compile time (%INCLUDE statement).

DPPX PL/I Compiler features include:

- Extensive syntax error diagnostics and support for execution-time error diagnosis are provided.
- More than one PL/I source program can be compiled with one invocation of the compiler.
- The DPPX PL/I Compiler can optionally generate floating-point machine instructions for 8100 Information Systems with floating-point support. If this support is not installed on the system on which the program will execute, the compiler is designed to generate code that simulates the hardware instructions for floating-point operations.
- Data mapping is compatible with S/370 OS PL/I and DOS PL/I, provided that compatible data types and access methods are used.
- Object modules are reentrant (to improve storage usage during execution).

DPPX PL/I provides the capability to access DPPX or DPPX/SP facilities and programs. These capabilities include:

- Library routines and/or object programs can be loaded into shared storage.
- Library routines and other programs can be invoked, even though they are not link-edited with the program.
- DPPX/Data Base and Transaction Management System (DPPX/DTMS) and DPPX/Distributed Presentation Services (DPPX/DPS) are supported.
- DPPX PL/I programs can interface with non-PL/I routines.
- Sort user exit programs can be written in PL/I.
- DPPX PL/I programs can issue DPPX or DPPX/SP commands.
- Return codes can be set and tested.

**Compiler and Library:** DPPX PL/I consists of two products:

- The DPPX PL/I Compiler, Program Number 5760-PL/I, which performs syntax checking and compilation of PL/I source programs.
- The DPPX PL/I Library, Program Number 5760-LM2, which contains reentrant routines that manage the execution environment, handle input/output operations, perform data manipulation, and provide mathematical functions.

These products enable the user to designate one DPPX or DPPX/SP system as a programming development center, while other DPPX or DPPX/SP systems may be devoted to running the programs developed at the center. Both the compiler and the library would be installed at the programming development center. Processors at the other locations need have only the library to be licensed and installed for execution of the program compiled at the development center.

DPPX PL/I programs are compiled and executed under the control of the Distributed Processing Programming Executive Base (DPPX/BASE) or DPPX/SP. DPPX/BASE or DPPX/SP provides program development and execution facilities in interactive or batch environments. It can be configured as part of a distributed processing system or as a stand-alone data processing system.

**INDUSTRY STANDARDS**

DPPX PL/I is designed according to the specifications of the following industry standards as understood and interpreted by IBM as of January 1981: American National Standard (ANS) PL/I, X3.53-1976, which is technically identical to ISO 6160-1979 (International Organization for Standardization), and ECMA-50 (1976) (European Computer Manufacturers Association).

**CUSTOMER RESPONSIBILITIES**

In order to install and use DPPX PL/I successfully, the customer must have DPPX/BASE or DPPX/SP installed. The DPPX PL/I Compiler and Library are each distributed on separate diskettes. These program products will be installed according to the DPPX or DPPX/SP procedure for program products (see *DPPX Installation: Guide* or *DPPX/SP Installation*).

**SPECIFIED OPERATING SYSTEM**

**HARDWARE REQUIREMENTS**

The DPPX PL/I Compiler and Library are designed to operate under DPPX/BASE or DPPX/SP for the IBM 8100 Information System processors.

A floating-point processor is not required, but can be used if available.

**Storage Requirements:** When *compiling*, the DPPX PL/I Compiler requires the following storage:

- A minimum real block limit (RBL) of 66K bytes. Programs with many distinct names for variables and constants need more than the minimum RBL to compile. Providing more storage (for example, an additional 30K bytes) will enhance compiler performance.
- A minimum of 150K bytes of auxiliary storage for compiler workfiles.
- The DPPX PL/I Compiler requires 1,000K bytes of auxiliary storage for residence.

When *executing*, the system requirements are as follows:

- Processor storage for the application program. The amount depends on the size and contents of the source program.
- Processor storage for the DPPX PL/I Library routines invoked by the application program. The amount of storage required will vary from one program to another, depending on the function used. For example, a program for a commercial application might need between 20K and 40K bytes of storage for library routines. The most commonly used library routines would normally be in shared storage.
- A floating-point processor is not required, but can be used if available.

Auxiliary storage must be provided for the residence of the library routines (600K bytes for the total DPPX PL/I Library).

Note that the storage requirements for the compiler and library are in addition to the storage required by DPPX/BASE or DPPX/SP and any other programs the customer may use together with DPPX PL/I.

**Device Support:** The application program can make use of input/output devices for which DPPX/BASE or DPPX/SP provides device-independent support.

**SOFTWARE REQUIREMENTS**

The DPPX PL/I Compiler is designed to execute on an installed and running Distributed Processing Programming Executive Base, Program Number 5760-010, or Distributed Processing Programming Executive/System Product (DPPX/SP), Program Number 5660-281.

To execute compiled DPPX PL/I programs (including any DPPX/Sort exit routines written in PL/I), an installed DPPX PL/I Library is required.

## PROGRAM PRODUCTS

**DPPX PL/I (cont'd)**

DPPX PL/I can be used with other DPPX program products, for example:

- DPPX Data Base and Transaction Management System DPPX/DTMS, Program Number 5760-TD1).
- DPPX Distributed Presentation Services, Version 2, (DPPX/DPS V2), Program Number 5660-264, is required if DPPX/DPS is to be used by PL/I programs.
- DPPX Sort/Merge, Program Number 5760-SM1, service level available at general availability of DPPX PL/I is required.

**COMPATIBILITY**

A large common set of PL/I language elements is accepted and processed consistently by the DPPX PL/I Compiler and the OS PL/I compilers. Source programs written for the DPPX PL/I Compiler will in most cases need some revision in order to compile and execute successfully on the OS PL/I compilers. The following are the main areas of difference between OS PL/I and DPPX PL/I (for more details, refer to *DPPX PL/I Compiler and Library: General Information* (GH19-6081):

- Language differences:  
DPPX PL/I follows the rules of ANS PL/I, which differ in some areas from OS PL/I.
- DPPX PL/I does not contain all the language elements available in the OS PL/I Optimizing Compiler.
- Differences in implementation-defined limits (for example, the maximum length of an EXTERNAL identifier is 8 in DPPX PL/I and 7 in OS PL/I).
- Access to DPPX or DPPX/SP program products and to certain DPPX/BASE or DPPX/SP facilities is implemented in a system-dependent manner which cannot be transferred directly to OS/VS.
- In addition, there are differences in the ANS implementation-defined items (for instance, ENVIRONMENT option).

Data mapping of all data types supported by DPPX PL/I is identical to that in OS or DOS PL/I.

**DATA SECURITY**

DPPX PL/I provides an application programming language compiler and a library for applications that run under control of the DPPX/BASE or DPPX/SP program product. Data security function is provided by the DPPX/BASE or DPPX/SP program product and/or the optional DPPX/DTMS program product.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX PL/I Compiler and Library: Program Summary* (GH19-6079) ...  
*DPPX PL/I Compiler and Library: General Information* (GH19-6081) ...  
*DPPX Compiler and Library: Licensed Program Specifications* (GH19-6080) ...  
*DPPX PL/I Compiler and Library: Language Reference* (GH19-6082) ...  
*DPPX PL/I Compiler and Library: Application Programming Guide* (SH19-6083) ...  
*DPPX PL/I Compiler and Library: Messages and Codes* (SH19-6084) ...  
*DPPX PL/I Compiler and Library: Diagnosis* (SY19-6062) ...  
*Compiler microfiche (program listings)* (LJD3-6008) ...  
*Library microfiche (program listing)* (LJD3-6009).

**DPPX/BASE or DPPX/SP SYSTEM INTEGRITY APPLIES:** Yes

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**IBM 8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
DATA STREAM COMPATIBILITY  
DPPX/DSC (5760-RC1)**

**PURPOSE**

This DPPX licensed program allows certain keyboard/displays, printers and selected controllers and communication systems attached to the IBM 8100 communication system with Distributed Processing Programming Executive Base (DPPX/BASE) to communicate with S/370, 303X or 4300 hosts as though they were directly attached by data link to the host processor.

**Keyboard Displays and Printers:** The Data Stream Compatibility licensed program supports both SDLC and BSC line control disciplines between the 8100 processors and the host system. When using an SNA access method, the 8100 appears to an application program as an IBM 3276 Control Unit/Display Station. In this case, transmissions from Data Stream Compatibility can share the same data link with transmissions from other 8100 applications. When communicating over a BSC link, the 8100 appears to S/370 and 4300 application programs as an IBM 3274 Control Unit or 3276 Control Unit/Display Station.

**Selected Controllers and Communication Processors:** The DPPX Data Stream Compatibility licensed program supports the SDLC line control discipline between the host system, the 8100 Information System and the controller or communication processor. The sessions supported by Data Stream Compatibility can share the same host data link with transmission from other 8100 Information System applications.

The 8100 Information System can be installed as a distributed processor while permitting existing host system applications to run with current controller or communication processor applications. DPPX Data Stream Compatibility provides a pass through function for existing applications and is a transition aid while new and additional distributed applications are developed and tested.

**HIGHLIGHTS**

**Keyboard Displays and Printers**

Data Stream Compatibility accepts input from:

- IBM 3104 Display Terminal.
- IBM 3232-1, 11 Keyboard Printer Terminal.
- IBM 3276 Control Unit/Display Station.
- IBM 3277 Display Station.
- IBM 3278 Display Station.
- IBM 3279 Color Display Station.
- IBM 8775 Display Terminal.

Data Stream Compatibility creates the necessary data stream for host communication.

The following printers are supported by Data Stream Compatibility:

- IBM 3230 mdl 1 on direct attached loop. IBM 3230 accepts SNA character string LU1 data only.
- IBM 3262-2,-12 on direct attached loop. IBM 3262 accepts SNA character string LU1 data only.
- IBM 3268 mdl 1 on direct attached loop. IBM 3268 mdl 1 accepts SNA Character String (LU1) data only.
- IBM 3287-11,-12 on direct attached loop. IBM 3287 accepts SNA character string (LU1) data only.
- All printers attached to a 3274 Control Unit.
- All printers attached to an IBM 3276 Control Unit/Display Station.
- All printers attached to the IBM 8101 Storage and Input/Output Unit via Display/Printer Attachment.

When Data Stream Compatibility is used on an 8100 connected to a S/370 or 4300 via a BSC data link, the printers that accept only SNA character string (LU1) data are not supported. When the connection is via an SDLC data link, the printers that accept only SNA character string (LU1) data are not supported for host applications sending LU3 data streams.

Host initiated copy is supported from:

- IBM 3277 to printers attached on the same Display/Printer Attachment.
- IBM 3278, 3279, or 3276 to printers attached to the same IBM 3230 or 3274 or 3276.
- IBM 8775 mdls 1, 2 and 3104 to printers on the same or another loop. Copy of programmed symbols and APL from the IBM 8775 to an IBM 3230 or an IBM 3287 is not supported. If utilizing host initiated copy from the IBM 8775, the associated

IBM 3230 or 3287 printer must be dedicated for host initiated copy.

Local copy is supported from:

- IBM 3278, 3279 or 3276 to printers attached to the same IBM 3274 or 3276.
- IBM 8775 mdls 1, 2 and 3104 to printers on the same or another loop. Copy of programmed symbols and APL from the IBM 8775 to an IBM 3230 or 3287 is not supported.

Printer and display assignments for copy are defined statically and can not be changed from a S/370 or 4300 program.

Advanced functions such as extended color and programmed symbols (PS) that require the 3270 extended data stream are supported by Data Stream Compatibility for SDLC host connections only.

A request for connection can come from the S/370 or 4300 (SDLC only) or from the keyboard/display. Data Stream Compatibility builds two active sessions for each user, keyboard/display-to-Data Stream Compatibility and Data Stream Compatibility-to-host.

The IBM 8100 Information System can be installed as a distributed processor while permitting most existing 3270 applications at the S/370 or 4300 host processor to run with little or no change. While the displays are in session with the host programs, the connection through the 8100 is not apparent to the user. When the displays are not in session with the host programs, they can be used by the 8100 for interactive work. Data Stream Compatibility provides a transition aid for existing applications while new and additional distributed applications are developed and tested.

**Selected Controllers and Communication Processors:** Data Stream Compatibility allows the following products with their application programs, when attached to the 8100 Information System to communicate with S/370, 303X or 4300 host application programs as though they were attached by SDLC data link to the host processor.

3601, 3602	Finance Communication Controller
3605	
3651	Store Controllers
3684	Point-of-Sale - Control Unit
4701-1,-2	
8130, 8140	Information System Processors with
DPCX	Distributed Processing Control Executive applications including DPCX/DOSF Distributed Office System Facility

The communication links between the 8100 DPPX/DSC system, the S/370, 303X or 4300 host and the downstream product must be SDLC.

The request for connection can come from the S/370, 303X or 4300 host (SDLC only) or from a program in a downstream controller or communication processor. DPPX/DSC builds two active sessions for each user, controller or communication processor-to-DPPX/DSC and DPPX/DSC-to-host.

**APL SUPPORT**

Data Stream Compatibility will accept input from the IBM 8775 with APL feature (#1120) and create the necessary data stream for S/370 and 4300 communications. The IBM 8775 is addressable from a S/370 or 4300 program using LU2 or BSC data streams. Data Stream Compatibility APL keyboard characters support is provided to the following host environments:

- OS/VS1 VSPC Release 2.0
- OS/VS2 MVS VSPC Release 2.0
- OS/VS2 MVS VS APL for TSO (See Note)
- VM/370 BSEPP/SEPP

**Note:** Changes to the VS APL for TSO Installed User Program (5796-ALB) to support the APL keyboard characters are described in a technical newsletter distributed to users of record.

In the above environments the then most current release of the VS APL program product (5748-AP1) will support, on the IBM 8775 with the APL feature (#1120), the same characters as are currently supported on the IBM 3274 with the APL/Text Control Function selectable during the customization of an IBM 3274 mdl 1A, 1C or 1D.

Support for the APL keyboard characters will be provided by Release 2 of the TSO Session Manager program product (5740-XE2).

Support for the complete APL Feature will be provided for use by suitably modified user application programs in the following environments.

- DOS/VSE
- OS/VS2 (MVS - including TSO)
- VM/370 BSEPP/SEPP



## PROGRAM PRODUCTS

## DPPX/DSC (cont'd)

The release of DOS/VSE, OS/VS1 and OS/VS2 (MVS) current at the time of hardware FCS applies.

## CUSTOMER RESPONSIBILITIES

The customer must install DPPX/BASE and provide sufficient real storage for the Data Stream Compatibility environments. In addition the customer must define the tables that associate displays and printers for local copy.

## SPECIFIED OPERATING ENVIRONMENT

## HARDWARE REQUIREMENTS

Data Stream Compatibility will operate on an IBM 8100/DPPX system with sufficient real storage to satisfy the combined requirements of Data Stream Compatibility, DPPX/BASE, and other customer required programs. Storage requirements are discussed below under "Performance Considerations".

The configuration must include sufficient I/O devices to support the requirements for system output, system residence and system data sets.

## SOFTWARE REQUIREMENTS

This licensed program is designed to work with the DPPX/BASE licensed program.

Data Stream Compatibility is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX assembler language with most of the original PL/DS statements shown as comments. Source code is available on magnetic tape with program listings available on microfiche as related optional material.

**Host Software:** Displays and printers connected to the Data Stream Compatibility licensed program in the IBM 8100/DPPX processor may communicate with the following host systems and facilities and all subsequent releases and modification levels unless otherwise stated:

## SDLC or BSC

VTAM applications under DOS/VS(E), OS/VS1, OS/VS2 MVS.  
TCAM applications under OS/VS1, OS/VS2 MVS.  
IMS/VS - 1.1.4 under OS/VS1, OS/VS2 MVS.  
CICS/VS - 1.3 under DOS/VS(E), OS/VS1, OS/VS2 MVS.  
TSO/TCAM or TSO/VTAM under OS/VS2 MVS.  
VSPC under DOS/VS(E), OS/VS1, OS/VS2 MVS.

## BSC Only

BTAM applications under DOS/VS(E), OS/VS1, OS/VS2 MVS, VM/370.

SDLC requires VTAM (VTAM2, ACF/VTAM Version 1 or ACF/VTAM Version 2 or ACF/VTAME) or TCAM (TCAM10, ACF/TCAM).

Note that S/370 and 4300 programming service is available only for current releases of S/370 and 4300 programming.

## COMPATIBILITY

Most existing application programs written to the IBM 3276 BSC, or SNA interfaces of the above host software will run with little or no change when using the 8100 and Data Stream Compatibility.

Data Stream Compatibility has the following restrictions:

- Character sets are limited to EBCDIC only.
- The data stream to Display/Printer Attachment attached devices are MINIBASE.
- BSC dial is not supported; the only switched link support is SDLC auto answer to S/370 and 4300.
- Display to display copy is not supported for Display/Printer Attachment attached displays or the IBM 8775 display.

For downstream control units, the following functions will not be supported or may require modifications to host or controller programs:

- Remote Power Off capability is not supported.
- LAST/NOT LAST option for session termination; DPPX/DSC will not support "LAST" and will assume "NOT LAST" is specified.
- BIND parameter with a MAX RX U '00' will not be acceptable and will require a bind image.
- Remote diagnostics and application fixes are only available when supported by active DSC sessions.
- The PU services available are those supported by the current level of DPPX.
- Threshold and Remote Analysis (TARA) support is not available for 3600 control units attached to an 8100/DPPX system.
- Advanced Communication Function (ACF) Enhanced Recovery Capability (ACTPU/ACTLU) is not supported.

## CONVERSION

No host software upgrade is necessary. The customer with an installed SNA S/370 or 4300 that is using RU sizes greater than 1024 bytes may have to regenerate his host CICS system if utilizing 8775 as his target display. The same is true for those users with IBM 3277 as the target display who use RU sizes greater than 512 bytes.

In addition, the customer who is installing control units or 8100 Information Systems downstream from an 8100 will be required to regenerate his NCP system.

## PERFORMANCE CONSIDERATIONS

All DPPX licensed programs are designed to execute in an 8100 Information System that includes the DPPX/BASE licensed program (5760-010).

The Data Stream Compatibility support provides the appearance of a 3276 to a S/370 or 4300 or, in the case when a controller is supported by Data Stream Compatibility, an application interface. The user should expect that response times will be longer when using Data Stream Compatibility than when terminals or control units are directly attached to S/370 or 4300.

The minimum storage required for Data Stream Compatibility supporting one display terminal via an SDLC connection to a S/370 or 4300 is 16K bytes. Each additional terminal supported requires 3K bytes.

The minimum storage required for Data Stream Compatibility supporting one display terminal via a BSC connection to a S/370 or 4300 is 25K bytes. Each additional terminal supported requires a minimum of 4K bytes.

Storage required for DPPX/BASE and related I/O buffers are not included in the above figures.

The Data Stream Compatibility licensed program requires approximately 130K bytes of disk space for program load modules and other permanent data sets.

In addition, disk space is required for any other licensed program installed, for user-defined data sets, and for work spaces.

## DOCUMENTATION:

(available from Mechanicsburg)

*DPPX/BASE General Information (GC27-0400) ... DPPX/DSC General Information and User's Guide (SC27-0507) ... DPPX Installation: Guide (SC27-0401) ... Data Stream Compatibility Licensed Program Specifications (GC27-0515)*

**SYSTEM INTEGRITY:** Refer to section GI 23.2.

**RPOs ACCEPTED:** No

**TERMS and CONDITIONS:** See PP Index

PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
DPPX SORT/MERGE  
DPPX/SORT (5760-SM1)**

**PURPOSE**

The DPPX Sort/Merge is a sort product for the 8100 Information System that runs under control of the Distributed Processing Program Executive Base (DPPX/BASE) and provides users with facilities for extracting data from their data sets and sequencing it. It is designed to address the users' needs not only for straightforward sorting and merging of records of a single type but also for related tasks such as selecting certain records from one or more files and handling multiple record types (records which do not have their fields - for instance their sort keys - in the same position) as well as ordering according to user-specified collating sequences.

**HIGHLIGHTS**

- **Sort or Copy a Data Set:** DPPX Sort/Merge addresses the users' basic needs for extracting data from one data set and creating a new file, with or without changing the sequence of the records.
- **Copy, Sort, or Merge Multiple Data Sets:** DPPX Sort/Merge will also extract data from multiple input data sets to one output data set and, at the same time, optionally resequence the records or merge the data set records if already in desired order. One invocation of the program can handle up to seven different data sets (data sets on direct access storage devices can each have up to four extents, but must be contained within one volume).
- **Select a Subset of the Source Data:** While performing above operations, DPPX Sort/Merge can compare fields in records to constants and select records based on the result of the comparison(s).
- **Process More than One Record Type in the Same Application:** DPPX Sort/Merge can handle different record types concurrently; records are of different types if their significant fields, for instance the sort keys, are not in the same position.
- **Use Flexible Control Fields:** DPPX Sort/Merge can order records on a major control field and multiple minor control fields (keys). Defined control fields, and other fields, can be anywhere within a record (contained entirely within the record) and can be contiguous or noncontiguous. The complete "control word", constructed by the DPPX Sort/Merge program based on the user's key field specifications, can be as large as 512 bytes.
- **Process Multiple Data Types:** DPPX Sort/Merge control field data types can be either character, signed decimal, decimal zoned, signed decimal packed, or number fields in the standard DPPX format for numeric information. The latter type, number fields, can be up to four bytes long; the other four types can be up to 255 bytes long.
- **Sequence Data with Flexible Collating Rules:** DPPX Sort/Merge can, as mentioned above, sequence records based on the value of multiple control fields (sort keys). It does order each individual field in ascending or descending sequence. Character type fields are ordered in accordance with the EBCDIC collating sequence, the ASCII collating sequence, or a user-specified collating sequence (see next paragraph). Numeric (noncharacter) type fields are ordered numerically, all zero fields being treated as equal regardless of their sign.
- **User-Specified Collating Sequence:** DPPX Sort/Merge allows users to modify, through the use of a subcommand, the standard EBCDIC collating sequence. Users will take advantage of this when they have special requirements such as the correct ordering of data containing characters not included in the English alphabet.
- **Record Lengths and Block Sizes:** DPPX Sort/Merge handles records with a length of up to 4086 bytes minus the length of the "control word" for sort applications. In all other applications the maximum record length is 4096 bytes. The input and output block sizes may both be up to 4096 bytes.
- **Input Sources and Output:** DPPX Sort/Merge can read input from and write output to any input or output device supported by the DPPX/BASE device independent SEND/RECEIVE macros, provided the records are in relative sequential data sets (RSDS). The records in a DPPX/BASE indexed data set, or in a data base managed by the DPPX Data Base and Transaction Management System (DPPX/DTMS), can, in addition to normal RSDS, be input to the DPPX Sort/Merge because the records themselves are in RSDS. However, indexes are not created or updated for any data sets, and DTMS managed data sets must be deactivated by the DTMS user, using established DTMS procedures, if the user wishes to allow DPPX/SORT to access them. Input to DPPX Sort/Merge can also be provided by an application program (input procedure), and records sequenced in the desired order can be given to another application program (output procedure).
- **No User Work Space Allocation:** DPPX Sort/Merge copies and merges data sets and, provided the records can be contained in

available primary storage, sorts data sets without using any auxiliary storage. When work space is required, any direct access device that is supported by DPPX/BASE can be used. If enough free space is available in the SYSCAT catalog - subject to an installation specified limit - DPPX Sort/Merge can take full responsibility for allocation of sort work space and the user will not be required to supply specifications for it. (If enough such space is not available, the user will have to specify, in a subcommand, the work space to be used.)

**DESCRIPTION**

DPPX Sort/Merge is designed primarily to address the users' needs to extract data from their data sets and sequence it. The input may come from multiple data sets or from an application program, it may be selectively extracted, and the output written to one data set or given, one record at a time, to an application program.

DPPX Sort/Merge runs as an application program under control of DPPX/BASE and uses standard DPPX/BASE protocols, commands, return codes, and message formats.

DPPX Sort/Merge contains more function than straightforward sorting and merging, and it can be considered as a set of generalized DPPX application programs.

A DPPX Sort/Merge process consists of two stages, a definition stage in which the application is defined based on the user specified SORT command and its subcommands, and an execution stage in which the defined application is executed. The execution stage performs the actual processing of data; reading, selecting, sequencing, writing, etc. It carries out those tasks based on what the definition stage indicates; which functions to perform, in which order, and how. The definition stage, in order to be able to indicate the exact application the user wants executed, processes a SORT command and its subcommands, checking their syntax and logic, informing the user of errors and inconsistencies, and, when it finds an application definition to be free of error and complete, passes control to the execution stage.

The definition stage can receive the user specifications - the SORT command and its subcommands (SOURCE, TARGET, OPTION, FIELD, CHANGE, ORDER, SELECT, CANCEL, DEBUG and END) in three different ways:

- Conversationally, with prompting for the subcommands, and with the ability for the user to correct and reenter subcommands found to contain errors or inconsistencies.
- For immediate execution of a predefined application, by entering a CALL.CLIST command specifying a previously prepared command list containing the SORT command followed by subcommands.
- For batch queue execution of a predefined application, by entering a SUBMIT.BATCH command submitting a previously prepared command list containing the SORT command followed by subcommands.

The execution stage can receive control only from the definition stage as described above.

**CUSTOMER RESPONSIBILITIES**

To install and use the DPPX Sort/Merge licensed program the user must:

Attend classes as appropriate ... Acquire knowledge of the functions as documented in *DPPX Sort/Merge User's Guide* and *DPPX Sort/Merge Reference* ... Become familiar with the commands and their uses as documented in *DPPX Sort/Merge User's Guide* and *DPPX Sort/Merge Reference* ... Become familiar with the facilities of DPPX/BASE ... When necessary, if the "program input/output" facilities are to be used, become proficient in an appropriate programming language and the use of the program interfaces to DPPX Sort/Merge as described in *DPPX Sort/Merge User's Guide* and *DPPX Sort/Merge Reference* ... Install DPPX Sort/Merge according to directions and guidance given in *DPPX Installation: Guide* and "Memo to Users" ... Carry out approved problem determination procedures before contacting IBM for program service ... Install fix packages / service level updates as appropriate.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

To Install the Program

- An IBM 8100 system operating under DPPX/BASE.
- A diskette containing the DPPX Sort/Merge object code in standard DPPX distribution format.

To Use the Program

- An IBM 8100 Processor Unit with Device Attachment Unit(s) and provisions for attachment of required input/output devices.

## PROGRAM PRODUCTS

**DPPX/SORT (cont'd)**

- Any input/output device supported by the DPPX/BASE device independent interface - for input to and output from the DPPX Sort/Merge program - if not handled from other DPPX programs.
- Any IBM direct access storage device supported by DPPX/BASE - for DPPX Sort/Merge work storage - if any larger sort applications than those that can be contained in primary storage will be executed. When such auxiliary storage is required, it must be sufficient to contain all input records, plus the total sort key for each record, plus ten bytes for internal pointers in each auxiliary storage block.
- A minimum of 28K bytes of main storage for the DPPX Sort/Merge program plus main storage for input/output buffers (depending on block size). This does not include DPPX/BASE main storage that may be required for an application program.
- Main storage for input and/or output procedures - when the "program input/output" facilities are being used.
- Any IBM terminal supported by DPPX/BASE presentation services - if DPPX Sort/Merge invocation from a terminal is desired.

**SOFTWARE REQUIREMENTS**

DPPX Sort/Merge operates under control of DPPX/BASE and uses facilities provided by DPPX/BASE.

Prerequisite Program: DPPX/BASE (5760-010)

DPPX Sort/Merge is distributed in DPPX assembler language. Source code for DPPX Sort/Merge is available on diskettes, and the program listings on microfiche, both as related optional material.

If the user wishes to enter the input records via a program (input procedure) and/or accept output records in a program (output procedure), routines in DPPX assembler language, or an appropriate high level language, for instance DPPX/COBOL, which are otherwise not required, must be developed.

**PERFORMANCE CONSIDERATIONS**

The performance of the DPPX Sort/Merge licensed program is dependent on the system resources available, the programs that operate concurrently and their relative priorities, and system and data set placement. Performance for a specific DPPX Sort/Merge application is also dependent on factors such as number of records in the input file(s), number of records selected for output, block size, record length, total sort key size, degree of sequencing already existing in the input file, amount of main storage available, placement of work space (when required), type of input/output data sets and devices, hardware configuration, whether or not all the DPPX/BASE routines required by the program are resident, and other options selected for the execution. For specific application performance and response time needs, attention should be given to ensuring that adequate real resources such as primary storage and direct access device work space are available, that input/output data set block sizes are not too small (number of accesses to the data sets are not too large), and that applications are not designed so that an unnecessarily large amount of data has to be processed.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX Sort/Merge Licensed Program Specifications (GC26-3932) ...  
DPPX Sort/Merge General Information (GC26-3931) ... DPPX/BASE  
General Information (GC27-0400) ... DPPX Installation Guide  
(SC27-0401) ... DPPX Sort/Merge User's Guide (SC26-2934) ...  
DPPX Sort/Merge Reference (SC26-3944).*

**SYSTEM INTEGRITY:** Refer to section GI 23.2.

**RPQs ACCEPTED:** No

## PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
DATA BASE and TRANSACTION MANAGEMENT SYSTEM  
DPPX/DTMS (5760-TD1)****PURPOSE**

Distributed Processing Programming Executive Data Base and Transaction Management System (DPPX/DTMS) is the data management and transaction management system that provides ease-of-use facilities for the IBM 8100 Information System application programmers and system programmers in the online transaction-oriented environment. DPPX/DTMS operates under the control of Distributed Processing Programming Executive Base (DPPX/BASE). The facilities provided by DPPX/DTMS are designed to enable the programmers to concentrate on application system program development, rather than data and transaction management.

The following paragraphs contain general information pertaining to DPPX/DTMS. A section beginning on page 3 (TD1.3) covers follow-on Functional Enhancement Package (FEP) highlights.

**HIGHLIGHTS**

- Handles concurrent requests with effective use of main storage. DPPX/DTMS allows several terminal users to effectively utilize DPPX/DTMS controlled storage areas called subenvironments. DPPX/DTMS also provides for data base buffer pooling, and will allocate or deallocate data buffers to the pool as system workloads vary.
- User ability to prioritize transactions. High priority transaction definitions may be designated by the user to reside in main storage, enabling execution to be initiated quickly.
- Facilities to assist in the development and testing of user programs. Users can operate in test mode, which allows programs to process production data bases, with no permanent change to the data bases. Online DPPX/BASE debugging services are supported.
- Ease-of-migration. Previously running DPPX programs may execute as DPPX/DTMS transactions, with no source or object code change. Existing DPPX indexed data sets can be defined as DPPX/DTMS-managed data bases with no physical change to the data.
- Provides security facilities. Specific user authorization requirements can be associated with transactions or data bases under control of DPPX/DTMS. DPPX/DTMS verifies that users have the proper credentials.
- Controlled sharing of data with full integrity.
- Automatic reset of an active DPPX/DTMS data base, if:
  - User program abnormally terminates
  - DPPX/DTMS abnormally terminates
  - DPPX/BASE abnormally terminates
- Re-creation facilities which allow for full recovery of DPPX/DTMS-controlled data bases, if the data has become invalid.
- Supports DPPX/COBOL and DPPX Distributed Presentation Services (DPPX/DPS). DPPX/DTMS has been designed to operate with and complement other products such as DPPX/COBOL and DPPX/DPS, although they are not prerequisites. DPPX COBOL programs can be written to utilize and access the DPPX/DTMS facilities, without the requirement for DPPX assembler language subroutines. DPPX/DTMS supports DPPX/DPS if present in the system, and uses it for work invitation and message displays.
- Ease-of-installation. No system generation is required. DPPX/DTMS as supplied from PID may be tailored by replacement of default values and environmental information. Data bases and transactions are defined through DPPX/BASE-like commands.
- Data base utilities, which reorder the data for more efficient sequential processing.
- Deadlock detection for shared data bases. When DPPX/DTMS detects a potential deadlock, it rejects the request that would have caused the deadlock. The rejected transaction program can request restart.

**DESCRIPTION**

DPPX/DTMS is designed primarily for processing online, commercial transactions. Two distinct but related functional areas are supported:

- DPPX/DTMS data base manager provides the management and control functions required for controlled intra-system sharing of data. Data integrity is maintained, both during normal program execution and after abnormal termination.
- DPPX/DTMS transaction processing manager provides transaction processing facilities in support of online applications and shared data. Concurrent requests from a number of terminals are resolved through management of system resources.

The most significant data management services of DPPX/DTMS provide for controlled shared access to data, data recovery, and re-creation of damaged files. The transaction processing component manages the use of processor resources while responding to concurrent requests. The data manager component and the transaction processing component are capable of operating independently of each other, allowing for more effective use of main storage since both programs need not be in main storage simultaneously.

**The Data Base Manager**

The extended data management services of DPPX/DTMS assist the user in: Definition of sharable data bases ... Controlling shared access to data ... Recovery and reconstruction of data ... Reorganization of data ... Data security ... Avoidance of deadlock.

**Sharable Data Bases:** Using the DPPX/DTMS commands supplied, the customer defines the characteristics and structure of each controlled data base. The resulting profile contains information such as blocking, record and field descriptions, numbers of buffers to allocate during processing, file security and authorization details and level of recovery and re-creation protection, as well as information relevant to one or more key sequences of the data. These profiles are external to application programs. They exist as stored data themselves, and are referenced by DPPX/DTMS when it is processing access requests for application programs.

**Controlling Access:** Multiple application programs executing in DPPX/DTMS, DPPX/BASE interactive, or DPPX/BASE batch environments may be scheduled simultaneously against the same data base. When an application program is updating a record, other programs are prevented from accessing the record being updated until the updating program has completed its entire update procedure or reached a point of synchronization. If the updating program, DPPX/DTMS, or DPPX/BASE terminates abnormally prior to completion of the update procedure, the updates it has made can be, under user option, backed out of the data base to the last point of synchronization. This process ensures that all of the data accessible to a given application represents the results of successful, completed transactions.

**Recovery, Reconstruction, Reorganization:** An optional logging facility allows data changes to be journaled to an independent data set for later use if reconstruction of damaged data bases becomes necessary. Data base unload, reload, and re-create utilities provide for the coordination of backup files with the journaled data changes, during reconstruction. These same utilities can be used to reorder a given file to optimize physical storage sequence according to new user processing needs.

The data bases managed by DPPX/DTMS are DPPX indexed access method data sets that have been defined to DPPX/DTMS. A record contains a fixed number of fixed length fields, at least one of which serves as a key. Up to eight key indices are maintained per data base. Access to records is by reference to an index.

**Data Security:** DPPX/DTMS, in conjunction with DPPX/BASE facilities, provides for data security through a combination of user identification, password, and authorization categories. Security checking is done by DPPX/DTMS, to verify that a user requesting access to a protected data base has the appropriate credentials. If not, the request is denied.

**Avoidance of Deadlock:** A deadlock situation occurs when two or more programs are waiting for each other for access to data records. In such a waiting situation none of the programs can continue. DPPX/DTMS recognizes these potential situations before they happen, and rejects the request that would have caused the deadlock. The rejected transaction program is notified, and can elect to restart or bypass this particular request.

**The Transaction Processing Manager**

The transaction processing services of DPPX/DTMS provide:

- Application-independent terminal management.
- Effective use of storage.
- Input/Output message routing.
- Conversational/Interactive application support.
- Transaction-initiated work requests.
- System command and control facilities.

To use the DPPX/DTMS transaction processing facilities, a terminal user may logon directly to DPPX/DTMS. A security check verifies the user's password, and the user may then request execution of any transaction processing programs for which he is authorized.

**Application-Independent Terminal Management:** Specific application-oriented transactions are written by the customer, and defined to DPPX/DTMS through command facilities. Each transaction definition contains security authorization information, priority level, transaction

**DPPX/DTMS (cont'd)**

owner, application program name, and the transaction name or identifier. Users then request execution of a given transaction by indicating, at the terminal, the name of the transaction they wish to invoke. Transaction definitions can only be altered or deleted by the transaction owner or an authorized operator.

**Effective Use Of Storage:** The transaction processing manager of DPPX/DTMS makes effective use of storage by allowing several terminal users to share DPPX/DTMS-controlled subenvironments. When a user requests a transaction to be run, the transaction occupies a subenvironment only for the time required for execution. The subenvironment storage is made available for use by other users between transactions or while the user is entering data for the next transaction.

**Input/Output Message Routing:** After the user initiates a transaction request and enters the relevant data, DPPX/DTMS loads the user's transaction program and makes the data available to it. Thus the application program is relieved from the necessity of actually reading directly from the terminal, since the data is available to it when it begins execution. The program can also create a message for DPPX/DTMS to route back to the terminal when this transaction is complete, eliminating the need for explicit terminal output statements and freeing the subenvironment without waiting for the writing of the message to end.

If a customer has DPPX/DPS installed, DPPX/DTMS supports its use in conjunction with the DPPX/DTMS terminal input/output operations. Users can take advantage of the facilities offered by DPPX/DPS when combining its use with DPPX/DTMS.

**Conversational/Interactive Application Support:** Transactions may be logically chained together, such that a program that looks like a single conversational program to the terminal operator may really consist of several one-step programs. This allows program storage to be freed for use by other transactions during user think time or input entry time.

Continuous conversational applications are supported by DPPX/DTMS as well. However, since the program is in control of the terminal input/output, the transaction stays resident until the entire conversational transaction is complete.

**Transaction-Initiated Work Requests:** Application programs themselves, whether running under DPPX/DTMS or not, can ask DPPX/DTMS to create a work request for a transaction program. The work request may be associated with the originating terminal, with other user terminals, or with devices such as terminal printers.

**System Commands and Control:** DPPX/DTMS allows user control over the operating environment through a collection of monitoring and tailoring facilities. Inquiries may be made concerning the current availability and status of the DPPX/DTMS components, such as the transaction processing or data management components themselves, as well as the data bases and transactions defined to DPPX/DTMS. Current operating status, such as identification of current online users, names of transactions being executed, data bases opened, and pending transactions can be displayed.

Data bases may be dynamically defined and brought online or offline, and subenvironments for transaction processing can be added or deleted through operator control, without interrupting transaction processing. The transaction processing manager and the data base manager can be brought up and shut down independently.

**CUSTOMER RESPONSIBILITIES**

To install and use DPPX/DTMS the user must: Attend classes as necessary ... Acquire a knowledge of the functions as documented in *DPPX/DTMS Administration: Guide* and *DPPX/DTMS Reference ...* Become familiar with the facilities of DPPX/BASE ... Understand the DPPX/BASE installation processes described in *DPPX Installation: Guide* as they relate to DPPX/DTMS ... Understand the customization procedures as documented in *DPPX/DTMS Customization: Guide* ... Become familiar with operating procedures as described in *DPPX/DTMS Operation: Guide* ... Become proficient in an appropriate programming language such as DPPX/COBOL, and learn the specific program interfaces to DPPX/DTMS as described in *DPPX/DTMS Application Development: Guide* ... Design and implement the specific user system, including the creation of transaction definitions and programs as well as the definition and construction of DPPX/DTMS-controlled data bases ... Become familiar with the facilities of DPPX/DPS and DPPX Presentation Services for IBM 3640 terminals (DPPX/PS3640) if these are to be installed ... Carry out approved problem determination procedures before contacting IBM for service ... Install fix packages and service level updates as appropriate.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

DPPX/DTMS hardware system configuration requirements (except for storage) are consistent with those of the DPPX/BASE licensed program.

The following table specifies the minimum real storage requirements for DPPX/DTMS, excluding initialization. Since either the data base manager or transaction processing manager may function independently, storage is shown for the three configuration variations.

The minimum storage requirements for the Data Base Manager alone assume a single DPPX/DTMS data base, requests from a single batch or DPPX interactive command facility user and no audit file. Data base reset is assumed.

The minimum storage requirements for Transaction Processing Manager Alone assume a single terminal and support for a single transaction subenvironment.

The minimum requirements for full DPPX/DTMS, Both DBM/TPM, assume a single DPPX/DTMS data base, a single terminal, and support for a single transaction subenvironment.

Data Base Manager Alone	Transaction Processing Manager Alone	Both DBM/TPM
30K bytes	32K bytes	48K bytes

Storage required for DPPX/BASE, user programs and data, and optional but related coexistent products such as DPPX/DPS and DPPX/COBOL, are not included in the above figures.

**System Operator Console:** Same as DPPX/BASE requirements.

**Direct Access:** For system libraries, any appropriate IBM devices supported by DPPX/BASE are allowed.

For DPPX/DTMS user data storage and DPPX/DTMS system data sets, at least one disk storage unit is required. It may be the same device as required for DPPX/BASE system operation.

The DPPX/DTMS licensed program requires approximately 1.2M bytes of disk space for program load modules and other permanent data sets.

In addition, disk space is required for any other licensed program installed (such as DPPX/COBOL), for user-defined data sets, and for work spaces.

**Tape Units:** Although not required, one or more IBM 8809 Magnetic Tape Units are recommended for use with DPPX/DTMS data logging facility. Data logging can also be directed to disk storage, or not done at all.

**User Terminals:** Users may establish sessions with DPPX/DTMS (through LOGON or AUTOLOG) with all devices supported by the DPPX/BASE line/page presentation services classified as Keyboard/Displays, Keyboard/Printers, or Printers. In addition, customers with the DPPX/DPS licensed program installed may use all devices supported by DPPX/DPS classified as Keyboard/Displays or Printers.

**SOFTWARE REQUIREMENTS**

The user may write DPPX/DTMS transactions and DPPX/BASE interactive and batch application programs in DPPX assembler language, PL/DS or DPPX COBOL. DPPX FORTRAN may also be used, but will require DPPX assembler language subroutines to access many of the DPPX/DTMS facilities.

DPPX/DTMS works directly with DPPX/DPS, if available. It is recommended that DPPX/DPS be used in conjunction with DPPX/DTMS, to maximize programmer productivity.

Since DPPX/COBOL has IBM language extensions for DPPX/DTMS, it is also recommended for use with DPPX/DTMS to provide the advantages of this high level language to the DPPX/DTMS programmer.

DPPX/DTMS is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX assembler language with most of the original PL/DS statements shown as comments. Source code for DPPX/DTMS is available on magnetic tape and program listings are available on microfiche as related optional material.

DPPX/DTMS requires the Functional Enhancement Package 1 (FEP1), or later, level of the DPPX/BASE licensed program (5760-010) for installation and execution.

DPPX/DTMS has been designed to operate with and complement the following licensed programs, although they are not required:

DPPX/COBOL Compiler	5760-CB1
DPPX/COBOL Run-Time Library	5760-LB1
DPPX/DPS	5760-XR1
DPPX/PS3640	5660-267
DPPX Assembler (DPPX/ASM)	5760-AS1
DMS/DPPX	5760-XC2

**CONVERSION**

Indexed data sets, created and operable under the basic DPPX/BASE facilities, may be placed under control of DPPX/DTMS with no change or movement to the physical data sets. Minor command list (CLIST) changes are required, as well as the redefinition of the data sets to DPPX/DTMS data bases.

Existing DPPX conversational and batch programs may also execute as transaction programs, to be run under the control of DPPX/DTMS. No revision or recompilation is required, although it may be desirable in

## PROGRAM PRODUCTS

**DPPX/DTMS (cont'd)**

order to take advantage of the unique facilities provided by DPPX/DTMS.

Existing DPPX programs which access Indexed Access Method files which will be defined as DPPX/DTMS data bases may also execute unchanged, although there are a few differences which may make recompilation or reassembly necessary. For example, data bases can only be accessed through the device independent SEND/RECEIVE macros (READ/WRITE statements), not through the lower level (EXCP) macro type interfaces available with the indexed access method. Also, there are such items as additional return codes, CLIST considerations, and differences in data record locking which may be the basis for minor program changes.

**PERFORMANCE CONSIDERATIONS**

The performance of DPPX/DTMS is highly dependent on the system resources available, the programs that operate concurrently and their relative priorities, and system data set and data base placement. Performance also depends on specific options selected by the customer, including data base buffer pooling, the number of transaction subenvironments, storage resident transaction definitions and/or transaction programs, level of security protection, extent of data recovery facilities, selection of DPPX/BASE and DPPX/DTMS modules and buffers, storage resident scratch pad data areas for inter-transaction communication, and the DPPX/DPS and DPPX/PS3640 licensed programs.

**HIGHLIGHTS of FEP 1**

The DPPX/DTMS functional enhancement package 1 (FEP 1) provides additional capabilities in availability, performance and usability and also may be used with the 8101 File/Tape Switch RPQ.

**AVAILABILITY**

**FULLY QUALIFIED DATA SET NAMES:** This enhancement allows the user to define system data sets SYSAUDnn, SYSDBPL, SYSPRODS, SYSRDS, SYSRIDS and SYSTPL in any volume catalog or user catalog (as well as the master catalog) and permits DTMS to access them in their user-defined location. This will allow a user with the File/Tape Switch RPQ the ability to switch a data base file from one 8100 processor to another without losing these system data sets. For customers not using the File Switch RPQ, Fully Qualified Data Set Names is useful for greater operational flexibility and recovery purposes, allowing the DTMS data sets to be placed on volumes other than the system residence volume. Previously, the system data sets were required to be defined in the master catalog.

**RELOAD to DIFFERENT VOLUME:** This enhancement will allow a data base to be recreated and renamed on a volume different from the original. This enhancement increases the flexibility of recovery for all DTMS users and can enhance system availability in the event of the loss of a disk volume. The Reload to Different Volume enhancement will add volume serial and data set name parameters to the RELOAD.DB, RECREATE.DB and ALTER.DB commands. Previously, when a data base was reloaded or recreated, DTMS required that the data base be rebuilt on the volume on which it originally existed. Even though the data to rebuild the data base existed elsewhere, the data base could only be rebuilt on the original volume. If the original volume was unavailable due to a disk failure, for example, the customer could not recreate the data base.

Fully Qualified Data Set Names and Reload to Different Volumes were shipped to customers in Fix Package 0499 in January, 1982.

**PERFORMANCE**

**MULTIBLOCK I/Os to the AUDIT FILE:** DTMS will now read and write to the audit file with multiple logical blocks instead of one block at a time. The audit file buffer will be written whenever it is full or when a data base containing data in the audit file is committed. Audit file reads during recovery of a data base will be for multiple logical blocks instead of one block at a time. I/O operations to the audit file will therefore be significantly reduced.

**MULTIBLOCK WRITES to SYSRIDS:** Multiblock writes to the reset information data set (SYSRIDS) will be done through a buffer so that data to SYSRIDS can be written with fewer I/O operations than was previously required. Often, only one I/O operation will be required.

**FAST UNLOAD/RELOAD:** The Unload and Reload services are changed to improve the performance of data base recovery. Target and index data set images are saved during unloading and then restored during recovery operations, thus eliminating the need for rebuilding the indexes.

**USABILITY**

**READ ACCESS to LOCKED RECORDS:** This enhancement allows the user to specify the READLOCKED operand on the ASSOCIATE.DB command, thus allowing read access to records locked by another user.

**RECREATE.TSE COMMAND:** A new command permits the user to cause one or more transaction subenvironments (TSEs), either specifically by name or by profile name, to be recreated. This enhancement makes it

easier to re-execute the TSE initial CLIST and therefore re-establish connections or implement other changes in that CLIST.

**AUTOMATIC RECOVER.DATA:** DTMS will automatically recover certain internally used DTMS data sets when DTMS is restarted after a failure. This will eliminate the need for the user to both keep track of which data sets need to be recovered and to issue RECOVER.DATA commands during a DTMS restart operation.

**SYNCHRONOUS DEACTIVATE.DB COMMAND:** A new parameter will be added to the DEACTIVATE.DB command to provide for the command to operate synchronously. Users will now be able to deactivate and unload a data base from a single command list (CLIST). Previously, DEACTIVATE.DB operated asynchronously and it was not possible in a CLIST to follow a DEACTIVATE.DB with a command (such as UNLOAD.DB) which depended upon the completion of the DEACTIVATE.DB command.

**PERFORMANCE CONSIDERATIONS**

DTMS online systems with high recreatable or resettable data base activity will experience fewer system I/Os to the audit file and SYSRIDS. As a result of this reduced I/O, these systems can experience a general improvement in performance.

In addition, the number of I/Os used by the Unload/Reload facility is significantly reduced and will result in a performance improvement when using this function.

**COMPATIBILITY**

DPPX/DTMS FEP 1 is upward compatible with earlier service levels. Program products supported on earlier service levels will be supported on FEP 1.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/DTMS General Information (GC26-3915) ... DPPX/DPS General Information (GC33-0090) ... DPPX/PS3640 General Information Manual (GC31-0010) ... DPPX/COBOL Compiler and Run-Time Library General Information (GC26-3914) ... DPPX/BASE General Information (GC27-0400) ... DPPX Installation: Guide (SC27-0401) ... DPPX/DTMS Messages (SC26-3918) ... DPPX/DTMS Customization: Guide (SC26-3937) ... DPPX/DTMS Application Development: Guide (SC26-3938) ... DPPX/DTMS Administration: Guide (SC26-3939) ... DPPX/DTMS Operation: Guide (SC26-3940) ... DPPX/DTMS Reference (SC26-3941) ... DPPX/DTMS Licensed Program Specification (GC26-3936) ... DPPX/DTMS Diagnosis: Guide (SY26-3875) ... DPPX/DTMS Diagnosis: Reference (SY26-3876).*

**SYSTEM INTEGRITY:** Refer to section GI 23.2.

**RPQs ACCEPTED:** Yes



PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
REMOTE JOB ENTRY WORKSTATION FACILITY  
DPPX/RJE (5760-XC1)**

**PURPOSE**

DPPX Remote Job Entry Workstation Facility (DPPX/RJE) permits the 8100 Information System to function as a multi-leaving or multiple logical unit remote job entry workstation for submitting jobs to a host S/370 or 4300 for execution under OS/VS, DOS/VS, DOS/VSE and VM/370 operating systems with a job entry subsystem installed.

**SPECIAL SALES INFORMATION**

8100 Information System customers can benefit from DPPX/RJE in several ways. Those who previously utilized RJE terminals will be able to install an 8100 and become productive quickly by utilizing existing RJE host programs until other applications are developed. Those installing a distributed system, where RJE has not previously been an application, will be able to extend the effective processing power of the 8100 through the use of DPPX/RJE.

**DESCRIPTION**

DPPX/RJE executes under Distributed Processing Programming Executive Base (DPPX/BASE), sharing system resources with other DPPX application programs. DPPX/RJE will support the definition of multiple workstations within one 8100. The limitations on the number of physically unique and separately controlled workstations is determined by the available system resources and required performance.

The host connection may be established for SNA/SDLC over a point-to-point switched or multipoint nonswitched line (for details on communication lines supported by 8100/DPPX, see DPPX/BASE pages). Both BSC and SNA/SDLC may connect over a nonswitched point-to-point line. SNA/SDLC utilizes multiple logical unit (MLU) support and BSC utilizes the multi-leaving protocols. Using SNA/SDLC discipline, the user may submit jobs to OS/VS operating system through the following:

RES (Rel. 6)	VS1 (Rel. 6.7)
JES (Rel. 4.1)	MVS (Rel. 3.7)
JES/NJE (Rel. 2-3)	MVS (Rel. 3.7)
JES3 (Rel. 3)	MVS (Rel. 3.7)
POWER/VS	DOS/VS (Rel.34)
VSE/POWER with RJE feature	DOS/VSE (Rel. 2.0)

Using the BSC discipline, the user may submit jobs to OS/VS operating systems above, and additionally through:

RSCS	VM/370 (Rel. 5.0)
RSCS Networking	VM/370 (Rel. 6) VM/SE (Rel.2) VM/BSE (Rel. 2)

Host S/370 or 4300 RJE programming support is generated by specifying the 8100 as an SNA terminal under the SNA/SDLC protocol or as a S/360/370 multi-leaving workstation (Mdl 25) under the binary synchronous communication line control discipline.

DPPX/RJE allows multiple groups of I/O devices, either physically adjacent to or physically remote from the 8100, to be designated as independent SNA workstations. Each workstation is controlled independently by its own RJE console and each can use the DPPX session log facility.

A collection of I/O devices, which is defined at the host entry system as one workstation, need not be physically adjacent. This enables the customer to distribute subsets of that collection of devices to different remote locations, thus providing the appearance of multiple remote workstations under the control of one console.

DPPX/RJE, executing under DPPX/BASE, affords the properly authorized RJE operator access to other DPPX facilities (utilities, interactive editor).

The data editing functions used to create RJE input files can be performed outside the control of DPPX/RJE by a DPPX editor.

DPPX/RJE provides capabilities to:

- Support multiple concurrent SNA input/output sessions up to the maximum dictated by the installation's resource and performance requirements or by the host job entry subsystem.
- Support multiple input and output data streams under the multi-leaving binary synchronous communication (BSC) line control discipline.
- Process commands entered at the workstation and transmit host commands. The local commands enable the workstation operator to:
  - Control the operation of the workstation.

- Invoke other DPPX facilities concurrently with DPPX/RJE operation.
- Dynamically reconfigure a workstation connected to the 8100 if the operator has the proper authority and if the reconfiguration is a subset of the total workstation defined to the host job entry subsystem.

The host commands enable the workstation operator to submit and monitor jobs being processed at the central complex. Messages received at the workstation are displayed on the console. Once displayed, the messages can be logged in an operator's log. Each workstation is controlled by its own separate console and can have its own separate log.

- Perform intermediate data storage (SNA/SDLC only) of RJE output.
- Control printer forms by specifying forms control locally or from the host S/370 or 4300.

Initialization of DPPX/RJE is performed by an authorized operator logging on to the DPPX/BASE command facility and execution of commands that initialize DPPX/RJE and establish communications to the host. Access to DPPX/RJE is controlled through the DPPX/BASE security facilities.

Multiple logical unit (SNA)/Multi-leaving (BSC) provides, in a general sense, a fully synchronized, pseudo-simultaneous, bi-directional transmission of a variable number of data streams between two or more systems.

**HIGHLIGHTS**

**Multiple logical unit support (SNA)** - Provides for support of multiple logical units up to the maximum number of logical units dictated by the installation's system resources and performance requirements or by the host job entry subsystem.

**Multi-leaving support (BSC)** - Provides for support of a variable number of bi-directional data streams between the host S/370 or 4300 and the 8100 and its attachments.

**Customizable user interface** - Through the capability to customize the DPPX/BASE command interface, DPPX/RJE commands may be tailored to more closely resemble a variety of desired user interfaces.

**Non-dedicated workstation** - Input/Output devices are not dedicated to the RJE function. They may be reassigned to other systems or user tasks before or after assignment to the RJE function.

**Reconfigurable workstation** - The workstation configuration (i.e., readers, printers, etc.) can be dynamically modified to be a subset of the host's definition of the workstation

**Intermediate output data storage (SNA/SDLC only)** - RJE output may be printed or punched or routed to disk for future printing or punching. With a user-written installation correlation table, output can be directed to one of multiple output classes according to the output parameters specified. Jobs are then submitted to the DPPX/BASE printer sharing facility for output. The operator may view or cancel jobs scheduled for printing.

**Forms control** - Locally cataloged forms control blocks can be specified for loading into the printer when the print function is started. Additionally, for SNA/SDLC, forms control may be accomplished automatically as specified by the host S/370 or 4300.

**Prestored job control commands** - Sequences of job control statements may be pre-stored at either the workstation or the host S/370 or 4300 location for concatenation to their appropriate data files.

**Data concatenation** - DPPX/RJE supports the concatenation of multiple cataloged DPPX data sets which can be transmitted as RJE jobs to the host. The data sets may contain data with or without job control statements or job control statements alone.

**Direct card input (hot card reader support)** - Multiple jobs can be input from the card reader for immediate transmission to the host without RJE operator intervention between job streams.

**Unattended operation** - A user-written programmed operator routine can be used to minimize the need for an RJE operator.

**Device Support**

Console: IBM

- 3232-1, 11 Keyboard Printer Terminal
- 3276 Control Unit Display Station
- 3277-1, 2 Display Station
- 3278 Display Station
- 3279 Color Display Station
- 8775 Display Terminal
- 3767 Communication Terminal

PROGRAM PRODUCTS

DPPX/RJE (cont'd)

2741 Keyboard Printer (not error checked)

VM/BSE (Rel. 2)

Direct RJE Input: IBM

- Disk Storage
- 3501 Card Reader (via 3289-3 Printer)
- 2502-A1 Card Reader (via 3289-3 Printer)
- 3521 Card Punch with read option (via 3289-3 Printer)
- Diskette Type 2D (must have the format created by DPPX data management -- it cannot be Basic Data Exchange format)
- 8809 Magnetic Tape Unit (data sets must be cataloged)

Direct RJE Output: IBM

- 3262-2, -12 Line printer
- 3289-3 Line printer
- Disk Storage
- 3521 Card Punch (via 3289-3 printer)

**Printer Performance Considerations:** The following system factors must be considered in determining anticipated printer performance:

For SNA/SDLC work stations:

- Host link speed.
- NCP pause value.
- RU size.
- Pacing values.
- Data set compaction/compression.
- Print line length.
- Disk block size on queued output data sets.

For BSC work stations:

- Host link speed.
- Host transmission block size.
- Maximum number of output buffers.
- Data set compression.
- Print line length.

In addition to the above, achieving rated printer speed for the 3262 mdl 2 may require that output be routed to intermediate disk storage on the 8100 for subsequent printing. This capability is available: SNA only.

**CUSTOMER RESPONSIBILITIES**

To install DPPX/RJE the customer must: Attend classes as required ... Become familiar with the facilities of DPPX/BASE ... Understand the DPPX/BASE installation procedures described in *DPPX Installation: Guide* and *DPPX/BASE Administration* as they relate to DPPX/RJE ... Understand the customization procedures as described in *DPPX/BASE Administration* ... Become familiar with the operating procedures as described in *DPPX/RJE Administration and Operation: Guide* ... Design and implement the specific DPPX/RJE system the customer requires (i.e., command synonyms, command lists, etc.) ... Create host applications for the RJE function ... Carry out approved problem determination procedures before contacting IBM for service ... Install fix packages and/or service level updates as appropriate.

To use DPPX/RJE the customer must: Attend classes as necessary ... Become familiar with the facilities of 8100/DPPX as they relate to DPPX/RJE (i.e., printer sharing, editor, etc.) ... Become familiar with the operating procedures as described either in *DPPX/RJE Administration and Operations: Guide* or as dictated by the customer personnel responsible for the specific customized version of DPPX/RJE.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM host connection may be established for SNA/SDLC over a point-to-point switched or multipoint nonswitched line (for details on communication lines supported by 8100/DPPX, see DPPX/BASE pages). Both BSC and SNA/SDLC may connect over a nonswitched point-to-point line. SNA/SDLC utilizes multiple logical unit (MLU) support and BSC utilizes the multi-leaving protocols. BSC lines must operate in transparent mode: Non-transparency is not supported. Using SNA/SDLC discipline, the user may submit jobs to an OS/VS, DOS/VS and DOS/VSE operating system (and subsequent releases and modification levels unless otherwise stated) through the following:

RES (Rel. 6)	VS1 (Rel. 6.7)
JES2 (Rel. 4.1)	MVS (Rel. 3.7)
JES2/NJE (Rel. 2-3)	MVS (Rel. 3.7)
JES3 (Rel. 3)	MVS (Rel. 3.7)
POWER/VS	DOS/VS (Rel. 34)
VSE/POWER	
with RJE feature	DOS/VSE (Rel. 2.0)

Using the BSC discipline, the user may submit jobs to the OS/VS and VM operating systems (and subsequent releases and modification levels unless otherwise stated) through the above, and additionally through:

RSCS	VM/370 (Rel. 5.0)
RSCS Networking	VM/370 (Rel. 6)
	VM/SE (Rel. 2)

IBM host S/370 or 4300 RJE programming support is generated by specifying the IBM 8100 Information System as an SNA terminal under the SNA/SDLC protocol or as a S/360/370 multi-leaving workstation (Mdl 25) under the binary synchronous communication line control discipline.

DPPX/RJE will operate on an IBM 8100 Information System with DPPX/BASE installed, providing there is sufficient storage to satisfy the combined requirements of DPPX/RJE, DPPX/BASE, and other customer required programs.

The minimum processor storage requirement for DPPX/RJE operating under the SDLC protocol with one input or output device specified is 30K bytes. When using the system default values, which have been selected to provide performance for a typical SNA RJE user, 34K bytes of main storage is required with an IBM 3289-3 printer as the only active device. Each additional input or output device requires a minimum of 10K bytes.

The minimum processor storage requirement for DPPX/RJE operating under the BSC protocol with one input or output device specified is 48.5K bytes. When using the system default values, which have been selected to provide performance for a typical BSC multi-leaving RJE user, 54K bytes of main storage are required with an IBM 3289-3 printer as the only active device. Each additional input or output device requires a minimum of 7K bytes.

These storage requirements do not include processor storage required by DPPX/BASE for the RJE operator environment, or for the host link and the printer, or processor storage required by any other programs which may be used in conjunction with DPPX/RJE.

The configuration must include sufficient I/O devices to support the requirements for system output, system residence, and system data sets. Sufficient direct access storage must be available to satisfy the user information storage requirements and may consist of any direct access facility supported by 8100/DPPX.

Use of DPPX/RJE requires a keyboard/display or keyboard/printer supported as a DPPX/BASE operator's terminal to function as an RJE console. The DPPX/BASE operator's terminal may be used concurrently as an RJE console.

**SOFTWARE REQUIREMENTS**

The DPPX/RJE licensed program is designed to work with the DPPX/BASE licensed program.

This licensed program is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX assembler language with most of the original PL/DS statements shown as comments.

Source code is available on magnetic tape, and program listing on microfiche, as related optional material.

The following program is required:

DPPX/BASE, 5760-010

Use of DPPX Assembler (5760-AS1) to generate or modify forms control buffers (FCBs) may be desired, but is not required.

**CONVERSION**

Conversion from other IBM RJE products may require:

- Respecification of the 8100 to the host job entry subsystem.
- Specification of a DPPX environment and associated resources for execution of DPPX/RJE.
- Adjustment to the DPPX/RJE operating environment (commands, operator activities, etc.). The installation may utilize the command synonym and procedural capability to help minimize the effect of some differences.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/RJE General Information* (GC30-3053) ... *DPPX/RJE Administration and Operation: Guide* (SC30-3129) ... *DPPX/RJE Licensed Program Specification* (GC30-9539).

**SYSTEM INTEGRITY:** Refer to section GI 23.2.

**RPQs ACCEPTED:** No

PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
APL (DPPX APL)  
5760-XR2**

**PURPOSE**

The DPPX APL program product provides the APL programming language for use on the 8100 Information System. DPPX APL supports application program development and personal computing in the distributed data processing environment. DPPX APL complements VS APL on the host with local APL processing of local data.

DPPX APL enables users to write, debug and execute APL programs - from informal casual programs to full size interactive application programs using local data bases.

**HIGHLIGHTS**

DPPX APL is an IBM program product that provides APL programming language for use on the 8100 Information System.

The following list summarizes how DPPX APL supports application program development and personal computing in the distributed data processing environment. DPPX APL complements VS APL on the host with local APL processing of local data.

The DPPX APL user can:

Write, debug, and execute APL programs - from informal casual programs to full size interactive application programs using data bases.

The DPPX APL language is designed to be compatible with VS APL, Release 4.0. DPPX APL includes the primitive functions and operators provided by VS APL, and the system commands, system variables, and system functions provided by VS APL, with a few exceptions. Terminal support and auxiliary processing used to access program services outside the APL environment are different from VS APL. APL support functions help to provide auxiliary processing compatibility.

Access screens defined through DPPX Distributed Presentation Services (DPPX/DPS) or the FM component of DPPX/SP. These screens can be used for interactive applications developed in APL. However, creation of maps (defining screens) is done outside the APL environment, using the IMD component of DPPX/DPS or DPPX/SP IMD. (Note: APL characters cannot be used in fixed fields.)

Access data stored in DPPX or DPPX/SP data sets and DPPX Data Base and Transaction Management Systems (DPPX DTMS) data bases.

Execute DPPX/BASE or DPPX/SP commands. These provide access to the input/output services and other services of DPPX/BASE.

Use support functions that help the user to set up interfaces to DPPX or DPPX/SP functions such as DPS and DTMS. The support functions provide a high-level interface, that is easier to use than the low-level interface to the DPPX APL Auxiliary Processor, through which all DPPX communication is performed using APL Shared Variables. These functions are coded in APL and supplied with the product.

Interface with programs written in other languages, provided they conform to DPPX or DPPX/SP linkage conventions. The interfaces must be defined to the DPPX APL Auxiliary Processor.

Interface with other APL sessions and workspaces on the same 8100 system. An application program can thus be structured using more than one working area.

Access a working area of approximately 60,000 bytes.

Format workspaces and APL objects for subsequent sending to VS APL on the host processor, and after receiving APL objects from VS APL. The VS APL workspace needed is distributed with DPPX APL.

**CUSTOMER RESPONSIBILITIES**

- Install DPPX APL.
- Obtain education in using the APL language, if needed.
- Obtain education in using DPPX or DPPX/SP, DPS AND DTMS, if needed for application development using APL.
- Carry out problem determination procedures before contacting IBM for program service.
- Update DPPX APL and related products with fix packages as appropriate.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

DPPX APL is designed to operate on the following IBM machines:

IBM 8130 or 8140 processor with 768K or more bytes of storage. Floating-point hardware (feature #3750, available only with 8140) is recommended for performance reasons.

The following IBM devices are supported:

8775 Display Terminal - mdl's 1, 2, 11, 12

3276 Control Unit Display Station - mdl's 11, 12, 13 14

3278 Display Station - mdl's 1, 2, 3, 4 (for attachment with 3274/3276)

3279 Color Display Station - mdl's 2B, 3B (no specific color support) (for attachment with 3274/3276)

3287 Printer - mdl's 1, 1C, 2, 2C (no specific color support) (for attachment with 3274/3276)

The corresponding APL feature must be installed on the above devices if they are to be used for editing APL functions or if the APL characters are otherwise required.

The following list gives the APL feature code and prerequisite feature codes for these devices:

Device	Feature #
8775	4626, 3905, 3624, 3622
3276	4626, 1120, 1067, 1068, 3610
3278	4626, 1120, 3610
3279	4626
3287	1120, 3610, 9082

**STORAGE REQUIREMENTS:** The minimum storage required for the APL environment is 230K bytes of real storage. The APL environment contains the APL interpreter and a minimum of one swap slot of 64K bytes for active workspaces.

Additional storage is needed for users logged on to DPPX APL. The minimum requirement per user is 12K bytes of real storage.

Additional storage may be needed due to application and performance requirements for APL and user environments. The maximum number of swap slots is four.

**SOFTWARE REQUIREMENTS**

The following programs are required for installation and operation of DPPX APL:

DPPX/BASE (5760-010) service level 0701 and subsequent service levels, unless otherwise stated by IBM, or DPPX/SP (5660-281).

DPPX/DPS V2 (5660-264) service level 0100 (Format Management) (feature #9520), and subsequent service levels, unless otherwise stated by IBM.

To use particular functions the following programs may be required:

DPPX DTMS (5760-TD1) service level 0303 and subsequent service levels, unless otherwise stated by IBM, for access to DTMS data bases.

Distributed Systems Executive (DSX) (5748-XXG) on a S/370, 4300 or 30XX host, for transfer of APL objects to and from the host.

DPPX/DPS V2 (5660-264) Interactive Map Definition (feature #6000), or DPPX/SP IMD for ability to define DPS maps.

**CONVERSION and COMPATIBILITY**

Existing VS APL functions, workspaces and applications may need conversion and restructuring before executing them on an 8100 system. The APL language differences are minimal; however, some system interfaces are different (such as I/O and DPS screen access) and maximum workspace sizes are different.

When converting from DPPX APL to VS APL, consideration must be given to functions provided in DPPX APL but not in VS APL, as well as to the above considerations.

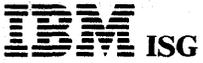
**PERFORMANCE CONSIDERATIONS**

The performance of DPPX APL is dependent on the system resources available, in particular:

Floating-point hardware

Storage

Amount of storage available for system transient areas, and amount of resident code for DPPX APL



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PP 5760-XR2.2

Jul 83

PROGRAM PRODUCTS

DPPX APL (cont'd)

**DOCUMENTATION**

(available from Mechanicsburg)

*General Information Manual* (GH19-6208)

The following publications will be available on product release:

*Licensed Program Specifications* (GH19-6207) ... *User's Guide* (SH19-6209) ... *Messages and Codes* (GH19-6244) ... *Diagnosis Guide and Reference* (SH19-6210) ... *Microfiche* (LYA9-6159).

RPQs ACCEPTED: No

DPPX/BASE SYSTEM INTEGRITY APPLIES: Yes

## PROGRAM PRODUCTS

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
PERFORMANCE TOOL (DPPX/PT) MONITOR  
WITH REPORTER FEATURE  
DPPX/PT Release 2 (5760-XR5)****PURPOSE**

The DPPX/PT Monitor, together with the DPPX/PT Reporter feature, is a licensed program that monitors and reports on the activity of components of the Distributed Processing Programming Executive Base (DPPX/BASE), the Distributed Processing Programming Executive/ System Product (DPPX/SP), and DPPX Data Base and Transaction Management System (DPPX/DTMS) licensed programs. The DPPX/PT Monitor is a program which collects performance data. The DPPX/PT Reporter feature is a program that generates reports on the basis of the data collected by the DPPX/PT Monitor. The regular use of DPPX/PT can provide a basis for performance management of an 8100 DPPX or DPPX/SP system.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/PT General Information (GH20-2155) ... DPPX/PT Program Reference and Operations Manual (GH20-2502) ... DPPX/PT Licensed Program Specification (GH20-5291).*

**SYSTEM INTEGRITY:** Refer to section GI 23.2.

**RPOs ACCEPTED:** No

**HIGHLIGHTS**

DPPX/PT provides both general and detailed information to help manage the performance of a DPPX system.

- Processor Information.
  - Utilization by priority level.
  - Distribution of dispatch queue by priority level.
  - Utilization by environment.
- Real Storage Information.
  - Queuing for real blocks to back transient areas.
  - Range of real storage allocation.
  - Usage of transient modules.
  - Buffer and storage usage by environment.
- DASD Information.
  - Utilization by device.
  - Distribution of request queue by device.
  - DASD data set utilization.
- DTMS transaction statistics.
  - Number of transactions by type.
  - Time under DTMS control by type.
    - Time waiting for dispatch.
    - Time dispatched.

**CUSTOMER RESPONSIBILITIES**

It is anticipated that customer personnel will be able to install and run the DPPX/PT programs and that system programmers will be able to use the DPPX/PT reports after studying the DPPX/PT manuals.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

DPPX/PT is designed to operate on an IBM 8100 DPPX/BASE or DPPX/SP Information System with sufficient real storage to satisfy the combined requirements of DPPX/PT, DPPX/BASE, DPPX/SP and DPPX/DTMS when the DTMS option is selected, and other customer required licensed programs and applications. This must include storage for the software timer which is used by DPPX/PT and which must be available when running the DPPX/PT Monitor. The real storage required for basic measurements is 8.5K for the DPPX/PT Monitor and 13.5K for the DPPX/PT Reporter feature. Optional additional measurements require additional storage. See *DPPX/PT General Information Manual (GH20-2155)* for storage details.

An output device, either DASD or magnetic tape, must be provided. If the reports are to be printed locally, a printer is required.

**SOFTWARE REQUIREMENTS**

This licensed program is designed to work with the DPPX/BASE and DPPX/SP licensed programs. If data regarding DPPX/DTMS is desired, then the DPPX/DTMS licensed program is also required. No other licensed programs are required to use DPPX/PT.

DPPX/PT is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX Assembler language containing PL/DS statements as comments.

**DATA SECURITY, AUDITABILITY, and CONTROL**

DPPX/PT programs run under DPPX/BASE or DPPX/SP, and access to them may be controlled using DPPX/BASE or DPPX/SP facilities such as user authorization. Since the DPPX/PT Monitor program is privileged to run in master mode, access to it should be limited. User management is responsible for the selection, implementation, and adequacy of the security controls.



**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
DATA CAPTURE AND MANAGEMENT SYSTEM  
DCMS/DPPX Release 1 (5760-XR6)**

**PURPOSE**

This licensed program is a data entry package for users of the 8100 Information System that simplifies the design, setup, and execution of the user's data entry applications. The DCMS/DPPX licensed program consists of an interactive job definition program, an online executor for data capture, and two batch utility programs for DCMX/DPPX local data interchange and statistical recording.

**HIGHLIGHTS**

- Provides online interactive definition of data entry unique requirements.
- Provides ENTRY, VERIFY, SCAN, CORRECT and BROWSE functions.
- Provides a comprehensive set of checks and edits and allows exits for user-defined checks and edits.
- Provides operator statistics, including: Batches completed, saved, cancelled; key strokes per hour (by processing function or mode); error counts and errors per batch per hour.
- Provides immediate availability of entered data to other DPPX application programs.
- Simplifies the setup of data entry jobs.
- Provides the capability to update (add or delete) data items in a record structure.
- Provides 8775 screen partition support in enter mode.
- Provides sub-batching support allowing multiple operators to process related data sets.
- Provides online batch management utilities.
- Provides online operator status utilities.
- Provides utilities to print copies of record and job procedure definitions.
- Provides the capability to restrict the terminal operator to access only authorized functions and data sets.

Five operational functions may be selected by the data entry operator:

- ENTER** -- Batched data may be entered into the system through enter mode. The data is checked and edited according to user specified edits as soon as the operator depresses the "ENTER" key. The operator may then correct any errors. Any data in error which cannot be resolved can be written to the file as a "marked" record to be examined later. Records may also be "flagged" to indicate some unusual condition noted by a terminal operator.
- VERIFY** -- Verify mode is used for checking the accuracy of the data which has already been entered. If the verify data does not match the previously entered data, the operator is required to resolve the conflicts. The level of verification is user selectable. The user may choose to verify every record, or only those which have been defined as "requires verification".
- SCAN** -- Scan mode allows any authorized operator to browse through the batch and examine and change any record. In scan mode an operator may insert, delete, mark or flag, and modify records. Any scan mode data modifications must pass the user-defined edits.
- CORRECT** -- In the correct option of scan mode, only records which have been marked or flagged are displayed to the operator. The operator may correct the records, delete them, or mark them again. Any modified data is edited according to user specifications.
- BROWSE** -- Browse enables a user to examine a batch file in read only mode.

DCMS/DPPX provides the following check and edit capabilities:

- Required field.
- Minimum length input.
- Alphameric.
- Alphabetic.
- Character (any EBCDIC characters).
- Numeric (signed or unsigned)
- Blank detection.
- Date check.
- Time and date insertion.
- Justify and fill (left or right).
- Automatic field duplication.
- Automatic field skip (entry, verify).

- Field verification required.
- Self check (mod 10 or mod 11, verify or generate).
- Table value substitution.
- Table validation (range checks and/or lists).
- Batch total accumulation and balancing.
- User-defined exits (field and record level).
- Constant insertion.
- Duplicate character (Type 3 map processing).
- Field resequencing.
- Field-to-counter arithmetic operations.
- Self check (user mod NN, verify or generate)

DCMS/DPPX requires a number of input, output, and work files to retain information as it is processing the various data entry facilities. These files are:

1. DCMS/DPPX job parameter table.
2. DCMS/DPPX journal file.
3. DCMS/DPPX error table file.
4. DCMX/DPPX profile file containing operator and batch records.

**CUSTOMER RESPONSIBILITIES**

To install and use DCMS/DPPX program product the user must: Acquire a knowledge of the functions provided by the different facilities ... learn how to use the definition facilities for unique information required by DCMS ... provide the necessary batch data sets to be used ... provide any necessary user programming to perform functions not provided by DCMS/DPPX. This may be accomplished via user exits. The customer may elect to write his own routines to be run by the DCMS/DPPX executor or DPPX/BASE or DPPX/SP batch facilities. This capability enhances the user's options for further checks and edits, file I/O, or other functions to be performed during execution time of the DCMS/DPPX product.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum configuration for data entry definition and execution under DCMS/DPPX is:

IBM 8100 Information System with 512K bytes of processor storage and 23 or 29 megabytes of disk storage if using DPPX/BASE or 58 megabytes of disk storage if using DPPX/SP.

IBM operator console or terminal

IBM display terminal with 1920-character screen (can be operator console)

**Processor:** DCMS/DPPX and its generated job parameter tables will run only on an IBM 8100 Information System.

**Main Storage:** In an execution environment, DCMS/DPPX requires a minimum of 54K bytes of main storage for resident processing requirements plus an additional 6K bytes for non-resident processing. (Actual storage requirements may vary up to 78K because of unique application requirements and concurrent use of multiple modes and functions in a shared environment.)

Each operator requires an additional minimum of 6K bytes. The basic 6K byte user storage area will support a DCMS/DPPX job definition which includes a single map for a data entry application.

The amount of additional storage required by each operator is directly dependent upon:

- The number of maps and the number of associated entry fields.
- The number and size of user records.
- The size of user exit processing routines.
- The number and size of user validation services.

The above storage estimates do not include the storage required for DCMS/DPPX dependent products (DPPX/BASE, DPPX Distributed Presentation Services (DPPX/DPS), or DMS/DPPX).

As DCMS/DPPX uses DPPX/BASE and DPPX/DPS Format Management (FM) services for device access, the appropriate manuals should be consulted for the additional storage requirements. The storage requirements of the user's subroutines will depend on the facilities used and the complexity.

**Disk Storage** DCMS/DPPX operating environment requires disk storage space of approximately 6,000 blocks. Data

## PROGRAM PRODUCTS

**DCMS/DPPX (cont'd)**

set space varies with the number of terminal types and size of procedures defined within DCMS/DPPX.

**Peripherals** For use of DCMS/DPPX in either a developmental or execution environment, a DPPX/DPS-supported display terminal with at least a 1920-character screen is required.

**SOFTWARE REQUIREMENTS**

DCMS is written in Programming Language for Distributed Systems (PL/DS). It is designed for execution together with DPPX/BASE.

For the development environment, DCMS/DPPX requires the following IBM licensed programs:

Program Name	Program #
DPPX/BASE	5760-010
DPPX/DPS V1 or V2	5760-XR1 5660-264
DMS/DPPX	5760-XC2

**Note:** DMS/DPPX is required for table definition. It is also recommended for map definition but not required. Map definition may be accomplished using DPPX/DPS-IMD.

For the execution environment, DCMS/DPPX requires the following IBM licensed programs:

Program Name	Program #
DPPX/BASE	5760-010
DPPX/DPS FM V1 or V2	5760-XR1 5660-264

**Note:** If the customer elects to write user exits, then the appropriate compiler is required for the development environment and the appropriate library is required for the execution environment.

DCMS/DPPX customers may use the following products:

Program Name	Program #
DPPX/ASM (Assembler)	5760-AS1
DPPX COBOL Compiler	5760-CB1
DPPX COBOL Library (required if execution of COBOL subroutines is selected)	5760-LB1
DSX (Distributed Systems Executive) Release 2 (may be used to transmit batch files to a S/370 or 4300)	5748-XXG
DPPX/RJE (Remote Job Entry Workstation Facility) (may be used to transmit batch files to a S/370 or 4300)	5760-XC1

**PERFORMANCE CONSIDERATIONS**

Because of the variations possible with an 8100/DPPX system, it is difficult to predict performance. The performance of DCMS/DPPX is highly dependent on the following:

- Size and complexity of the DCMS job definition
- Customer's use of user-written routines
- Amount of resources available - memory, disk storage, etc.
- Data file placement
- Number of batch or online users
- 8100 environment in which the DCMS product is executing

**DOCUMENTATION**

(available from Mechanicsburg)

*DCMS/DPPX Licensed Program Design Objectives (GH20-5053)*

**SYSTEM INTEGRITY:** Refer to section GI 23.2.

**8100 INFORMATION SYSTEM  
DISTRIBUTED PROCESSING PROGRAMMING EXECUTIVE  
DPPX/BASE (5760-010)**

**PURPOSE**

The following paragraphs contain general information pertaining to DPPX/BASE through the Functional Enhancements Package 5 (FEP 5) service level. A section at the end of these pages covers the highlights of later FEPs and service levels.

DPPX/BASE is a licensed program designed for distributed data processing applications running on 8100 Information Systems. It provides multi-programming, multi-user and multi-level system support for concurrent application environments. Interactive, batch, and plant floor applications are supported.

DPPX/BASE provides a variety of functions to communicate with S/370, 4300, other 8100 systems, and terminals. There are facilities to simplify installation, application design, program development and system operation. DPPX/BASE provides general usage system support which may be tailored or modified to suit unique requirements.

DPPX/BASE may operate alone or with the following related licensed programs (described separately).

**DPPX Licensed Program**

- Distributed Presentation Services (DPPX/DPS)
- Presentation Services for 3640 Terminals (DPPX/PS3640)
- Data Base and Transaction Management System (DPPX/DTMS)
- COBOL Compiler (DPPX/COBOL Compiler)
- COBOL Library (DPPX/COBOL Run-Time Library)
- FORTRAN Compiler (DPPX/FORTRAN Compiler)
- FORTRAN Library (DPPX/FORTRAN Library)
- Assembler (DPPX/ASM)
- Sort/Merge (DPPX/SORT)
- Data Stream Compatibility
- Remote Job Entry Workstation Facility (DPPX/RJE)
- Parameter Table Generation Facility for IBM 3644 Automatic Data Unit (DPPX/GEN3644)
- Development Management System (DMS/DPPX)
- Data Capture and Management System (DCMS/DPPX)
- Performance Tool (DPPX/PT)

**SYSTEM/370 and 4300 Licensed Programs**

- Distributed Systems Executive (DSX) Release 2
- Host Command Facility (HCF)
- Distributed Processing Development System PRPQ (DPDS) - with Programming Language for Distributed Systems (PL/DS)

**DESCRIPTION**

The major components of the DPPX/BASE licensed program are:

- Supervisor
- Command Facility
- Device Support
- Communication Support
- Data Management
- Interactive Editor
- Linkage Editor
- Interactive Debug
- Batch Capability
- Printer Sharing
- General Utilities
- Initialization, Customization and Service Functions
- Reliability, Availability, and Serviceability (RAS)

**SUPERVISOR**

The supervisor is a fundamental part of the DPPX/BASE licensed program. It provides the basic services to manage the resources of the system:

- Processor and error recovery management, which handle interrupts, and schedule and dispatch the units of work (threads) at each machine level in the system.
- Basic services, which manage queues, locks and timers. Queuing, locking and timer services may be used directly by user assembler language programs. Timer services provide a time-of-day clock and multiple logical interval timers.
- Storage and contents management, which keep track of the relationships among address spaces and other system resources.

- Initial Program Load (IPL) function, which permits any of several DPPX systems to be selected by the operator at IPL time.

**Addressing Structure**

- The logical addressing structure of the 8100 (4MB) allows DPPX/BASE to use any group of 2048 byte blocks of main storage to build an address space for the programmer, which appears as a single contiguous area.
- DPPX use of 8100 logical addressing provides:
  - Flexible allocation of main storage.
  - Storage protection, which may be used to protect DPPX from user applications and one user application from another.
  - A common area, which is available to all applications for shared programs and storage.

**COMMAND FACILITY AND COMMANDS**

A comprehensive set of commands are provided with DPPX/BASE to define system environments, initiate work, and manage the operation and resources of the system. Terminal users, user applications, batch programs, and operators communicate with DPPX/BASE using this single set of commands.

The command facility interprets these commands and invokes the interactive editor, interactive debug, linkage editor and the assembler and compiler licensed programs, as necessary, in order to execute commands.

DPPX can be customized dynamically. Using commands, new resources may be added to the system when they are acquired. Customization can be done interactively at a terminal. With commands, a customer can install, execute, and service DPPX. Included are commands to:

- Set time and date.
- Define, support, and delete resources (devices, adapters, network links, programs, data sets, commands etc.)
- Execute commands, command lists and jobs.
- Edit programs and data sets.
- Copy, move, index, print and display data and messages.
- Debug programs.
- Link edit programs.
- Service DPPX.
- Compile programs (if a compiler licensed program is installed).

Commands may be executed interactively by the terminal user or by batch methods. (Commands are available from DPPX/FORTRAN, DPPX/COBOL, and DPPX/ASM coded programs, by using a CALL statement.)

The user can write commands and command lists unique to the installation and define an application program that can be called by a command. Command names can be readily abbreviated or changed.

A command list is a series of commands which may be defined by the user or by IBM to perform a predetermined set of operations. A list can use substitution parameters and make unconditional branches forward as well as branch on return codes.

Individuals can be restricted to a subset of the command repertoire by using authorization profiles; that is, the customer may not permit all users to access all commands, particularly commands which could affect system integrity.

The command facility provides capability needed by the customer to write a program (in assembler language) to perform system operator functions. This program can provide a programmed series of predefined actions which will permit an 8100/DPPX system to run virtually unattended.

**DEVICE SUPPORT**

**Overview:** DPPX/BASE provides programming support for the many devices that can be attached to the 8100. For most devices the programmer may use the SEND/RECEIVE macros to handle logical records without concern for the physical device characteristics. Through the SEND/RECEIVE macros (and their equivalents in the DPPX COBOL or FORTRAN languages or PL/DS), the user can refer to data in a device independent manner. For example, a user program can communicate with a terminal, another user program (local or remote) or a pair of sequential data sets (one for input, one for output), without any change to the program. Since IBM licensed programs also use these macros, the 8100 user can readily substitute alternative devices. Depending on the device, this user interface may be supported by:

PROGRAM PRODUCTS

DPPX/BASE (cont'd)

- Sequential presentation services for disk, IBM Diskette Type 2D and tape.
- Unit record presentation services for input only or output only devices.
- Line/page presentation services for interactive devices and user applications.

Printer control characters may optionally be used with unit record presentation services. The IBM 3287 SNA Character String (SCS) Support Feature (#9960) is a prerequisite for presentation services support of the 3287 Printer mdls 1 and 2.

Lower level interfaces may be used to satisfy special requirements.

**General Device Support:** Programming support is available for the following devices: (IBM devices, unless otherwise indicated, and supported by both DPPX and DPPX/SP, unless otherwise indicated).

8130 and 8140 Processors

8101 Storage and I/O Unit

Disk Storage (included in 8130/8140 and optionally in 8101)

Diskette Storage Type 2D (included in 8130/8140 and optionally in 8101)

2502, 3501 Card Readers and 3521 Card Punch

8809 Magnetic Tape Unit

**Printers**

3230 mdls 1, -2

3262-2, -3, -12, -13

3268-1, -2

3284-1, -2

3286-1, -2

3287-1, -1C, -2, -2C, -11, -12

3288-2

3289-1, -2, -3

5210-E01, -E02, -G01, -G02 (DPPX/SP only)

6580 Displaywriter System (through 3270 Data Stream Compatibility licensed program)

(Note that keyboard/printers may be used as printers for most functions.)

**Keyboard/Displays**

3104-B1, -B2 Display Terminal

3178 Display Station

3274-41C Control Unit

3274-51C Control Unit

3274-61C Control Unit

3276-1, -2, -3, -4 Control Unit Display Station with SDLC/BSC switch set to SDLC

3276-11, -12, -13, -14 Control Unit Display Station

3277-1, -2 Display Station

3278-1, -2, -3, -4, -5 Display Station

3279-2A, -2B, -3A, -3B Color Display Station

3290 Information Panel

6580 Displaywriter System through:

- 3270 Data Stream Compatibility (3278)

- 3277 Device Emulation (3277)

- 3277 Device Emulation/Document Transfer (3277)

8775-1, -2, -11, -12 Display Terminal

**Keyboard/Printers**

3232-1, 11 Keyboard Printer Terminal

3767-1, -2, -3 Communication Terminal

2741 Communication Terminal

Western Union Teletypewriter Exchange Services M33/35, or IBM

3232-51 or equivalent, for example, the IBM 3101 Display Terminal (Character Mode)

(Note that data sent to or from the 2741 is not error checked.)

**3640 Devices**

3641 Reporting Terminal (Appears as a keyboard/prINTER)

3642 Encoder Printer (Appears as a printer)

3643 Keyboard Display (Appears as a keyboard/display)

3644 Automatic Data Unit (Appears as a keyboard/prINTER)

3645 Printer

3646 Scanner Control Unit (Appears as a keyboard/prINTER)

3647 Time and Attendance Terminal (Appears as a keyboard/prINTER)

Includes the following controllers supported as a keyboard printer:

3600 Finance Communication Controllers

3630 Plant Communication Controllers

3650 Store Controllers

3680 Point-of-Sale Control Unit

4700 Finance Communication Controllers  
8100 Information System with DPCX

When a controller or communication processor is supported on a host via Data Stream Compatibility (DPPX/DSC), the PU services available are those supported by the then current level of DPPX/BASE.

User applications may appear as a keyboard/prINTER terminal to other user applications, and to certain DPPX functions. A DPPX/BASE function, remote intercommunication, is used to create this appearance.

**Attachment of Specialized Subsystems**

- 3270 Personal Computer Attachment
- 3640 Plant Communication devices for host communication via Data Stream Compatibility (DSC)
- 5150 Personal Computer
- 5280
- 6580 Displaywriter with Displaywriter 3270 Data Stream Compatibility (DSC)
- Series/1

**BSC Protocol Support:** DPPX provides specific support for the following BSC protocols:

- 2780/3780 line protocol on a point-to-point BSC line using the SEND/RECEIVE macros. This interface is supported for output only operations (as a printer) and for input only operations (as a card reader).
- 8100 as a 3271 attached to a S/370 or 4300 host on a nonswitched multipoint BSC line. (Used by DPPX/DSC.)
- 8100 as a S/360 mdl 25 MULTI-LEAVING RJE Workstation on a point-to-point BSC line to a S/370 host. (Used by DPPX/RJE.)

**8775 Support**

- Supported by DPPX/BASE line/page presentation services (SEND/RECEIVE macros).
- User programming or other DPPX licensed program can support 8775 advanced functions such as highlighting, multiple partitions and field validation.
- DPPX/BASE can accept and store diskettes containing 8775 functional support.
- DPPX/BASE loads the 8775 with the appropriate functional support when the device is activated.

**Display Copy Support:** The following support is available for operator initiated copy from a display onto a printer:

- 8775-1, -2 and 3104-B1, -B2 onto a loop attached 3268-1 or 3287-11, -12 or a 3230-1.
- The 3276, the 3278 and the 3279 may also copy onto 3276/3274 attached printers independent of DPPX/BASE.

**COMMUNICATION SUPPORT**

DPPX is designed for interactive operation in a host S/370 or 4300 controlled or DPPX controlled network. Communications support is an integral part of the DPPX/BASE licensed program support. It provides:

- Independence of Network Appearance.  
The DPPX/BASE structure allows non-SDLC devices to be managed and to appear as similar SDLC devices, transparent to user applications or higher level DPPX functions.
- Link Independence.  
User applications need not be concerned with the particular physical link to which devices are attached.
- Link Sharing.  
SDLC links may be shared by many sessions. For example, DPPX/RJE and HCF can share a host link concurrently with a number of 3270 terminals.
- Multiple Host Links.  
Multiple communication links between an 8100 and one or more S/370 or 4300 hosts allows, for example, DPPX/RJE to communicate with a S/370 or 4300 job entry subsystem, and DPPX/DSC, in the same 8100, to concurrently communicate with a S/370 or 4300 application in the same or a different host.

**DPPX/BASE (cont'd)**

- **Device Independent Communications.**

User programs which transfer logical records may, without change, communicate with a DPPX keyboard/display, keyboard/printer, a pair of data sets, or (using remote intercommunication support) a DPPX user application. The user program may be written in DPPX COBOL, FORTRAN (using READ and WRITE statements), PL/DS or Assembler language. All SNA terminals are supported in this manner as well as others, such as the 2741, 3232-51 and 2780/3780 BSC equivalent devices.

Logical record, device independent communications are supported, through the SEND/RECEIVE macros, by line/page presentation services for interactive devices, and by unit record presentation services for input-only or output-only devices. The logical record is broken into one or more lines and displayed. Similarly, a logical record is built from data entered from a terminal or unit record device.

- **Remote Intercommunication.**

DPPX/BASE remote intercommunication support allows communication between applications in two interconnected 8100/DPPX systems. (The systems are connected by a single link with no intervening systems). The applications communicate logical records with the SEND/RECEIVE macros (line/page presentation services) and may be written in DPPX COBOL, FORTRAN, PL/DS or assembler language. A user application can also connect to certain DPPX functions, such as the command facility or the DPPX/DTMS licensed program, which are written with these macros. The user application appears as a keyboard/printer terminal to these functions. Knowledge of node addresses is not required in the application, which refers to the destination symbolically. This symbol is resolved at execution time into the actual remote program and node names.

DPPX COBOL applications may communicate with a remote application or DPPX function. A DPPX system can form such sessions with several other systems. However, only one such session may exist between any given pair of systems.

DPPX assembler language and PL/DS may communicate with a local or remote DPPX application or function. Several sessions of that kind may exist within or between systems.

- **Adjacent Node Terminal Communications.**

Adjacent node terminal communications complements remote intercommunication described above. It supports networks of IBM 8100s by permitting SNA terminals and supported 3640 devices attached to an 8100 node to establish, via SDLC links, sessions with applications in adjacent 8100 nodes. Thus, such a terminal connected to an 8100 can access function in another 8100 connected to the first via an SDLC link (the ability to service 8100 systems using DSX and HCF requires the 8100 to be S/370- or 4300-connected). This facility includes capabilities for:

- A terminal at an 8100 servicing another 8100 system,
- A terminal at an 8100 getting transaction processing performed on a connected 8100,
- All program development being located at one 8100 while still having the capability available on a connected 8100,
- A terminal at an 8100 system communicating through DPPX/DSC, with a host S/370 or 4300 connected through an intermediate 8100, (similar to a terminal at a S/370 or 4300 communicating through HCF with 8100s connected through an intermediate 8100).

- **Host Transaction Facility.**

Allows DPPX/DTMS applications (written in DPPX COBOL, PL/DS or DPPX assembler language) and S/370 or 4300 IMS/VS and CICS/VS applications to communicate via SNA. The host transaction facility (HTF) uses host presentation services to handle host communication protocols. The host presentation services function is also available to the customer. HTF can be used by DPPX/DTMS applications to send transactions to and receive replies from IMS/VS (transaction dependent terminal response mode) and CICS/VS applications. Data base inquiry, update, and message integrity are supported. HTF requires the transaction processing manager part of the DPPX/DTMS licensed program and supports DPPX/DTMS applications written in DPPX COBOL, PL/DS and DPPX assembler language through a simple CALL statement. HTF thus provides a transaction management level of function for host communication.

HTF is designed for use with CICS/VS 1.4 and IMS/VS 1.1.4 or subsequent releases.

For CICS/VS, host transactions may be sent with or without an expected reply message.

A variable number of host sessions may be active concurrently, permitting the user to trade off link performance against processor and storage utilization.

HTF sessions and transactions are initiated at the 8100/DPPX node.

HTF support includes standard DPPX/DTMS transactions that display replies to transactions to the originating terminal and log unsolicited messages. The user may replace these transactions (for example, to route unsolicited messages). For solicited replies to transactions, the CALL statement and an HTF routing profile provide flexibility in specifying the program which is to process a transaction reply. The program (user or IBM supplied) which processes the reply runs as a DPPX/DTMS transaction and may use DPPX/DTMS facilities, such as the data base manager. It may also send a message to the requesting terminal.

Separate user transactions initiate the host transaction and process any reply. The DPPX/DTMS "scratch pad" may be used to save data for the reply transaction running under DPPX/DTMS which may itself initiate another host transaction. The DPPX/DTMS applications, however, are not part of a single DPPX/DTMS recovery scope.

- **Host Presentation Services.**

The host presentation services allows DPPX assembler language or PL/DS applications to communicate with host IMS/VS and CICS/VS applications and SNA over an SDLC link. The host presentation services provide an access method level of function for host communication. A header precedes all data and is used to communicate information between the host presentation services and the user, such as SNA sequence number handling and whether or not replies are required. The host presentation services also provide the communications protocol handling for HTF. The host presentation services use SLUTYPEP support in IMS/VS (IMS/VS 1.1.4 or subsequent releases) and the 3790 Full Function Logical Unit support in CICS/VS (CICS/VS 1.4 or subsequent releases). For host presentation services use with CICS/VS running under TCAM, note that CICS/VS contains no unique device support for TCAM. It is the responsibility of the TCAM programmer to provide support. DPPX documentation will describe the specific functions and capabilities of the host presentation services in relation to IMS/VS and CICS/VS.

- **Communication Services.**

The communication services provide a general set of SNA functions and protocols which are used by other DPPX components, services and licensed programs. The interface to communication services is referred to as the data stream interface and is available to Assembler language programs for specialized network communication. It permits DPPX assembler language or PL/DS applications to communicate with TCAM or VTAM applications or subsystems or with any SNA cluster or device. The Communication Services provide function analogous to the VTAM Application Program Interface (API).

- **Transform Services.**

Provided to integrate selected non-SDLC devices into the DPPX SNA network. For example, the BSC 2780/3780 is managed in this way.

- **EXCP BSC Interface.**

DPPX/BASE includes a basic set of BSC functions for direct control of BSC links and devices. These functions are available through the EXCP macro. BSC devices and protocols can be supported in this manner. Four modes of BSC operation are supported:

- Point-to-point primary.
- Multipoint control.
- Point-to-point secondary.
- Multipoint tributary.

Specifically excluded are the following:

- ASCII.
- Switched operation.

Specific testing and higher level function have been provided for the following BSC protocols:

- Multi-leaving BSC on point-to-point lines (for the DPPX/RJE licensed program).
- Appearance to the host as a BSC 3271 on a multipoint line (for the licensed program).
- Attachment of 2780/3780 compatible devices.

Two features of the DPPX structure can simplify the attachment of BSC devices:

**DPPX/BASE (cont'd)**

- The use of transform programs to manage and integrate non-SNA devices into DPPX as similar SNA devices.
- The isolation of specific device support from higher level components. For example, the DPPX/DTMS licensed program and the DPPX/BASE command facility are not concerned with whether the terminals in session with them are 2741 or 3767 terminals or whether the links are start/stop or SDLC.

• **Link Support.**

- Direct attached loop.
- Data link attached loop via the 3842/3843.
- Nonswitched point-to-point and multipoint SDLC links.
  - Cluster appearance of 8100/DPPX to a host.
  - DPPX systems to a controlling DPPX system.
  - Terminals connected to an 8100/DPPX system.

Includes the following controllers on nonswitched multipoint SDLC links:

- 3600 Finance Communication Controllers
- 3630 Plant Communication Controllers
- 3650 Store Controllers
- 3680 Point-of-Sale Control Unit
- 4700 Finance Communication Controllers
- 8100 Information System with DPCX

When a controller or communication processor is supported on a host via Data Stream Compatibility (DPPX/DSC), the PU services available are those supported by the then current level of DPPX/BASE.

Note that switched facilities may also be used to simulate a nonswitched line by manually establishing the connection. Switched network backup can also be accomplished in this manner.

- Switched SDLC link.
  - DPPX auto answer to S/370 or 4300.
- Nonswitched multipoint BSC tributary to S/370 or 4300.
- Point to point BSC 2780/3780 links.
- Nonswitched 2741, 3232-51 and Western Union Teletypewriter Exchange Services Model 33/35 or equivalent, start/stop links.
- Other BSC links and terminal types. The user is responsible for programming support for the particular BSC protocol, using basic BSC functions provided by DPPX.
- DPPX/BASE supports direct attached loops at 9600 and 38.4K bps, data link attached loops at 2400 bps, and communication links at up to 56K bps (SDLC) and up to 9600 bps (BSC) on an 8140, and up to 9600 bps (SDLC or BSC) on an 8130. See the machine pages for details.

**DATA MANAGEMENT**

A single data organization, the Relative Sequential Data Set (RSDS) is used to organize, access and catalog data sets in the 8100/DPPX.

**Access Methods:** Data management provides two access methods, relative sequential and indexed.

The Relative Sequential Access Method (RSAM) provides the following capabilities:

- Direct access to records using a relative record or block number.
- Sequential access to records.

Indexed access to records using the Indexed Access Method:

- Up to 8 indexes, each accessing the data set with a different key, may exist concurrently.
- Indexes and the corresponding data records are maintained in separate data sets.

Direct and indexed access methods apply only to disk and IBM Diskette Type 2D storage. Sequential access may be used for most supported devices through the SEND/RECEIVE macros.

**RSDS Structure:** RSDS organization provides a common method of organizing data with the following characteristics:

- Records may be any size from 2 up to 4096 bytes for disk and diskette.
- Records may be any size from 18 up to 4096 bytes for tape.
- For disk and diskette storage, logical blocks may be any multiple of 256 bytes up to 4096 bytes. For tape, logical blocks may be any size from 18 bytes to 4096 bytes.
- All records in a data set must be the same size.

- All logical blocks in a data set must be the same size.
- At the user's option, locking is performed at the logical block level.

**System Catalog**

- The system catalog contains profiles of all data sets catalogued on the system residence volume, as well as all user and volume catalogs known to DPPX.
- Utilities are provided to list and modify the system catalog.

**User Catalogs**

- Multiple user catalogs may be created and updated.
- Utilities to list and modify the user catalogs are provided.

**Volume Catalogs**

- Provides capability of exchanging data between DPPX systems using diskettes as transporting media.

**Tape Labels:** Tape labels compatible with S/370 and 4300 are supported for tape processing. The DPPX/BASE licensed program provides support for tape label processing for IBM 'standard' labels, 'non-standard' labels, 'standard user labels' and unlabelled tapes. The label processing capability allows tape interchange with other systems using IBM-defined labels and allows the user the flexibility of establishing unique label formats for use within a customer enterprise.

**INTERACTIVE EDITOR**

The interactive editor is an editor for entering and editing data (character and hexadecimal internal formats). It operates as a line editor from keyboard/printers and keyboard/displays, or as a full screen editor (using the DPPX/DPS licensed program) on displays. It may be used to enter and edit source programs written in any DPPX programming language. The interactive editor can also be used for subsequent updating and reformatting.

**LINKAGE EDITOR**

The linkage editor supports the language translators by combining and linking object procedures (output of the language translators) into load modules. The linkage editor can also be used for module editing, to reserve storage for common areas and to build overlay structures.

It has options for special processing and produces output reports and diagnostics.

**INTERACTIVE DEBUG** The interactive debug facility can be used with any of the languages offered by DPPX. A simple command set allows the programmer in a terminal session to:

- Invoke a program to be tested.
- Place break points in the program at which execution is to be suspended, and display or alter any areas or registers within the program.
- Invoke dump facilities.

**BATCH CAPABILITY**

Batch processing is provided via the DPPX SUBMIT.BATCH command. The user enters "SYSIN" records into a data set either interactively, using the interactive editor, or via tape, diskette, disk or card reader. The SUBMIT.BATCH command is then issued to enter the job into the batch queue.

The batch processor, when active, will scan the job queue for "jobs" and will initiate them.

**PRINTER SHARING**

Printer sharing allows multiple users to write output to a print data set rather than directly to the printer. Printer sharing permits multiple interactive application programs, batch programs, utilities, and RJE "SYSOUT" to share the system printer facility by spooling output to the disk. Multiple printers are supported up to a maximum of four printers.

**GENERAL UTILITIES**

The utilities offered in DPPX are data management oriented. They include:

- Volume initialization for tape and disk storage.
- Copy data function.
- A utility to build indexed data sets.
- Commands to list catalogs.
- DEFINE, ALTER and DELETE data set and catalog commands.
- A stand-alone disk storage DUMP/RESTORE.
- A system trace to assist in analyzing and debugging the system.
- A stand-alone processor storage dump.
- Utilities to format and print storage dumps.

## DPPX/BASE (cont'd)

- Ability to read or write basic data exchange from or to an IBM Diskette Type I or IBM Diskette Type 2D on an IBM Diskette Type 2D Drive.

### ACCOUNTABILITY

DPPX provides the customer with tools, facilities, and options for a level of protection at each node of a distributed system.

**Authority:** For each object known to DPPX (people, programs, data sets, commands, physical devices, logical devices), there is a DPPX structure known as a profile -- a list of descriptors of the object. The profiles for people, programs, data sets and commands include authorization descriptors called credentials; the credentials of all of these objects attest to the authority they have to make use of other controlled objects. These credentials are known as authority credentials. Objects usable by others also have requirement credentials stating what authority is needed in order to use them. For one object to use another, the authority credentials of the first must include at least the requirement credentials of the second.

Requirement credentials and authority credentials are compared by the command facility in behalf of data set commands, the linkage editor, the interactive editor, and the interactive debug facility. This verification routine may be replaced by the DPPX/BASE user.

**Password Protection:** The profile for a user has a field for a password. When a user logs onto DPPX/BASE, the password contained in the profile must be supplied or the user will be rejected. Rejections result in a message to the system operator and can be journaled. Passwords may be changed by personnel with proper data set access privilege.

**Isolation:** A person can function as if he alone were using the system. Isolation (user/user, application/application, user/system, application/system) is achieved in DPPX by the environment structure, private address spaces, four levels of privilege for instructions, and eight levels of priority for interrupts. (This latter isolates program checks to the level to which they occur.) Storage protection is another facility used.

**Cryptography:** Cryptographic protection over a communication link, other than loop, is provided by the IBM 3845 and 3846 and is used to encrypt/decrypt at each end of the line. (Certain diagnostics must be bypassed.) A S/370 or 4300 host with ACF/VTAM Encrypt/Decrypt Feature (#6010), 5735-RC2, and the IBM Programmed Cryptographic Facility licensed program, 5740-XY5, can communicate cryptographically with a 3276 mdl 11, 12, 13, or 14 Control Unit/Display Station or a display station connected to a 3274 mdl 51C Control Unit with the Encrypt/Decrypt Feature (#3680) if the DPPX Data Stream Compatibility licensed program is installed on the 8100 system.

**Physical Security:** An optional three position keylock is provided for the operator's control panel. It limits panel use to off/on only, or to no use at all, and is not removable in the full use position. Keylocks for the covers and mechanical locks for the access doors to the diskettes are available. (Communications connectors are located inside these covers.)

**Installation:** The installation of 8100/DPPX is a flexible process, designed to minimize customer effort. DPPX initialization consists of a system residence device initialization and an initial program load (IPL). Performing these tasks requires only the setting of a mode switch, depression of the IPL button, and response to several prompts through the Basic Operator Panel. The customer has the option of accepting defaults or providing the responses in the manual mode of operation.

During the DPPX initialization phase, a data set of operational parameters (System Parameter List) is automatically accessed by DPPX to provide information about the operational environment (interrupt levels, activate lists, etc.). A default list is shipped with each DPPX system and a system parameter list accompanies each preconfigured definition (PCD) provided with the DPPX system. The customer can select the default list or a PCD system parameter list and use it as is or the lists can be modified using the interactive editor and the ALTER.SYSPARMS command. The customer can also create his own unique list.

The final phase of system installation consists of defining and activating the hardware configuration to the DPPX system. This customer process is performed interactively through the command facility. Data sets of define and activate commands are stored as a command list (CLIST) and invoked to perform the hardware/licensed program configuration matching. A CLIST data set will accompany each PCD. The customers may use the CLIST as is, modify it, or create their own. Default CLISTs will be shipped with each DPPX system which will allow a system operator console to be identified to the system.

### RELIABILITY, AVAILABILITY, SERVICEABILITY (RAS)

DPPX has the following RAS features:

**Integrity:** Integrity features allow the system to protect itself from damage that might be caused by user errors.

DPPX is designed to use the integrity features designed into 8130/8140 processors, which provide:

- Storage access control codes: INVALID, READ, READ/WRITE, READ/EXECUTE and READ/WRITE/EXECUTE.
- Address space control to preserve integrity of control and application code.
- Control mode state use restricted to prevent unauthorized use of privileged processor instructions.

**Data Set Access Credentials** - Insure a user has authorization to access a data set, alter a data set profile or delete a data set.

**Function Access Credentials** - Commands received by the command facility are checked, at the command processor level, to ensure that the command is valid and that the user has the authorization to issue that command. Program access can also be restricted.

**Availability:** DPPX availability functions enhance the capability of the system to continue to provide the services demanded by its users during failure occurrence.

**Error Exit Routines** - Provides the application or DPPX component with the ability to effect a recovery suitable to each step of the application or component.

**Resource Recovery** - Resource managers attempt to recover resources when an environment is terminated to prevent contention because of resources not freed.

**Printer Sharing** - Allows several programs to share the same printer by scheduling printer output in data sets.

**Auto Re-IPL** - A re-IPL of the system occurs automatically when power resumes after a power outage.

**Return Codes For Errors** - For an unsuccessful operation, the return code defines the module of DPPX code that was unable to complete its requested function.

**Stop Function** - Allows an application to be terminated by the system operator.

**Disable Failing I/O** - When a physical link has an unrecoverable physical malfunction, the error is logged and application programs connected to terminals on the failing link are notified, enabling them to deactivate the resources.

**Serviceability:** DPPX serviceability can facilitate the service of failing components.

**Error Logging** - Incidents and related information are recorded in the error log to assist in problem determination. An interface is provided for customer developed programs to enter incident records in the error log.

**Error Log Summary and Archive** - Formats, summarizes and stores error log data in an archive data set.

**System Messages** - When an operator needs to be informed of an incident or of an action to be taken, a message is sent to the console. These messages describe an error, an action to be taken by the operator, or a recovery executed by DPPX.

**Standalone Dump** - Provides a capability to dump the registers, segment space, storage space and selected parts of control space of the processor if DPPX cannot be operated. Output is written to a data set on diskette.

**Formatted Dump** - Prints or displays, in readable format, the results of a standalone dump.

**Message Log** - Messages sent to or received by a particular terminal operator may be optionally logged for subsequent examination.

**Interactive Debug** - Allows online debugging of user environments. A set of commands allow the user to display, dump, and modify addresses and registers.

**System Trace** - Allows the operator to control a trace operation. Trace output may be directed to a data set.

**Notification of Failing Network Component** - When an SNA station, a link, or a physical unit incurs an unrecoverable physical error, a message is sent to the operator and the error is logged.

**Distributed System Environment Test** - May be invoked interactively to verify DPPX operation.

**Service Level Update Management** - The DPPX/BASE INSTALL.PROGRAM command is used for both initial installation and subsequent application of service level updates for 8100/DPPX licensed programs other than DPPX/BASE. Initial installation and service level updates of DPPX/BASE are handled via the initialization/customization functions of DPPX/BASE. In general, customers who apply fix packages as they are made available will not require service level updates.

**APAR Create** - An interactive aid which gathers pertinent information required to solve programming problems and outputs this data to a diskette.

PROGRAM PRODUCTS

**DPPX/BASE (cont'd)**

**Fix Install** - Allows a customer to apply fixes which are provided on a diskette.

**Interactive Editor** - Used to apply temporary fixes (patches) to load modules, or to modify records in sequentially accessed DPPX data sets.

**Dump Manager** - Provides a dump of a failing thread with its associated processes, control blocks and environment.

**Initial Error Detection Under DPPX** - Provided by ROS (Read Only Storage) tests during IPL (Initial Program Load). These tests include the processor circuitry, arithmetic operations, basic I/O, storage, disk and other functions.

Offline diagnostics are also available to service hardware components.

With the exception of offline functions (e.g., standalone dump, IPL, DPPX/BASE service level update), most of these functions are accessible from a S/370 or 4300 terminal using the Host Command Facility licensed program.

**CUSTOMER RESPONSIBILITIES**

To install and use DPPX/BASE the user must:

Attend education courses, as necessary ... Acquire a knowledge of the functions documented in the DPPX/BASE customer publications ... Understand the management and control of the design, installation and control of the DPPX/BASE system as described in *DPPX Administration* ... Understand the DPPX/BASE initialization/customization processes as described in *DPPX Installation: Guide* ... Install DPPX/BASE on the 8100 system ... Become familiar with operating procedures as described in *DPPX Operation* ... Become familiar with the facilities provided by other DPPX licensed programs. Add these optional licensed programs to the DPPX system ... Design and implement user applications ... Carry out approved problem determination procedures before contacting IBM for program service ... Install service level updates and fixes as appropriate.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum DPPX/BASE system requires the following configuration:

- 256K IBM 8130 or 256K IBM 8140 processor with 256K bytes of processor storage, disk file and diskette drive.
- IBM 3276 Control Unit Display Station - connected via direct attached loop, or
- IBM 3274 Control Unit with a display station, for instance, an IBM 3278 Display Station - connected via direct attached loop, or
- IBM 3104 Display Terminal - connected via direct attached loop, or
- IBM 8775 Display Terminal - connected via direct attached loop, or
- IBM 3277 Display Station mdl 1 or 2 - directly attached via an IBM 8101 Storage and Input/Output Unit.

Additional keyboard/displays and an IBM 3262, 3268, 3287 or 3289 printer and/or communication link may additionally be attached where required.

- The DPPX/BASE licensed program requires approximately 15.5M bytes of disk space for program load modules, macros, catalogs, command lists, and other permanent system data sets.
- In addition, disk space is required for any additional licensed programs installed (such as DPPX/DPS and DPPX/ASM), for user-defined data sets and for work spaces.

The design objective of this system configuration is to support any of the following interactive or batch applications:

- Interactive command facility.
- Interactive editor (Line/page mode).
- One or more user-written assembler application.
- Multiple terminal interactive assembler application (number of terminals is dependent on size of user application).
- Printer sharing.
- Batch processor.
- Data set utilities.
- Stand-alone dump utility.

Not all the terminals and attachments in this configuration are necessarily active at the same time during the course of execution of the above applications. Devices may be activated and deactivated based on the sequence of the applications being executed.

The available storage for concurrent application processing is dependent upon the number of concurrent applications and the size and complexity of the user applications. A storage analysis should be made to determine which of the above applications and

functions can be run concurrently. Additional storage beyond the minimum storage required can be utilized by DPPX/BASE to improve performance and system throughput.

**SOFTWARE REQUIREMENTS**

DPPX/BASE can operate either standalone or connected via selected communications facilities to S/370 or 4300.

- When connected to S/370 or 4300 or 30XX via SDLC communication facilities, the following operating environments apply:

- SNA Communication Services.

VTAM (VTAM2, ACF/VTAM Version 1 or ACF/VTAM Version 2, VTAME) or TCAM (TCAM 10, ACF/TCAM), and subsequent releases and modification levels unless otherwise stated, operating under DOS/VSE (VTAME only), OS/VS1 or OS/VS2 (MVS).

- Host Presentation Services.

CICS/VS 1.4 and IMS/VS 1.1.4 (and subsequent releases and modification levels unless otherwise stated) operating under the S/370 or 4300 or 30XX programming supported by CICS/VS and IMS/VS, respectively, and supported by the DPPX/BASE SNA communication services (described above).

- Host Transaction Facility.

CICS/VS 1.4 and IMS/VS 1.1.4 (and subsequent releases and modification levels unless otherwise stated) operating under the S/370 or 4300 or 30XX programming supported by CICS/VS and IMS/VS, respectively, and supported by the DPPX/BASE SNA communication services (described above).

- When connected to S/370 or 4300 or 30XX via BSC communication facilities, the following operating environments apply:

- EXCP BSC interface.

- BTAM, VTAM, VTAME and TCAM under DOS/VSE (except TCAM), OS/VS1 or OS/VS2 (MVS).

- VM/370.

Note that S/370, 4300, and 30XX programming service is available only for releases of S/370, 4300 and 30XX operating systems and subsystems designated as current for service purposes.

This licensed program is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX assembler language with most of the original PL/DS statements shown as comments.

**PERFORMANCE CONSIDERATIONS**

DPPX performance depends upon a number of factors such as the system configuration and the system resources available, the number of concurrent user programs and their associated workloads and relative priorities, the user data set characteristics and access method.

The DPPX Storage Configuration option of ANDPPX can assist in determining main storage needed to support the required configuration and application programs.

*DPPX Administration* contains considerations which can be used in designing, coding and installing DPPX systems.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/BASE General Information* (GC27-0400) ... *DPPX Installation: Guide* (SC27-0401) ... *DPPX/BASE Terminal Operation* (SC27-0402) ... *DPPX/BASE Administration* (SC27-0403) ... *DPPX/BASE Commands: General Use* (SC27-0404) ... *DPPX/BASE Programming: Guide to System Services* (SC27-0405) ... *DPPX/BASE Programming: Using DPPX Program Listings* (SC27-0408) ... *DPPX/BASE Programming: Macro Reference* (SC27-0413) ... *DPPX/BASE Programming: Adding Communication Support* (SC27-0415) ... *DPPX/BASE Commands: Configuration and Operations* (SC27-0511) ... *DPPX/BASE Licensed Program Specifications* (GC27-0512) ... *8100/DPPX Library User's Guide* (GC27-0522).

**HIGHLIGHTS OF FUNCTIONAL ENHANCEMENT PACKAGE 6 (FEP 6)**

FEP 6 contains the following new and extended support:

IBM 8140 Model C support provides DPPX system users with the capability to take advantage of the performance improvements available in this model of the 8140 series. FEP 6 will support the following expanded storage capacities available in the 8140 Model C:

- Real storage of up to 2 megabytes.
- Logical storage of 16 megabytes.
- Additional shared storage (CASS). This provides the user with the capability to share more programs and can thus reduce the total storage requirements for multiple, concurrent applications.

**DPPX/BASE (cont'd)**

- Increased message throughput of up to 60 percent for the same response time. Specific performance information is covered in the performance section.

X.21 switched upstream support conforms to the International Telephone and Telegraph Consultive Committee (CCITT) recommendation X.21 on data transmission over public data networks. This recommendation defines a circuit switched protocol for synchronous operation between Data Terminal Equipment and Data Circuit-terminating Equipment. The switched connection capability allows for more flexible configurations than with leased connections, and also provides auto answer and auto call capability. FEP 6 provides the capability for the 8100 Information System to communicate with a host S/370 via public data networks employing the X.21 protocol.

**Improvement to Availability**

- Automatic re-IPL capability will be optionally available depending on the specific system wait condition. Unattended remote 8100 sites can benefit from the improved availability potential offered by this enhancement.
- Printer sharing will not terminate the printer environment on an inoperative condition and will automatically restart the printer when the printer is re-activated. This recovery is applicable when the printer (loop attached only) is deactivated, powered off or reset.
- An option is provided in printer sharing to specify initial setup and/or restart without prompts for alignment, etc.
- An option is provided in printer sharing to define the cancel key on the printer as cancel without restart.
- Printer sharing now supports up to 12 printers. Depending upon configuration, a user may not be able to drive all printers at rated speed simultaneously.
- Catalog Directory Compression.
  - Using this facility, DPPX/BASE will automatically attempt to recover from instances which previously resulted in an out-of-space condition in a catalog directory. This facility can also be requested by using a command.

**Performance and Usability Improvements:**

- The system will now be more self-tuning and it will no longer be necessary for users to provide load lists for LET (Linkage Effector Table) creation at IPL time.
- Expansion of a system parameter (SYSPARM) will occur automatically the first time a user-specified value is exceeded. This enhancement will reduce unnecessary customer involvement and the potential for over-allocation of storage. This applies to those parameters which normally cause a wait condition when the parameter storage is exhausted.
- Users can now display network resources, how they are currently defined, and determine current status. Information is supplied on links, physical and logical units, their active or inactive status, and sessions between logical units. This improvement is provided by the DISPLAY.NET command.
- Editor/Interactive Productivity Facility.
  - New local-line function to set up tab stops.
  - Hardware tabbing is now supported.
  - PF key assignments are now compatible with other IBM products.
  - Installing location can modify default PF key assignments.
  - Certain PF keys are displayed in a protected line at the bottom of the screen.
  - A separate line for messages.
  - The INCLUDE subcommand will now support included records shorter than the file being edited.
  - Repetitive subcommand entry.
  - Scroll backward and forward.
  - The DELETE and REPEAT subcommands allow a value up to 9999.
  - Variable length subcommand verbs and operands.
- Fewer system parameters required in ALTER/DISPLAY SYSPARMS commands.
  - Many parameters have been eliminated from the System Parameter Modules. These include ASEs and TCBS. There is no longer a need for user specification of these parameters.
- Enhanced CLIST Variable Substitution.
  - Named variables, available on a system-wide basis, are supported as substitution symbols in CLISTs.
  - New SET.SYSVARIABLE command to define and set a system level named variable.
  - New DISPLAY.VARIABLES command to display the value of the variables currently defined.

- Improved messages in catalog management and Host Data Transfer.
  - Improved message text.
  - Many messages self-explanatory.
  - Variable data supplied as needed.
- DISPLAY.COMMAND.
  - Provides the ability to display DPPX command operands, defaults and allowable values. The operator can then enter and execute the command from the same screen. (Requires DPPX/BASE Version 2 program product.
- Printer Sharing Enhancements.
  - The RESTART.PRINTER command is enhanced to support the cancel and hold options. These options allow the operator to cancel or hold a running job with one request and without stopping the printer.
  - Prompts now list valid replies.
  - A prompt is reissued after a reply error.
- Additional tuning information from the DPPX Performance Tool program product.
  - DPPX at FEP6 level with the DPPX Performance Tool will provide information on the use of the Dynamic Resident module for both resident and non-resident modules. The DPPX Performance Tool program product fix package 0206 is required to obtain the additional tuning information
- New Option for the RECOVER.DATA Command.
  - The "Subset" option is added to the RECOVER.DATA command to provide for faster data set recovery in situations where 1) there is sufficient free space at the end of the data set and 2) the data set is used in a fashion where new records are always added to the next available free record. (This is consistent with all the DTMS-maintained data sets.)
- Improved Scheduling Algorithm
  - The DPPX scheduling algorithm has been modified to provide more equitable distribution of the processor among threads with equal priority.

**Service Enhancements**

- The selective backout feature of a fix package for a program product is supported. System catalogs will be restored to their original levels as part of the backout procedure. This enhancement applies where the Remote Service Distributed Option (RSDO) was not used to install the fix package.
- The CSP (corrective service package) log will now be automatically updated when a CSP is replaced by a permanent and complete fix package. The customer will no longer have to manually update the file on the system.

**System Management Enhancements**

- Data set spanning multiple diskettes.
  - A data set which exceeds the capacity of a single diskette can be saved onto and retrieved from multiple diskettes.

**Problem Determination Aids**

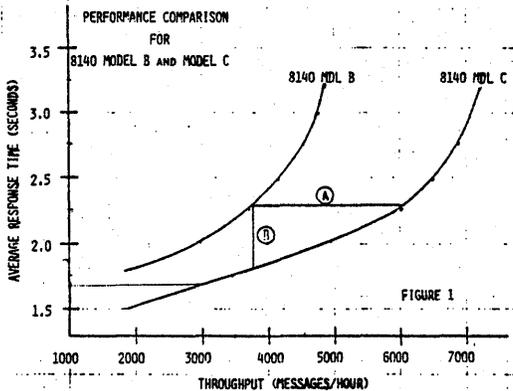
- System status dump.
  - Formats key problem determination information to create a problem determination subset.
  - Reduces print dump time.
  - Expedites finding "duplicate" problems.
  - Improves problem reporting accuracy.
  - Reduces problem determination analysis time.
- Error Log Data Analysis.
  - Display of errors by tape volume serial and/or 8809 address.
- New trace options.
  - Ability to trace request units (RUs) at various points in the DPPX I/O layer.
- New error log data.
  - New error log data includes certain SNA protocol error and standalone dump events.
- Debugging of USERLIB.
  - Debug is now available for transient programs in USERLIB.

**DPPX/BASE (cont'd)**

**PERFORMANCE**

FEP 6 and the 8140 Model C operating in dual mode introduce a new performance growth path for interactive 8100 users. They are capable of providing increased message throughput over a similarly configured 8140 Model B operating under DPPX/BASE FEP 5. An improvement in response time is also possible under certain conditions.

The following figure shows the performance advantage offered by an 8140 Model C (operating with FEP 6) for a specific, yet representative, DTMS "Order Entry" application.



For example, an 8140 Model C replacing an 8140 Model B with processor utilization of 65% results in:

- a. A 70% increase in message throughput for the same response time, or
- b. An improvement in response time for the same throughput rate.

Under certain conditions both response time and throughput improvements are achievable. (See Figure 1.) Because of the increased system load, additional resources like communication links, loops, disks, real storage, etc. may be needed to achieve the above results.

FEP 6 and the 8140 Model C do not offer any performance improvements for jobs using the Floating Point feature or standalone batch applications like COBOL compilations.

The throughput improvement actually achieved by an 8140 Model C operating with FEP 6 depends upon:

- Installed real storage.
- Input/output load.
- Configuration.
- Processor utilization.
- Application.

An application characterized by heavy communication traffic and/or DASD load may not achieve the full message throughput improvement shown in Figure 1.

Applications running on the 8140 Model C in single mode with DPPX/BASE FEP 5 will experience performance equivalent to the 8140 Model B. DPPX/BASE FEP 6 with storage available to accommodate additional function will run on the 8130 and 8140 Models A and B with performance equivalent to DPPX/BASE FEP 5.

Performance is dependent on many factors. Since the above figure pertains to a specific application environment, individual applications and configurations should be evaluated before any statement of expected throughput improvement is made.

**COMPATIBILITY**

FEP 6 is upward compatible with earlier service levels. Licensed programs supported on earlier levels will be supported by FEP 6. However, the latest service levels on some licensed programs, such as the DPPX/Performance Tool, will be required to operate with FEP 6.

When application programs written for earlier service levels are run on the Model C with FEP 6, some minor modifications may be necessary to programs using the processor mask functions.

FEP 5 will run on the Model C but without taking advantage of either the improved performance or the extended storage capabilities of the new processor. When pre-FEP 6 levels are run on the Model C, the real and logical storage amounts are 1 and 4 megabytes, respectively. For BSC operations with the Model C configuration, an 8101 containing a BSC communications adapter must be attached to the Model C.

FEP 6 will run on any 384K or more 8100 processor, providing the enhancements stated above, but the extended storage and performance improvements support only the Model C.

FEP 6 supports BSC operation on the 8101, 8130, and 8140 Models A and B. For BSC operation with a Model C configuration, an 8101 containing a BSC communications adapter must be attached to the Model C. When FEP 6 and the Model C run BSC with the 8101 attachment, only the extended storage capability (and not the performance improvements) of the Model C are made available (single mode). An IPL is required to change modes.

**SYSTEM INTEGRITY**

The system integrity features of earlier service levels are unchanged and apply to DPPX/BASE FEP 6.

**DATA SECURITY, AUDITABILITY and CONTROL**

The data security, auditability and control features of earlier service levels are unchanged and apply to DPPX/BASE FEP 6.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The minimum DPPX/BASE FEP 6 system requires the following configurations:

- 8130 or 8140 processor with a minimum of 384K storage, at least one disk file and a diskette drive.
- One IBM 3276, IBM 8775 display terminal or a 3274 control unit with an attached display station, connected via a directly attached loop; or a directly attached IBM 3277.

The storage available for applications is dependent upon the number of, and the size and complexity of the user applications. A storage analysis should be made to determine which applications and functions may be run concurrently.

**FEP 6 Processor Storage Requirements:** The various Functional Enhancement Packages (FEP) through FEP 5 provide significant enhancements to the DPPX/BASE program product that improve performance and provide functional and usability enhancements. Through FEP 5, processor storage has been managed to a consistent level which resulted in negligible storage growth.

The DPPX/BASE FEP 6 enhancements will utilize an additional 35K bytes of processor storage above FEP 5. Storage requirements should be re-evaluated to determine the impact of this increase. It is recommended that customers assume a storage increase of 60K bytes (which includes the above 35K bytes) to account for future enhancements in response to customer requirements and IBM maintenance activity. The additional enhancements described in this update are contained within the 35K bytes of processor storage above FEP 5.

Operation of FEP 6 is not supported on systems with less than 384K bytes of processor storage. Configurations with 384K bytes of processor storage may still be viable under DPPX/BASE FEP 6. Since systems with 512K bytes of processor storage are capable of supporting a wide range of applications and production configurations, 512K is recommended as the minimum processor storage for FEP 6.

The increase in processor storage applies to DPPX/BASE only and not to the other licensed program products. As in the past, they will continue to announce their storage requirements individually.

**Software Distribution:** When the optional source code is ordered, it is distributed in DPPX Assembler language with most of the original PL/DS statements shown as comments.

**INTEGRITY:** Refer to section GI 23.2.

**RPGs Accepted:** Yes

**8100 INFORMATION SYSTEM**  
**DPPX/BASE COMMAND FACILITY EXTENSIONS**  
**FEATURE**  
**Features #6005, #6006, #6007 (5760-010) §**

**PURPOSE**

The DPPX/BASE Command Facility Extensions Feature is a prerequisite for the DPPX/Interactive Productivity Facility. It provides the logic, display and table management services for DPPX/Interactive Productivity Facility operation and use.

The DPPX/BASE Command Facility Extensions feature Level 2 will provide a dialog development facility which simplifies the development of dialogs and the installation of customer-developed dialog hierarchies. It is a prerequisite for DPPX/Interactive Productivity Facility Release 2. DPPX/BASE Command Facility Extensions feature Level 2 is a complete replacement of DPPX/BASE Command Facility Extensions feature Level 1 and will delete all Level 1 modules and catalogs. DPPX/BASE Command Facility Extensions feature Level 2 is intended for systems operations usage and is not designed for application development.

**HIGHLIGHTS**

The DPPX/BASE Command Facility Extensions feature provides support for the operation of the DPPX/Interactive Productivity Facility. The DPPX/BASE Command Facility Extension feature provides services for logic control, accessing and displaying pre-defined menu, data entry and tutorial panels of DPPX/Interactive Productivity Facility. It invokes DPPX commands and programs based on the logic of the DPPX/Interactive Productivity Facility scripts. It manages the retrieval, modification and display of internal DPPX/Interactive Productivity Facility tables.

The DPPX/BASE Command Facility Extensions feature Level 2 provides the following enhancements:

- Dialog development facility - Simplifies the development of dialogs by providing a step-by-step procedure which includes a series of full screen panels to lead the user through the development of menu/data entry panels, tutorial panels and dialog programs. Facilities are provided to test the dialogs online. Permits independent integration of dialogs into the DPPX system.
- Customized dialog hierarchy - Simplifies the development of dialog hierarchies. The customer need only specify the connection between menu panels and scripts.

**CUSTOMER RESPONSIBILITIES**

To install and use this licensed program, it is the customer's responsibility to:

- Become familiar with DPPX/BASE concepts and facilities.
- Use the installation process as described in the DPPX/BASE Command Facility Extensions Feature program directory.
- Carry out the problem determination procedures described in the *DPPX/BASE Command Facility Extensions Feature Diagnosis* guide before contacting IBM for program service.
- Install fix packages and service level updates.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The DPPX/BASE Command Facility Extensions Feature is designed to operate on an IBM 8130 or 8140 processor with 512K bytes of processor storage, with a diskette drive and with 58MB of disk storage capacity. Also required is a display supported by DPPX/DPS Format Management with a screen width of at least 80 characters and a depth of at least 24 lines. DPPX/BASE Command Facility Extensions feature Level 2 commands can be executed via program function keys if available on the display.

**Storage Requirements:** The DPPX/BASE Command Facility Extensions Feature storage requirements are dependent upon the various configuration and workload parameters. The parameters include: Device type, map size, message rates, number of resident maps and the number of processing environments.

The DPPX/BASE Command Facility Extensions Feature executes in a standard DPPX interactive command facility environment (approximately 48K bytes of processor storage).

The approximate processor storage estimates for the DPPX/BASE Command Facility Extensions feature Level 2 are:

Resident Programs (shared address space)	11,000 bytes
Control Blocks and Work Areas (user address space)	8,000 bytes
Dynamic Variables (user address space)	1,000 bytes
<b>Total</b>	<b>20,000 bytes</b>

Non-resident DPPX/BASE Command Facility Extensions Feature programs are invoked as required on a temporary basis and unloaded when no longer needed.

These programs utilize additional processor storage.

The DPPX/BASE Command Facility Extensions feature Level 2 object code requires about 2,500 256-byte blocks of disk storage space for programs and messages, and 60 256-byte blocks of disk storage space for display panel maps (\*) in the System Program Catalog (SYSPGM).

(\*) Blocks of disk storage space for display panel maps are required for each one of up to 14 selected device groups using DPPX/DPS Version 1 or DPPX/DPS Version 2.

The DPPX/BASE Command Facility Extensions feature Level 2 also requires 2,600 256-byte blocks of disk storage in three user catalogs, for dialog scripts, help panels and tables.

**SOFTWARE REQUIREMENTS**

This feature is designed to operate with the current supported levels of the DPPX/BASE (5760-010) FEP5 and DPPX/DPS FM Versions 1 or 2. All subsequent service levels are supported unless otherwise stated.

The DPPX/BASE Command Facility Extensions Feature is written in Programming Language for Distributed Systems (PL/DS). When optional source code is ordered, it is distributed in DPPX Assembler language with most of the original PL/DS statements shown as comments. Source code on magnetic tape and program listings on microfiche are available as optional material.

**DATA SECURITY, AUDITABILITY and CONTROL**

DPPX/BASE Command Facility Extensions Feature utilizes the system services of DPPX/BASE and therefore is governed by the security and auditability features within that environment. Customer management is responsible for the selection, implementation and adequacy of these features.

**PERFORMANCE CONSIDERATIONS**

Performance of DPPX with the DPPX/BASE Command Facility Extensions Feature and the DPPX/Interactive Productivity Facility depends on a number of factors such as the system configuration, the available system resources, the number of concurrent user programs and their associated workloads and relative priorities, user data set characteristics and access methods.

**DOCUMENTATION**

(available from Mechanicsburg)

*DPPX/BASE General Information (GC27-0400) ... DPPX/Interactive Productivity Facility General Information ... DPPX/Interactive Productivity Facility Licensed Program Specification.* Users of this licensed program are encouraged to order the Licensed Document, *DPPX/BASE Command Facility Extensions Feature Diagnosis.*

**DPPX/BASE INTEGRITY**

IBM will accept APARS where the installation of the DPPX/BASE Command Facility Extensions Feature introduces an exposure to the system integrity of DPPX/BASE. This program is intended to run authorized.

**RPOs ACCEPTED: No**

**5761-DS1 - DPCX V1 R 2.2, 3 and 4  
DISTRIBUTED PROCESSING CONTROL EXECUTIVE  
VERSION 1, RELEASES 2.2, 3 and 4**

**PURPOSE**

DPCX offers users a multi-application display oriented operating system designed for the distributed environment. It provides functions especially designed for combined text and data processing applications with local and host interactions. With up to 31 concurrent applications multiprogrammed by DPCX in Release 2 and 62 in Release 3, a wide variety of office needs can be satisfied. The user can start to use the system without user programming. Integral to DPCX are 3270 Data Stream Compatibility for access to existing host applications, online bulk print for outputting host data and a comprehensive RJE facility. A text system application program, the Distributed Office Support Facility (DOSF) is available which has extensive functions without the need for user programming. In addition, applications and procedures can be developed for both DPCX and DOSF expanding the usefulness of the distributed system. DPCX Release 2 has been developed specifically to extend DPCX Release 1 for both data processing and text applications. It includes all the functions of Release 1 and provides enhancements. Feature #6001 is available and is enhanced. In particular, the new functions provide the installation with the ability to better balance the system against the demands of multiple applications. DPCX Release 3 is designed to take advantage of the increased storage and performance improvements available with the 8140 mdl C processor. It also increases the allowable number of concurrent active user tasks from 31 to 62, providing improved system flexibility; supports data link attached loops and new printer functions; provides a new network installation management capability; and contains several usability and serviceability enhancements. Feature #6001 is integrated into Release 3, simplifying both the ordering and installation processes.

DPCX Release 4 provides support for the new 8130B and 8150B Processors. The Data Stream Compatibility function is more powerful and flexible. The number of user data sets is increased to 191. The 6580 Displaywriter may be attached to an 8100 DPCX system and used as a 3270 display. Enhancements have been made to network management, usability, and serviceability.

Note: All unique Feature #6001 functions listed below are part of the base DPCX Release 3 program.

**HIGHLIGHTS OF NEW FUNCTIONS OF RELEASE 2 and FEATURE #6001**

- Base for DOSF, a new text application program.
- Performance enhancements.
  - System balancing options designed to optimize storage and disk utilization.
  - Improved DPCX transient management to reduce disk accesses.
  - Additional data set placement options to optimize access time.
- Print spool (feature #6001).
  - Accessible to all applications including DOSF.
  - Available for display on any local or remote 1,920-character or larger display.
  - Printable on any local or remote attached printer.
- Procedure enhancements.
  - Capability for automatic initiation of procedures after IPL or operator log-on (feature #6001).
  - Facility to initiate a procedure as an application subtask.
- Additional Device Support.
  - Direct Attach 3732 Text Display Station.
  - Direct Attach 3736 printer (correspondence quality).
  - Direct loop supported 3262 mdl 2 and mdl 12 with print bands for text (feature #6001).
  - Direct loop-attached (9.6K bps only) 5210-E01,E02 Printer.
  - Communication port attached 6670 Information Distributor (feature #6001).
  - Direct loop and communication port supported 8775 with IDTF licensed program.

**HIGHLIGHTS OF NEW FUNCTIONS IN RELEASE 3**

- 8140 Processor model C supported
- Maximum number of concurrent active user tasks increased from 31 to 62.
- Data link attached loops supported.
- Network Installation Management supported.
- 5210-E01, E02 with EC #996869 supported, providing attachment to 38.4K bps loop and SNA LU Type 1 data stream capability.
- New Error Log and Summary Analysis function.

- Link Problem Determination Application (LPDA) supported.
- Several usability and serviceability enhancements.
- Feature #6001 integrated into the base DPCX program.

**HIGHLIGHTS OF NEW FUNCTION IN RELEASE 4**

- Support for the new 8130 and 8150 Processors.
- New Data Stream Compatibility function.
- Number of user and system data sets increased.
- Network Management enhancements.
- Connectivity enhancements.
- Usability improvements.
- Installation enhancements.

**DPCX HIGHLIGHTS**

- System Concept
  - Virtual storage management which features demand paging and swapping and allows:
    - Efficient real storage utilization.
    - Real storage space required for program execution is independent of application program size.
    - No overlays are required.
    - Program to program protection.
- Multiprogramming support for concurrent execution of up to 31 tasks in Release 2 and 62 tasks in Release 3. These tasks can be user programs and/or system-provided functions (e.g., 3270 DSC and RJE).
  - Dynamic DPCX assignment of dispatching priority to terminal oriented application programs.
- Batch transmission support for data exchange with the host:
  - Online exchange of data sets from host to 8100.
  - Batch data exchange (BDE) via diskette or tape.
  - RJE Workstation Package (WSP) and associated interactive package (SYSEDIT) for creating and editing RJE input files and procedures.
- Includes support for access to host applications on S/370, 30XX and 4300 for 8100-attached 3270, 3104, 8775, Personal Computer, 6580 Displaywriter and Series/1 devices.
  - 3270 data stream compatibility (3270 DSC) for existing 3270 host DB/DC, VTAM, TCAM, TSO, and VSPC applications.
  - A bulk print function which offers online printing support for existing 3270 or SCS applications.
  - Base color support, extended color and highlight support, programmed symbols, multiple partitions, scrolling and field validation.
- User control of the placement of data on disk to optimize disk access time and data set availability.
- Interactive support for creating and editing input files (SYSEDIT)

**Application Development Facilities:** A set of application services, accessible through programming statements:

- Transaction support.
- Queued printer support (spool).
- Message handling support.
- Panel generating and maintenance support.
- Application to application information transfer.

See the DPCX programming statements or Development Management System (DMS/DPCX) program product, for coding of 8100 applications programs including display and printer formats, data definition and processing sections.

- DMS/DPCX also provides:
  - Data location at 8100 or host can be transparent to the application program.
  - Applications written with DMS/DPCX can exchange application definitions with DMS/DPPX within the constraints of the target machine. See DMS/DPCX announcement letter for additional information.
  - Support for 3732.

**Host Facilities and Control:** Program preparation and validation is via OS/VS or DOS/VSE assembler, at the host.

PROGRAM PRODUCTS

**DPCX V1 R2.2 & 3 (cont'd)**

The Host Prep licensed program (5735-XR3) is required at the Host by the users of DPCX Feature #6001, or users who make use of the following functions:

- Support for creation of subcategories for disk space allocation.
- Support for receipt of the DPCX Release 2/3 stand-alone system dump, and its formatted printing.
- Text programming statements used with a 3732/8775 terminal.
- Online fix distribution support and remote problem determination support for 8100/DPCX via the Subsystem Information Retrieval Facility (SYSINFOREF) program.

If the above functions are not required, the Host Support SCP programs 5747-BQ1 (DOS/VS) and 5744-BZ3 (OS/VS) provide the required support.

Host Prep Release 4 is required for support of DPCX Release 2.0 and 2.1, Host Prep Release 4.1 is required for support of DPCX Release 2.2, and Host Prep Release 5 is required for support of DPCX Release 3. DPCX Release 4 requires Host Prep Release 6.

Central library support for the 8100/DPCX network is provided by the Distributed System Executive (DSX) program product or Subsystems Support Services (SSS).

The capability for Host connected displays to log on to the host resident Host Command Facility program product and subsequently sign on to DPCX to access DPCX services and application programs.

The capability for a host program to initiate a session with a DPCX application program.

**Operator Interface and Procedures**

- Basic operator interface for selecting any user written or IBM provided program.
- Command operator full screen interface that extends the basic capability to include use of command language and initiate user written procedures. With support available in Feature #6001, both prompt screens and descriptive help information are available to assist operators in entering commands.
- Journaling, resulting in hard copy output, is available for some operator actions such as, initiation or termination of programs or IBM provided functions, commands entered, command responses, or messages retrieved. Journaling can be invoked for specific operators or all operators.
- Procedures can be written to simplify and customize operations. These can be written at the Host or the 8100 site.
- Access codes may be used to restrict operator access to specific DPCX supplied commands and programs (Feature #6001).

**RJE Work Station Support:** The RJE support which operates in conjunction with the host RJE support (RES/JES1, JES2, JES3, POWER/VS, POWER/VSE) provides all functions necessary to generate jobs and data either via an 8100/DPCX keyboard display or via diskette, transmit the job to the Host and receive the output from the Host.

- User written procedures for simplifying and customizing operations.
- Output print stream can be compressed and compacted making efficient use of host and printer links.
- Output jobs on the print spool can be viewed at any display, 1,920 characters or larger which can often eliminate the need for printing.
- Printing multiple copies from spool eliminates need to send more than one copy from the Host.

**Performance Options:** There are many aspects of the design of DPCX that help performance such as virtual storage management, a preemptive time-slicing dispatcher, multi-use of real storage blocks and direct sector application paging.

The user has control of disk and real storage allocation that can have significant effect on the response time or throughput of the system. These include:

- The user can select the location of data sets and indices on disks to control access time. These can span disks.
- The user can optionally control the size of four DPCX real storage pools that can reduce I/O accesses and the I/O processing.
- The user can place applications in real storage eliminating demand paging from disk and related I/O processing and access time.

**Disk File Access Methods:** DPCX support four file access methods that provide a range of characteristics that can be used to match application and performance requirements. These are:

- Distributed Indexed Access Method, DXAM, (Part of Feature #6001) provides for records of up to 4096 bytes, up to 8 keys,

including duplicate key values, with random or collating sequential access by key. Read and locate instructions allow finding records by five compare operators, such as GREATER THAN OR EQUAL. Keys can be up to 64 bytes.

- Relative Sequential Access Method, RSAM, (Part of Feature #6001) provides for records of up to 4096 bytes with random access by relative record numbers, RRN, or sequential access. Read and locate instructions allow finding records by five compare operators, such as LESS THAN OR EQUAL. The user has the ability to use both DXAM and RSAM access to records. Changes made to the records via RSAM will automatically update the DXAM indices.
- Indexed data set provides for records up to 1,920 bytes, with one or two keys with random access by key.
- Relative data set provides for records up to 256 bytes with access by RRN.

**Display and Display Printer Support Summary:** DPCX supports many SNA members of the 3270 family of control units, displays and printers, the 3104 display terminal and the 8775 single display station. The support includes:

- Direct attachment, directly attached loop, data link attached loop, and communication port attachments. (The 3104 is loop attached only.)
- Display sizes include 1,920, 2,560, 3,440, and 3,564 characters. The 3104 provides 1920 characters only.
- 8775 with IDTF licensed program.
- 8775 features - Advanced Function (#3624) and Multiple-partitions and Scrolling (#5110).
- 8775 mdls 1, 2 and 3104 copy support can be to any loop attached or communication port attached printer except the 3289-3.
- Support for the 3178 Display Station, a lower priced member of the 3270 Information Display System, providing functions equivalent to the base functions of the 3278-2.
- 3290 Information Panel support, offering a single terminal providing:
  - A concurrent multiple screens capability.
  - A multiple screen-copy capability
  - A multiple interactive screen capability
  - A multiple partitions capability
- Base and extended color, extended highlighting and programmed symbols.
- View contents of the general spool file.
- Online with the Host:
  - 3270 Data Stream Capability including APL/TEXT Feature.
  - Online bulk print.
  - RJE online printing.
- User written programs executing on 8100/DPCX. This includes full screen processing (FSP) or field by field (FxF) display modes and full screen print (FS Print) for printers. Applications can also acquire a printer for exclusive use.
- RJE spool, Print spool output printing.
- 6580 Displaywriter attachment in 3270 Data Stream Compatibility Mode. DPCX Release 4 supports two additional attachment alternatives to the Displaywriter.
- Downstream attachment of Series/1 (as a 3274-51C, 3274-61C, or 3276).
- IBM Personal Computer, 5150, attachment with SDLC Communication Adapter.
- IBM Personal Computer, 5150, attached to 8100 via 7426 Terminal Interface Unit.
- 7436-1 correspondence quality printer RPQ #XC5575.

**Printer Support Summary:** DPCX supports, in addition to the display family printers (see table), 3736 via direct attach, 3230, 3262, 3268, 3287, 3289 and 5210 printers via loop and communication port attached 6670. These printers have nominal capability from 40 cps up to 650 lpm.

- The 3289-3 can be attached to 9.6K bps loops.
- The 3230, 3262, 3268 and 3287 printers are loop attached at speeds up to 38.4K bps.
- The 3262 and 3289 printers have decompaction and decompression capability, thus saving host link and loop transmission utilization.

PROGRAM PRODUCTS

DPCX V1 R2.2 & 3 (cont'd)

- Up to 24 3736, 3284, 3286, 3287 and 3288 can be directly attached to a system.
- The 5210-E01, E02 Printer without EC #996869 attaches only to a 9.6K bps loop. With EC #996869, supported only by DPCX Release 3, it may be attached to either the 9.6K bps loop or a 38.4K bps loop. With EC #996869 it also supports SNA LU Type 1 data streams.
- The 6670 is communication port attached at line speeds up to 9.6K bps.
- Support includes:
  - Online Bulk Print (not 3289, 3736, or 6670).
  - Online RJE printing (not 3736 or 5210).
  - General spool, RJE spool or print data set to printer.
  - Display copy - 8775 mdl 1, 2 and 3104 to 3230, 3262, 3268 or 3287.

RELEASE 2/3 - DESCRIPTION

The following describes the new functions available with DPCX Release 2/3.

**DOSF System Application:** DPCX Release 2/3 provides an operating system for the execution of data processing applications and text applications. Text applications are of two types, those provided by the DOSF program product and those that are user written to extend text functions. By providing the functions described below, the user has additional flexibility to balance the system resources by trading real storage allocation for I/O processing and disk access time. This function provides the capability to balance the system resources for a wide variety of application programs. In addition, DPCX Release 2/3 provides new functions that support text and data application such as, the general spool file and new command processing functions.

**GENERAL SPOOL FILE (Part of Feature #6001)**

Release 2/3 provides a common printer output storage facility on disk that combines all existing facilities for all applications called the general spool. This facility provides the ability to:

- Print any file or job or DOSF document on any printer attached to the system (within the ability of the printer to handle the character set requirements).
- Allow any file or job or document to be viewed by authorized terminal users on any 1,920-character or larger display attached to the system. Review of the data will often provide the information needed by the user, thus eliminating printing.

The data in the spool file is in SNA character string (SCS) format. Data in the spool file can result from:

- User written application programs.
- Batch operations with the host.
- RJE output (local or from the host).
- Batch Data Exchange via diskette.
- Tape Data Exchange via tape.
- DOSF input.
- DPCX System Services (e.g., SYSLDSA).

The spool is divided into a set of files containing one or more records. Each file is targeted for a particular printer set-up, and may contain a password required for access.

The number of files that can be in the spool data set is limited only by disk space availability.

Existing interfaces for application programs, and RJE, are maintained and additionally extended with new interactions. Thus, for example, from an application program viewpoint, the file has from 1-64 groups, each of which has records with a Print Sequence Number identifier. (Sum total of records for all groups is 65,535.)

**Browse:** Files in the general spool data set can be viewed from any display, 1,920 characters or larger, locally or remotely attached to the system. This facility allows the terminal user to review the contents of the file as it exists in the spool, ready for printing. These records cannot be changed by the display operator. The record content is formatted for the printer in SNA character set, (SCS), format.

When viewing a file, the display is divided into three areas:

- An area containing information such as, file name, displayed page number, top line number and left most column displayed.
- A frame area for displaying the spool file.
- A message area containing messages and commands.

Data in columns beyond the screen width is viewed by horizontal scrolling.

The operator has control of the display through commands that provide the following functions:

- File Selection.

- Vertical and horizontal scrolling.
- Capability to position to the top, end or page number, in the selected record.
- Locate a specific string of characters.

These commands can be entered either manually in the message/command area or by program function (PF) keys of the 3270, 3104 or 8775 displays. The 3732 and 8775 with IDTF licensed program have specific keys for many of these functions.

The data as displayed is normally the same, line by line, with the hard copy that will result from printing. There are a few exceptions resulting in multiple display lines, but in only one print line: For example, underscore, overstrike and boldface.

**Printing:** Data in the general spool file can be printed on any printer, locally or remotely attached to the system. When print data is added to the general spool, the system will dynamically use up to 2K of user space of Task Virtual Storage. The control of printing is through new commands for starting, restarting, stopping or cancelling print tasks and/or to modifying the formatting attributes. With the exception of the 6670, the restart capability permits starting at the top of the page where printing stopped or backing up from 1 to 5 pages. For the 6670, restart is under control of the 6670 and will be at the beginning of the document. A file can be erased by an authorized terminal user by command. An operator can also view the status (hold, complete or print) of a file.

Printing requires that there be a match between the printer and general spool file character set. Characters not supported will result in a unique character or print check depending upon the printer. Since print data in the general spool is already formatted, if multiple copies are required, format processing only occurs once saving system processing and I/O operations. (The internally controlled multiple copy capability of the 6670 eliminates the need for multiple transmissions of the print data to the 6670.)

When using the 6670 Information Distributor for printing, 6670 Operator Control Language (OCL), contained in the system Edit file, can be prefixed to the print data stream for control of printing individual documents.

PERFORMANCE

The following performance related changes exist in Release 2/3:

- Less Symbolic Machine Rolling.

The installation is given direct control over the amount of real storage that is devoted to the Symbolic Machine Execution Pool above the system base. In general, the larger the Execution pool, the less rolling will take place and, therefore, the better the performance. This trend will hold true up to the point that sufficient real storage is devoted to the execution pool to hold all of the Symbolic Machines. At that point, no rolling will take place.

- Less Transient Loading.

The installation is given direct control over the amount of real storage that is used for the system transient pool above the system base. In general, with a larger transient pool, there will be fewer disk accesses to load transients and, therefore, better performance will result.

DPCX also provides other user real storage options. 1) Placing entire application programs in real storage, thus decreasing application program paging, and 2) Increasing the size of the real storage pool used to process DXAM indices, user programs, user data set records, and page Task Virtual Storage areas, thus decreasing disk I/O operations.

- Less Disk Arm Movement in Data Operations.

The installation is given more control over disk space allocation via Sub-categories. Through this mechanism it is possible to control the placement of the indices for data sets, separate from the data and, therefore, the results can be reduced disk arm movement in indexed data set operations.

- More Efficient Transient Loading.

The disk addresses of all transients will be known to the system, eliminating index accessing. As a result, disk accesses can be reduced, and transients can be located faster. Eight blocks of a transient are loaded concurrently further reducing disk time.

There are two processing elements within the 8140 model C. One of these processing elements performs the same functions as the 8130 and 8140 A and B models while the other is restricted in that it does not directly attach channel logic or system control function. The normal mode of operation with both processing elements operating on the 8140 model C processor is called dual mode. The 8140 model C can also operate with a single processing element which is called single mode.

DPCX Release 3 and 8140 mdl C operating in dual mode, and the increase in the allowable number of active user tasks, introduce a new

### DPCX V1 R2.2 & 3 (cont'd)

performance growth path for processor bound interactive and office system 8100 users. They are capable of providing up to 70 percent increased throughput over a similarly configured and heavily loaded 8140 mdl B operating under DPCX Release 2.2. In those cases where the processor was heavily utilized, an improvement in response time may be possible by going to the 8140 mdl C and DPCX Release 3 for the same throughput.

The throughput improvement actually achieved by an 8140 model C operating with DPCX Release 3 depends upon many factors, some of which are:

- Installed real storage
- Input/output load
- Configuration
- Number of concurrent active tasks
- Process utilization
- Application

Additionally, an application characterized by heavy communication traffic and/or DASD load may not achieve the full performance improvement potential. For example, RJE and DSC/DSFC would normally be communications-bound tasks. Large sorts and document archiving to and from diskettes would normally be DASD-bound tasks. Also, tasks utilizing all, or substantial portions, of the system resources will not experience performance gains.

The increased number of concurrent active user tasks provides improved system flexibility for accounts where sufficient processing capability exists.

Applications running on the 8140 model C in single mode with DPCX Release 2.2 or 3.0 will experience performance equivalent to the 8140 model B.

In Release 4, the 8130B and 8150B provide the following throughput improvements for the same or better response times compared to current 8100 processors:

- 8130B: Up to 1.4 times an 8130A
- 8150B: Up to 2.0 times an 8140C
- 8150B: Up to 3.2 times an 8140B

The throughput improvements are based on similarly configured and heavily loaded systems. Response time improvements for the same throughput will also be possible.

The throughput improvement actually achieved by the new processors depends on many factors, some of which are:

- Installed real storage.
- Input/Output load.
- Configuration.
- Number of concurrently active user tasks.
- Processor utilization.
- Application environment.

In addition, an application characterized by heavy communication traffic and/or DASD load may not achieve the full performance potential. For example, RJE and DSC would normally be communications-bound tasks. Large sorts and document archiving to and from diskettes would normally be DASD-bound tasks. Also, tasks utilizing all, or substantial portions, of the system resources will not experience performance gains.

**Data Stream Compatibility - Extended:** The performance of the DSC function currently provided in DPCX Release 3 remains unchanged in DPCX Release 4. Typically, the 8100 process time is very small for DSC (for example, a transaction every 45 seconds of 40 characters in and 800 characters out would use less than one percent of an 8140B).

The DSC-E facility in DPCX Release 4 which allows switching between a host application and a DPCX application will utilize between two and three times the amount of 8100 process time as the current DSC facility for identical operations. In the example above, the DSC-E user would utilize between two and three percent of an 8140B. The response time, however, should not change noticeably. The performance of the DSC-E facility when using the 'suspend/resume' function or invoking user programs to access screen data is dependent on the user functions and applications.

#### PROCEDURES

DPCX procedures can initiate other procedures or be initiated by an application program. Procedures can also be selected by an operator using the command interface.

Release 2/3 expands this capability in several ways: (Feature #6001 configured to use 32K task virtual storage and general spool)

- Application programs can now initiate procedures as a subtask.
- At the completion of IPL, a procedure can optionally be invoked.
- At the completion of an operator logon, a procedure can automatically be invoked.

The significance of these new functions is that the user has added capability and flexibility to tailor the system to the installation's unique requirements. Using procedures for repetitive operations can result in more consistent operations by simplifying the operator interface.

DPCX provides the ability to automatically invoke a user written procedure at the end of system IPL. This allows the user to establish the operating environment including such things as which terminals are enabled, enabling the host link, establishing hot printer queues, output standard reports, etc.

Post operator log-on capability allows a procedure to be called automatically to provide processing for the specific operator. Thus, the system could have several procedures available. The procedure that is invoked depends upon the operator's number. For example, DOSF could always be invoked for an operator.

Application programs can now initiate procedures as a parallel processing subtask. This provides the ability to have an application program initiate procedures that start system functions. For example, when an application has reached a certain point in execution, a procedure could be started that initiates printing.

#### RELEASE 4 DESCRIPTION

The following describes the new functions available with DPCX Release 4:

**Support for the 8130B and 8150B Processors:** DPCX Release 4 supports the new 8130 mdl B and 8150 mdl B Processors. These new processor models enhance the modularity of the 8100 processor family and provide increased performance, availability, and reliability for the 8100 DPCX user.

**Support for the New 8130 Mdl B23 and B24:** DPCX Release 4 supports the new 8130 mdls B23 and B24 which employ state-of-the-art technology and provide a new 32-bit central processing element. The following support is provided:

- Processor storage of up to 2 megabytes.
- Logical storage of up to 4 megabytes.
- Improved throughput of up to 40% compared to an 8130 mdl A.
- Attachment of up to three 8101 storage and I/O units.
- Field upgradable from an 8130 mdl A.
- Support for two high-speed ports.
- Direct processor support for the Display/Printer Adapter.

**Support for the New 8150 Mdl B:** DPCX Release 4 supports the new 8150 mdls B20, B40 and B60 which employ state-of-the-art VLSI processor technology. These new processor models provide the DPCX and DOSF users significant performance improvements over the 8140 processor models. The following support is provided:

- Processor storage up to two megabytes.
- Logical storage of up to four megabytes.
- Improved throughput:
  - 8150 mdl B: Up to 2 times that of an 8140 mdl C.
- Upward compatibility from the 8130 and 8140.

The following limitations apply to the DPCX support of the 8150 processors:

- I/O is provided on a single processing element of the 8150B.
- The configuration capabilities for DASD, communication ports, Display/Printer Adapters, and devices remain unchanged from the DPCX Release 3 support of the 8140 mdls B and C.
- 8150 keys and locks are not supported by DPCX.

**New Data Stream Compatibility Function:** Significant flexibility and functional capability are provided with a new Data Stream Compatibility - Extended (DSC-E) facility. While the functional capabilities of the DSC facility in DPCX Release 3 remain unchanged, the user may now optionally invoke the DSC-E facility which provides the following new functions:

- **A suspend/resume 'hot' key switch:** A user of DSC-E may now suspend his host application by pressing a single user-designated PF or PA key. When communication with the host application is suspended, all DPCX functions and applications (including DOSF) are available to the user. The user may then return to (resume) the host application by again pressing the same PF or PA key. A host session may be suspended any time the display keyboard is unlocked; a host session may be resumed any time the DPCX task is at a point where a command may be entered.

**DPCX V1 R2.2 & 3 (cont'd)**

- **A user exit capability:** When in DSC-E mode, the user now has the capability to invoke a user-written program to access and process/modify the screen data generated by the host application. The program can be invoked by a user-designated PF or PA key.

If the DPCX system has DOSF installed, a 'screen capture' capability is also provided that allows screens generated by host applications to be captured by DOSF and stored as documents.

When the DSC-E option is selected, two user tasks are always made active. This is independent of whether the 'suspend/resume' function is ever used. The current DSC facility continues to use only a single task.

It should be noted that the DSC-E facility cannot be initiated from the host. Any DPCX/DOSF display (except a 3732) can initiate DSC-E. Additionally, the local copy function on an 8775 is supported only if the printer adapter feature (#5580) is installed.

**Command Interface for DSC and DSC-E:** A single command is now provided for quickly and easily accessing the Data Stream Compatibility functions of DPCX. An operand of this command is used to specify if DSC or DSC-E is to be invoked.

**Number of User and System Data Sets Increased:** The number of data sets available for user-written function programs has been increased from 96 to 191. The number of system data sets has been increased from 32 to 64.

**Enhanced Network Management:**

- **Problem Determination Aid:** DPCX has the capability to notify the Host system when certain 8100 hardware errors occur which result in the loss of a critical resource in the 8100 DPCX system. Also, DPCX will pass through to the Host unsolicited alerts received from downstream nodes. This function works in conjunction with the Network Problem Determination Application (NPDA) and the Network Communications Control Facility (NCCF) to provide the user with the tools necessary to monitor errors and perform problem determination from a central site. NPDA and NCCF are licensed programs that run at the host system.

- **Error Log Summary and Analysis:** The Error Log Summary and Analysis (ELSA) tool has been expanded to display and process Type 2 and Type 4 Condition Incident Log (CIL) records which are generated as a result of system ABENDs. Records can now be selected by device adapter address. The Processing and Control Element number has also been added to the selection criteria. These two new selection criteria allow for a more precise sample to be taken.

To better monitor the Host link, all Host communication will generate Type 3 CIL records. Information added to the Type 3 records describes the error in more detail.

- **Network Installation Management:** Network Installation Management can support the transmission of the Interactive Display Text Facility (IDTF) program for DOSF users of the 8775 text terminals. The IDTF program can be loaded on remote-site 8100 from a central host site. Optionally, the IDTF program can also be installed at the remote 8100 from the central site.

- **System and Data Link Traces:** Users can specify that only those trace records generated during a certain time period be formatted or copied. By eliminating the extraneous trace records, the time required to format the records for analysis is reduced.

**Connectivity Enhancements:**

- DPCX Bulk Print support is extended to include the 5210 Printer mdl E1 or E2 installed with EC 996869. Host applications can use this printer when it is attached to the 8100 DPCX system as an SNA Character Stream (SCS) Logical Unit (LU) Type 1 SNA.

- DPCX Release 4 supports two additional alternatives to the 6580 Displaywriter:

- The Displaywriter can be directly attached to an 8100 via the Display Printer Adapter (DPA) using RPO #8D0098 and PRPO #P10074. With these features installed, the Displaywriter appears as a 3277 Display Station.

- A Displaywriter with feature #8332 can also be coax attached to a 3274 Control Unit or 3276 Control Unit Display Station which is in turn attached either to a local or remote 8100 loop or to an 8100 Data Link Adapter (DLA). Attached in this manner, the Displaywriter appears as a 3278 Display Station and, optionally, the Displaywriter printer appears as a 3287 Printer.

With these attachment alternatives, the Displaywriter may be used as a 3270 display. Both these attachments provide document interchange with DPCX/DOSF (see the DOSF Program Announcement dated June 22, 1983).

**Usability Improvements:**

- **Operator-Definable PF and PA Keys:** A new facility is provided to allow DPCX and DOSF users to assign a specified function to PF and PA keys. With this facility, frequently used commands, procedures, and programs can be invoked simply by pressing a single key.

Commands, procedure names, and user program names can be assigned to the Program Function keys (PF keys 1-24) or the PA1, PA2, and PA3 keys. The request may be invoked immediately or displayed in the command entry area, updated if needed and executed when the enter key is pressed.

A PF key may also be assigned the special function of recalling the last command entered on the command line, and redisplaying it on the command line for possible update and reentry.

**Control Operator Functions:**

- **Display Command Access Codes:** A new command is provided that allows a user to display and optionally print the access codes associated with any given DPCX or DOSF command. The use of the command is restricted to the control operator, or any operator designated by the control operator.

- **Spool File Enhancements:** A new command is provided that allows a user to list and perform maintenance functions in the spool file. The functions allowed are display, delete, browse, and print all, or a subset of the files in the the spool. This facility may be used only by the control operator.

- **Enhancements for Enable and Disable Commands:** When enabling or disabling a program, the user can now identify the program by program name. The ability to identify the program by program number is still available.

**Reliability, Availability and Serviceability:** DPCX Reliability, Availability and Serviceability has been improved in Release 4:

- Enhanced problem determination is provided for user applications with an FP trap function. The function is invoked with a TRAP command, with all options provided through a menu facility.

- DPCX now supports the type 2D diskette for the Stand-Alone Dump (SADUMP) and the Stand-Alone Save/Restore and Copy (SASRAC) functions. The type 2D diskette may be used to both contain the above programs and to capture the dump data set.

- A facility is also provided to copy SADUMP data from the 8100 system disk to a type 1 or type 2D diskette. This allows a DPCX user to take an SADUMP to the system disk in a matter of minutes, and then transfer the dump data to diskette at a more convenient time. This facility also allows for the viewing of the SADUMP table of content records. The data presented includes the component number, the size of the SADUMP in number of 256-byte blocks, and the number of type 1 and type 2D diskettes required for the data.

- Time can also be saved in invoking the SASRAC function with the ability in Release 4 to predefine default SASRAC parameters. This will allow SASRAC to be run with few or no operator prompts which reduces the potential for operator errors.

- For problem determination and fix verification on 5210 Printers, an online 'printer exerciser' function is provided. The function is invoked by a new PRINTEX command

**Installation Enhancements:** The Stand-Alone Save Restore and Copy (SASRAC) facility and the SYSCONFG system service have been enhanced in Release 4. The enhancements allow a Release 4 DPCX system to be restored on 8100 processor with a different disk model than that on the processor from which the system was saved. For example, a system crated on a processor with a fixed head disk can be restored on a system with a non-fixed head disk.

The processor on which the system is being restored must have the same or more disk surfaces as the processor on which the system was created.

SYSCONFG will also change or delete disk volumes on those systems using the system default categories.

The automatic system configuration can now be initiated from the SYSCONFG menu in addition to the processor control panel.

**SYSTEM COMPONENTS**

**3732 Text Display Station:** Provides a 1,920-character display (24 lines x 80 characters) designed specifically to provide text entry, revision and related document functions.

The top line of the display provides the user with horizontal positioning information such as a scale that indicates the margins, tab stops and current cursor position. With wide text line two is used to indicate screen position and column scale. The bottom line of the display provides the user with such information as page number and line width and depth settings.

PROGRAM PRODUCTS

**DPCX V1 R2.2 & 3 (cont'd)**

The keyboard is designed for text operations with keys for entry of data similar to a typewriter. In addition, there are function and control keys used during document creation, revision, formatting and printing.

The terminal is supported by DOSF, a text program product. DPCX support includes user written programs using a subset of Full Screen Processing support. Applications can be written, for example, for data capture and local and/or host inquiry and update including host communications. Most DPCX provided system services can be initiated and controlled via the 3732.

The 3732 display and keyboard are different than the 327X and 8775 displays. The keyboard does not have PA or PF keys, although alternative keys will provide the equivalent AID bytes. The character set has additional characters used for text. The 3732 does not support 3270 data stream compatibility.

The 3732 can be located up to 2000 feet from the 8100/DPCX system. Attachment to the 8100 requires a display and printer attachment port and 3732 with Specify Code #9610 for 8100 attachment.

**3736 Printer:** A bidirectional, serial impact printer with a speed of up to 55 characters per second. The 3736 prints on tractor-fed continuous stationery or on manually-loaded single sheets (cut forms), using interchangeable 96-character print wheel, 10 or 12 pitch. The character set supported is compatible with the 3732 and the 8775 with IDTF licensed program for document printing, including printing characters in superscript or subscript locations. Printing width is 132 characters using 10 pitch or 158 characters using 12 pitch. Film ribbons are used to provide correspondence quality printing. This directly attached printer can be located up to 2,000 feet from the 8100/DPCX system. Attachment to the 8100 requires a Display and Printer Attachment port.

**3262 Printer:** Provides medium speed line printing for text documents. Attached to the 8100/DPCX system via loops with speeds up to 38.4K bps. The printer is available in two models, 2 and 12, with nominal printing speeds of 353 and 125 lines per minute with a print band providing printing compatible with the 3732 and 8775 with IDTF licensed program input. Other functions not supported are superscript, subscript and boldface printing. Printing width is up to 132 characters.

**5210-E01, E02 Printer:** A correspondence quality, table-top, bidirectional serial impact printer with speeds up to 40 (model E01) or 60 (model E02) characters per second. The 5210 prints on tractor-fed continuous stationery, single sheets (cut forms) supplied from a two-drawer sheet-feed attachment or cut forms manually loaded. The character set supported is compatible with the 3732 and 8775 IDTF licensed program for document printing, including printing characters in superscript or subscript locations. Printing width is 132 characters using 10 pitch, 158 characters using 12 pitch and 198 characters using 15 pitch. The one million character ribbon is contained in a snap-in cartridge designed for ease of insertion and removal. The printwheel is contained in a drop-in cartridge and support is provided for changing printwheels while printing a document. The 5210 without EC #996869 attaches only to a 9.6K bps loop. With EC #996869, supported only by DPCX Release 3, it may be attached to either the 9.6K bps loop or a 38.4K bps loop. With EC #996869, it also supports SNA LU Type 1 data streams.

**6670 Information Distributor:** A high quality printer with communication capability. It can format and print documents received from DPCX or from magnetic cards. The printer consists of a laser print head, a magnetic card unit, a communication facility and a processor. It also serves as a convenience copier. The 6670 is attached to the 8100/DPCX system via the communication port attachment, supporting line speeds up to 9.6K bps. Data from either the DPCX general spool file or the DPCX/RJE print job stream (online from the host) can be sent to the 6670 for printing. 6670 Operator Control Language (OCL) commands and instructions can be defined through terminal input or user programming and prefixed to the DPCX print data stream or to the DPCX/RJE print job stream to control the printing of individual documents. A DPCX subtask initiation capability is also available to the 6670 user via magnetic card input.

**3290 Information Panel:** The 3290 is a large capacity flat plasma panel display. The characters are orange on a black background. It attaches to the 8100 via the 3274 Control Unit.

The 3290 is data stream compatible with all models of 3270 displays in alphanumeric application environments, and also provides new functions. Highlights of the new functions supported by DPCX are:

- Concurrent multiple screen capability.
- Multiple screen-copy capability.
- Multiple interactive screens.
- Multiple partitions.
- Coexistence of multiple Copy Screens with multiple Interactive Screens.

Not all 3290 functions are supported by DPCX. The following is a list of limitations applying when the 3290 is operating under control of DPCX in other than Data Stream Compatibility mode:

- No more than 8 logical terminals are permitted per 3274 Control Unit. (Each 3290 is capable of supporting up to 4 logical terminals.)
- No more than 8 partitions are supported per screen with a maximum partition size of 4K bytes.
- A default screen size of 1,920 bytes only.
- Screen sizes of 1,920, 2,560, 3,440 and 3,564 bytes only.
- Inbound chains of up to 2,500 bytes maximum.
- Customer-provided Programmed Symbol sets are required if Browse is used when the 3290 character cell size is smaller than 9 x 12 pels.
- The 'WRTDEV DISPLAY, COPY' programming instruction (used for copying a display to a printer) is not supported in partitioned state with an opened LU Type 3 printer.
- 14- and 16-bit screen addresses are not supported.
- The 3290 cannot attach to an ASCII system.

**8775 with IDTF Licensed Program:** Attaches either via a loop operating at speeds up to 38.4K bps or via a communication port. Provides an 8775 display function with text entry and edit capability. Two additional operator selectable, downstream loadable functions are also available: Enhanced Function (Feature #3624) and Multiple Partitions and Scrolling (Feature #5110).

The 87-key EBCDIC Typewriter/Text Entry and Edit Keyboard provides the characters and functions of the 87-key EBCDIC Typewriter Keyboard with additions for text edit and entry.

The terminal can be used for either text entry and edit or for data processing applications.

With the IDTF licensed program loaded, the 8775 provides functions similar to those available with the IBM 3732 Text Display Station, plus some text functions not provided by the 3732, while retaining the data functions of the 8775. Only a 1,920 character screen size is supported. The terminals operate in either text entry and edit state or in data state. Switching between the two states does not require a downstream load. It is performed automatically under DPCX program control, dependent upon operator-selected functions.

With the Enhanced Function (Feature #3624) loaded, highlighting, partitioning, field validation, programmed symbols and APL (display only) via host are supported.

With the Multiple Partitions and Scrolling function (Feature #5110) loaded, multiple partitioning and vertical scrolling are supported.

Each of the above three functions is downstream loaded from the 8100 using the appropriate 8775 terminal setup procedure and each is mutually exclusive of the other; therefore only one function at a time is allowed per terminal.

**Other Printers:** Provides the ability to print documents on any printer attached to the 8100/DPCX system. Some special characters are not supported on these printers and will be printed as a unique character or result in a print check depending upon the printer.

Printers attached to the system include loop attached 3230, 3262, 3268, 3287, 3289; direct attached 3284, 3286, 3287, 3288; and display control unit attached 3230, 3262, 3268, 3287, 3289 and 7436-1 RPQ correspondence quality printer, RPQ XC5575. Display control units can be either direct attached loop or communication port attached.

**FUNCTIONS AVAILABLE WITH DPCX FEATURE #6001**

- Display Support.
  - Large screen displays: 2560, 3440 and 3564 characters.
  - 3274-51C Enhanced Function: Extended color, extended highlighting and programmed symbols.
  - 8775: Feature #3624, Feature #5110 and the IDTF licensed program.
- Access Methods: DXAM and RSAM.
- Printer Support.
  - 3262 mdl 2, 12 with and without print bands for text.
  - 6670 Information Distributor for printing and DPCX subtask initiating capabilities.
- Programming Functions: 32K Task virtual storage, improved editing and data manipulation instructions.
- System Functions: Print spool including browse capability.
- Extended Command Interface: Extensions to user procedure capabilities and command interface.

PROGRAM PRODUCTS

DPCX V1 R2.2 & 3 (cont'd)

**Note:** DPCX application programs making use of these functions of feature #6001, must be prepared at the host with Host Prep licensed program Release 4.0, 4.1, or 5.0 (5735-XR3).

**DPCX RELEASE 1 to RELEASE 2 TRANSITION**

Application programs written for Release 1 with or without Feature #6001 function are both source code and object code upward compatible with Release 2 with or without Feature #6001 function respectively. No modifications are required unless new devices or new functions will be supported.

For example, application programs written for DPCX Release 1 that access the Print Data Set in sector mode must be modified to run on DPCX Release 2 if DPCX Feature #6001 general spool file will be used.

User written procedures written for Release 1 are upward compatible with Release 2. No modifications are required unless new commands will be supported.

Existing diskette and tapes supported by Release 1 are fully compatible with Release 2.

DPCX Release 2 can be update installed and uses Release 1 data sets and user entered information.

DPCX Release 2 requires an 8100 configured with 384K bytes of real storage. (DPCX Release 1 requires 256K bytes of real storage.)

**DPCX RELEASE 2 TO RELEASE 3 TRANSITION**

DPCX Release 3 requires an 8100 configured with 512K bytes of real storage. DPCX Release 3 is upward compatible with DPCX Release 2. The Release 1 levels of the command processor and the printer spool functions are not supported. DPCX Release 2.2 will run on the model C, but without taking advantage of the improved performance capability of the new processor.

**INSTALLATION CUSTOMIZATION**

DPCX as distributed from IBM includes all functions and capabilities announced. The customer will install using the prompt/response system service capability of DPCX to customize for the appropriate hardware/program configuration.

DPCX is released on a series of installation diskettes which are loaded by the control operator onto disk storage via the operator panel. The next step is the post-installation initial program load procedure which results in the loading of the starter system in real storage.

Then:

- Control operator invokes the interactive configuration service utility.
- Control operator enters configuration information from previously prepared work sheets.
- The input is edited and the configuration positively verified.
- Real storage required to support the specified configuration is assigned resulting in a defined system utilizing from 384K to 1M bytes.

The interactive configuration service then activates the configured devices and the control operator may exercise the report option to display the generated configuration. This completes the customization process.

The control operator then invokes the system installation parameter service to specify information relative to, for example, host communication, transaction data set and RJE.

An automated installation/customization facility, ASSIST, is available to DOSF users whose systems operate with at least 29 million bytes of disk storage. For users of DPCX releases prior to Release 2.2, there is a further restriction that their system must operate with no host communication, no user programming and only direct attached terminals and printers. This facility, an option of the installation program, simplifies the installation/customization process and the system is ready for use at the end of the procedure. Details are contained in the Installation Instructions which are provided with the system.

**Network Installation Management Capability:** The centralized control facilities of DPCX are enhanced to provide a Network Installation Management capability which allows the installation and customization of DPCX and DOSF at remote 8100 locations from a central site.

There are three elements required to do installation and customization from the host:

- A Source 8100 system at DPCX Release 3 level.
- A Host S/370, 30XX or 4300 system with appropriate programming.
- Destination 8100 systems at DPCX Release 3 level.

Once DPCX Release 3 is installed from diskettes at the remote systems, future installations, as well as configuration and customization functions, can be controlled from the host. Support is not provided for

the remote installation of the DOSF spelling dictionary and 8775 enhanced functions.

The host support required for the Network Installation Management function is provided by the Distributed System Executive (DSX) or can be provided by user-written programs.

**SECURITY, AUDITABILITY, and CONTROL**

DPCX is intended for business applications with customer management control of the 8100 processor. No facilities (e.g., source code, compiler or linkage editor) are available for modification of programs at the 8100 processor. These functions are performed at the host. This implementation and the facilities listed below provide for strong central management control of the system and applications.

- Program isolation through virtual resource management architecture.
- Program protection in both primary and secondary storage.
- Application program unmodifiable during execution.
- User identification and authorization through passwords.
- Host-to-DPCX authorization through passwords.
- Full control operator journaling on disk with hardcopy log output.
- Through user written procedures, added security functions, such as additional passwords, can be added to limit access to application programs.

**USER MANAGEMENT RESPONSIBILITY**

These features are intended for use in an environment where application development and control reside at the host. This is the frequently preferred environment for sensitive business applications. For applications in which sensitive data is sent over external communication facilities, user management may wish to augment these facilities with the application of cryptography.

Since security, auditability and control are application, price, environment and organization dependent, final responsibility for their adequacy must rest with user management.

**8100/DPCX PRODUCT SUPPORT**

See *DPCX General Information: Introduction: (GC27-9075)* for more information.

8100/DPCX supports the following features and devices:

**8130, 8140 or 8150 Processor**

- Storage size of 384K bytes to one megabyte (1,024K bytes).
- Storage size of 1,024K bytes to two megabytes (2,084K) for 8140 model C.
- Maximum of one diskette 2D drive (mandatory) with the following media format and capacity:

	128-BYTES	256-BYTES
DISKETTE 1	243K bytes	288K bytes
DISKETTE 2D	N/A	998.4K bytes

- Maximum disk capacity of 64.5M bytes for 8130 and 123M bytes for 8140 processors (approximately 8 megabytes of disk capacity is required by DPCX).

**8101 Storage and I/O Unit:** For up to 258M bytes of additional disk capacity to an 8130 based system for a total of 322M bytes, and up to 387M bytes of additional disk capacity to an 8140 based system for a total of 516M bytes, and additional communication adapters.

**Magnetic Tape: 8809:** A maximum of 4 drives are supported in 12.5 inch per second mode for Application Program Control of tape. The 100 inch per second capability is utilized by the stand-alone dump/restore utility.

**Terminal Devices Supported**

- Direct Attach with up to 24 of the following:
  - 3277 Display mdl 2, 3284 Printer mdl 1, 2, 3286 Printer mdl 1, 2, 3287 Printer mdl 2, 3288 Printer mdl 2, 3732 Text Display Station and 3736 Printer.
  - 6580 Displaywriter with the following:
    - Displaywriter-3277 Device Emulation RPQ #8D0098.
    - Displaywriter-3277 Device Emulation/Document Transfer PRPQ #P10074.

PROGRAM PRODUCTS

DPCX V1 R2.2 & 3 (cont'd)

The direct attachment to the 8100 Information System is via the 8101 Storage and I/O unit of 8140 Processor models B51 through B72, using the display and printer attachment, DPA.

Models of Devices Attachable: Loop or Communication Port

DEVICE	LOOP ATTACHED MODELS			COMMUNICATION PORT MODELS	
	Max No*	38.4K	9.6K	Max No*	Up to 9.6K
3104	20	B1, B2	B1, B2	--	--
3230	20	1	1	--	--
3262	20	2, 12	2, 12	--	--
3268	20	1	1	--	--
3274 (1)	5	51C, 61C	51C, 61C	5	51C, 61C
3276 (2)	5	--	12, 13, 14	5	12, 13, 14**
3287	20	11, 12	11, 12	--	--
3289	1	--	3	--	--
5210 (3)	5	E1, E2	E1, E2	--	--
6670 (4)	--	--	--	1	1, 2
7426	5	1	1	5	2
8775 (5)	20	1, 2	1, 2	10	11, 12

- \* The maximum number in this table pertains to DPCX Release 2 and earlier only. See below for Release 3 capabilities.
- \*\* Also mdl 2, 3 and 4 in SDLC mode (cannot attach 3279).
- (1) 3274 supports base and extended color, extended highlighting and programmed symbols.
- (2) 3276 supports base color only.
- (3) 5210 EC #996869 is required to attach to 38.4K bps loop. 5210 with EC #996869 is supported only by DPCX Release 3.
- (4) 6670 mdl 2 required for 9600 bps.
- (5) 8775 supports IDTF licensed program, extended highlighting, field validation, programmed symbols, multiple partitions and scrolling.

DEVICES ATTACHED TO 3274 AND 3276

DEVICE	3274-51C, 61C MODELS	3276-12, 13, 14 MODELS
	Up to 8 Devices	Up to 7 Devices
3178	C1, C2	C1, C2
3230	2	2
3262	3, 13	13
3268	2	2
3278	2, 3, 4, 5	2, 3, 4
3279	2A, 3A, 2B, 3B	2A, 3A, 2B**, 3B**
3287	1, 2, 1C, 2C	1, 2, 1C**, 2C**
3289	1, 2	1, 2
3290	1	--
7436*	1 (RPQ)	1 (RPQ)
6580***		

- \* RPQ XC5575.
- \*\* Supported with base color only.
- \*\*\* A 6580 Displaywriter attached to the 8100 through the 3274 Control Unit or the 3276 Control Unit Display Station with the Type A Terminal Adapter must be installed with the following:
  - Displaywriter-3270 Attached Workstation licensed program (5608-SR9).
  - Displaywriter-3274/3276 Attached Workstation Adapter, feature #8332.

Up to three single lobe direct-attached loops are supported, of which two can be high speed of 38.4 bps. A loop can have up to 20 stations of the combinations shown above and in addition, one 3289 mdl 3 printer.

Up to five communication ports are supported with speeds up to 9.6K bps in a multipoint (max 10 stations), point-to-point or point-to-point direct connection without modems. See table above for number and type of devices.

**Release 3 Configuration Changes:** The data link attached loop is supported in Release 3. With this enhancement, any currently supported loop attachable device, whether for data processing or text applications, is available for use at any location, regardless of distance from the 8100. At the remote site, a 3843 Loop Control Unit provides the interface between the data link and the attached loop. The 3843 runs at the speed of the attached modems (up to 9.6K bps).

For configuration purposes, devices attaching to a data link or a loop are viewed as either small stations (1 device per station), such as the 5510, 6670 and 8775, or large stations (up to 8 devices per station), such as the 3274 and 3276.

Up to 11 stations can be attached per data link, and they may be either small or large. (An exception is the attachment of the data link attached loop; only one 3843 may be attached per data link and no other devices may be on the same link.)

Up to 26 stations can be attached to a directly attached loop. Of the 26, up to 5 may be large stations. (If no large stations are used, all 26 may be small stations.)

Up to 10 stations can be attached to a data link attached loop, and they may be either small or large.

There are no maximum number restrictions requiring the attachment of any specific type of device in Release 3.

Host Link (SNA/SDLC)

1200 to 56K bps

- Switched with 8100/DPCX Information System Auto-Answer (1200 to 9600 bps)
- 8130 transmission Speed: 1200 to 9600 bps.
- 8140 Transmission Speed: 1200 to 56K bps.
  - Nonswitched - Point-to-point or multi-drop (1200 to 9600 bps).
  - Nonswitched - Point-to-point or multi-drop, half or full duplex (56K bps).
  - 1200 to 56K bps point-to-point direct connect (without modem).

CURRENT RELEASES AT DPCX AVAILABILITY OF:

Operating system support

- DOS/VSE
- DOS/VS
- OS/VS1
- OS/VS2 (MVS)
- MVS/XA

Access method support

- VTAM
- TCAM
- ACF/VTAM
- ACF/VTAME
- ACF/TCAM
- EXTM
- VSAM
- QSAM

Host program support

- CICS/VS
- IMS/VS
- VSPC (BASIC and FORTRAN only)
- NOSP (via 3270 DSC)
- RES/JES1
- NCCF
- JES2
- JES3
- POWER/VS
- POWER/VSE
- HOST COMMAND FACILITY
- DSX (Distributed System Executive)
- DMS/DPCX (Development Management System)
- Host Prep licensed program
- Host Support

With DOSF:

**HOST:**  
Distributed Office Support System/3730  
Document Interchange Facility/Host

**8100:**  
Distributed Office Support System/3730  
Document Interchange Facility/Distributed

**DSX Support:** (Batch Transmission)



PROGRAM PRODUCTS

**DPCX V1 R2.2 & 3 (cont'd)**

Sending to the 8100/DPCX Systems: Application programs, relative and indexed user records, display panels, data set, control blocks, messages, print data and commands for data to be sent to the host.

Receiving from the 8100/DPCX Systems: Transaction data, messages and application program dumps.

DSX does not support subcategory definitions or data for DXAM/RSAM access methods, transparent data or larger symbolic machine dumps.

**ASCII Support:** ASCII support is available in the United States and Canada only. Specify #2990. **SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

**Minimum Configuration Supported**

- 1 8130 with 512K bytes processor storage
- 1 3277-2 or 3732 direct attached to an 8101

**Minimum Configuration 2**

- 1 8140 with 512K bytes processor storage
- 1 direct attached 3277-2 or 3732

**Minimum Configuration 3**

- 1 8130 or 8140 with 512K bytes processor storage
- 1 direct attached loop or communication port
- 1 3274 with a 3178, 3278, 3279, or 3290; or 1 3276; or 1 8775; or 3104

**Maximum Configuration Supported**

**Maximum Configuration 1**

- 1 8130 or 8140 model B with 1M bytes of processor storage
- 5 Disks with an 8130 base system, 8 Disks with an 8140 based system
- 4 Tape drives
- 24 3277-2 and/or 3732 displays; and/or 328X and/or 3736 printers
- 1 Host Link with up to 56K bps
- 5 Communication ports with appropriate displays/printers (Maximum of 11 stations per communication port)
- 3 Direct attached loops with appropriate displays/printers (Maximum of 26 stations per loop)

**Maximum Configuration 2**

- 1 IBM 8140 model C with 2M bytes of processor storage
- 8 Disks
- 4 Tapes
- 1 Host Link with up to 56K bps
- 5 Communication ports with appropriate displays/printers (maximum of 11 stations per port)
- 3 Direct attached loops with appropriate displays/printers (maximum of 26 stations per loop)

**SOFTWARE REQUIREMENTS**

No additional programs are required to run DPCX on the hardware described.

**DOCUMENTATION**  
(available from Mechanicsburg)

*DPCX Licensed Program Summary (GC27-0557) ... DPCX General Information: Introduction (GC27-9075).*

**RPQs ACCEPTED:** No

**PROGRAM CURRENCY**

IBM Program Services previously announced for DPCX Release 3 will be available until February 1985.

**LICENSED PROGRAM MATERIALS AVAILABILITY**

**Restricted Materials:** No. All modules of this licensed program will be available with source licensed program materials.

PROGRAM PRODUCTS

**5761-XR1 - DOSF R2, 3, 4**  
**DISTRIBUTED OFFICE SUPPORT FACILITY**  
**for the 8100 INFORMATION SYSTEM**  
**RELEASES 2, 3 and 4**

**PURPOSE**

DOSF is a DPCX system application designed to provide automated office support for principal, professional, clerical, and secretarial users. DOSF provides facilities for document creation, revision, formatting, storage, retrieval, printing and host transfer. It also offers a file folder organization, and the capability to manage 'work in process' to fulfill company-wide requirements for enhanced professional and secretarial productivity. DOSF supports the development of office correspondence, business related documents and automated text generation using local data. DOSF along with the other components of the Distributed Office System provides a host document data base with search, retrieval and archiving capabilities; and document exchange capability with other host text processing programs. An easy-to-use Data Stream Compatibility function allows display screens generated by a host application to be captured and used as DOSF documents. In addition to these comprehensive functions available without user programming, the user can write text application programs to enhance capability. DOSF executes with the DPCX operating system which provides extensive data processing and I/O device attachment capability. Thus, DOSF is a component of a distributed system ready to meet today's office needs in text and data processing.

**RELEASE 2 HIGHLIGHTS**

With the 8100/DPCX/DOSF system, terminal users are able to do the following:

- Create documents rapidly using the 3732 Text Display Station or the 8775 with the IDTF licensed program.
- Let the system automatically determine line and page endings during creation, revision and formatting.
- Use special commands and keys to create and revise wide documents and manipulate columnar text.
- Store frequently used text for later use in other documents resulting in less repetitive keying.
- Use the 327X/8775 display terminals to produce customized form letters, browse thru formatted documents, process completed documents and invoke many DOSF functions.
- Use Automated Text facilities to create documents from pre-formatted patterns which can be personalized via any 1920 character or larger display with information from files, programs, other documents or the keyboard.
- Generate mass mail documents using the DOSF provided function.
- Use the Spelling Verification and Assistance facilities to check the correct spelling of a single word, or all the words in a page or a complete document, and to assist in correcting words found in error.
- Use Records Processing facilities to perform such functions as selecting records or fields from a text created file that meet specific criteria and sorting records or fields in a text created file.
- Perform arithmetic operations on data contained in documents.
- Initiate automated office practices thru DOSF user written cataloged procedures.
- Initiate user written application programs that extend the functions provided by IBM.
- Use queued access functions for printer, diskette and host communications.
- Send documents to the host for storage in the document data base provided by the Distributed Office Support System.
- Send requests to DISOSS for the search, retrieval or deleting of documents.
- Exchange documents via the Document Interchange Facility, with other host text programs that use the Document Library Facility, such as ATMS-III and Document Composition Facility.
- Protect documents from unauthorized users by use of passwords, access codes, delete codes and user profiles.

**RELEASE 3 HIGHLIGHTS**

DOSF Release 3 is enhanced by:

- Support for 8140 model C Processor.
- DPCX Data Link attached loop support.
- Additional automated text function.
- Automatic hyphenation support for additional languages.
- Several usability enhancements.

- DISOSS/8100 Support
  - Printing of Displaywriter documents.
  - IBM Scanmaster I support.

**RELEASE 4 HIGHLIGHTS**

DOSF Release 4 is enhanced by:

- Editable interchange between 6580 Displaywriter and 8100/DOSF documents.
- Editable document interchange with 6580 Displaywriter via DISOSS/370 Version 3.
- 6580 Displaywriter cluster controller support:
  - New 6580 Displaywriter attachment support.
  - Document interchange capability.
- Enhanced professional office support:
  - Menu interface to text commands.
  - Text editor enhancements.
  - Enhanced document file management.
  - Quick access to multiple documents.
  - 'Work in process' capability.
  - Automated annotate capability.
- Permanent store security enhancements.
- New Data Stream Compatibility function.
- 6580 Displaywriter document view.
- Automated text enhancements.
- Records processing enhancements.
- Archiving enhancements.
- Spool file list processing.
- Usability improvements.

**RELEASE 4 ENHANCEMENT HIGHLIGHTS**

- 3278 with 3270 Personal Computer Attachment support.
- File exchange between DPCX/DOSF and the 3278 with 3270 Personal Computer Attachment.
- Storing and processing IBM Personal Computer files in DOSF permanent store.
- DOSF list processing enhancements including support for IBM Personal Computer files.
- Enhanced DOSF permanent store search functions.

**DESCRIPTION**

Note: The following description is of DOSF at the Release 4 level. For details as to release-dependent functions, refer to the sections describing individual releases, located further in these pages.

Documents created on the 3730 Distributed Office Communication System can be exchanged with the DOSF/8100 system via the Distributed Office Support System (DISOSS) or diskette. These documents are upward compatible. DOSF/8100 documents can be exchanged with a 3730 system via DISOSS or diskette provided the document text controls are supported by the 3730 or the document does not contain wide text. See section on "Document Exchange".

The 8100/DPCX system provides text users with processors with up to 2M bytes of real storage and disk capabilities up to 500M bytes, satisfying a wide range of text system requirements.

Thus, DOSF, as a component of the Distributed Office System, is part of the offering that provides the capability to help manage office information.

**INTRODUCTION**

**Overview:** DOSF provides facilities for document preparation from creation through to archiving. The process of developing a document consists of three steps; creation, editing and formatting. Thereafter, the document is usually handled as an entity for printing, distribution, storing or archiving. A document, for example, can be a single or multiple page letter, a report or a manual.

**3732 Text Display Station:** To create and manipulate the document content, the user uses the 3732 Text Display Station attached to the 8100/DPCX with DOSF. The operator is provided with an 80 character wide by 24 line display. The top line of the display provides the operator with horizontal positioning information such as a scale that indicates the margins, tab stops and current cursor position. The bottom line of the display provides the operator with such information as page number, line width and depth settings. When text width is

## DOSF R2, R3 & R4 (cont'd)

greater than 79 characters, the second line is used to indicate screen position via a scale and column number.

The main part of the keyboard resembles that of the normal typewriter and has function and control keys used in document creation, editing, formatting and printing. In addition, the keyboard has function keys. These keys and a number of commands are used to enter, edit and format text, to control documents and to position the operator's view of the document. Some commands affect the document as displayed, while some affect the document when formatted just prior to printing.

The 8775 with the IDTF licensed program loaded provides functions similar to those available with the IBM 3732 Text Display Station, plus some text functions not provided by the 3732, while retaining the data functions of the 8775. The terminal can, therefore, be used when there is a need for both text and data processing applications. It is primarily intended for personnel whose normal tasks involve data applications and who have an occasional need for text functions.

A document created on an 8100/DOSF system via a 3732 Text Display Station or 8775 Display Station with IDTF (Interactive Display Text Facility) can be edited by a user on a Displaywriter workstation. Likewise, any document created on a Displaywriter can be edited by an 8100/DOSF user via a 3732 or 8775/IDTF workstation. Documents exchanged between the two systems must be converted to the receiving system's format for subsequent editing. This conversion occurs within the 8100/DOSF system.

**Working Store:** Is a facility provided by DOSF for each operator. It contains the current document that is displayed on the 3732 under operator control. Documents retrieved from Permanent Store including a concatenation of documents or subdocuments can also be placed in Working Store. Working Store contents can be sent to Permanent Store, or can be printed via the PRINT key. Up to seven work stores may be active at a time. A menu interface is provided to allow easy movement among these working stores.

**Permanent Store:** Is a DOSF facility provided for each operator, that is used to store documents. Documents stored in Permanent Store come from Working Store, from archive diskettes, from the 6580 Displaywriter or from the host. Application programs can also process these documents.

In permanent store, documents can be assigned to folders. The user is given the ability to list folder names, select a specific folder, and list the documents contained within that folder. The user can then select and edit any document listed in that folder. This facility allows the user to organize and work on his documents as he does today.

Access to user documents can be defined at the operator number level. The document accesses supported are get, add, delete, replace and list. Operators can now be grouped by departments, so that they share documents pertaining only to their department

### BASIC TEXT FUNCTIONS

**Document Creation:** Provides the facilities for entering documents into the system using the text display station. This operation is similar to typing, with the function keys and commands to help increase productivity. Functions include:

Settings for tab stops and page width and depth.

The operator need not slow down or look at the screen to decide line endings (adjust mode) since words are automatically spilled to the left margin of the next line.

Text can be entered in free form (typewriter-like) with the operator being responsible for line endings. A signal sounds when the cursor is at 5 character positions from the right margin (no adjust mode).

The left margin can be temporarily moved to the right; this automatically causes the text that is subsequently entered to be indented. Additional temporary margins can be used to provide other indentations.

Commands and keys provide the ability to do functions by character, word, line, sentence, column or block.

Text can be defined to be:

- Printed, highlighted or underscored to attract the eye.
- Included or excluded from a copy.
- Defined as superscript or subscript.

Columnar data can be entered row-by-row or column-by-column.

When text entered by the operator is to exceed 79 characters in width, a wide text mode is invoked. The operator can retain a portion of the text as a reference window to be used as a guide for entry. Words are automatically spilled on line boundaries when the ENTER key is used. DOSF allows wide text up to 255 characters, however, printed output is limited to the available printer widths.

The operator's view of the document allows both vertical and horizontal screen scrolling. By positioning the cursor, the screen scrolling can be as fine as a line or character position.

Other controls allow the operator to display the top or the end of the document or to scroll by page.

When creating a new document, the operator can use existing documents providing increased accuracy and throughput. For example, existing documents can be:

A document that contains text ranging from a phrase to an entire subdocument.

One or more documents can be concatenated to form a new document.

Documents created by different operators can be brought together into a single document.

Documents used only to predefine headings and footings or tab stops, page width and length. This allows a variety of predetermined formats to be readily available.

After entry, the operator may use the ADJUST key to have the system format the document into pages. The operator can review the page breaks to determine if further action is required.

**Document Editing:** Provides the facilities for making changes, additions and deletions to documents stored in the system. Functions include:

Locating and displaying that part of the document where editing is required, via scrolling, or using commands to find a page or string of text.

Making corrections in both columnar and horizontal text using insert, copy, move, find/change and delete functions.

To assist in reviewing, a document can be printed with line numbers and/or revision indicators in the margin and with selected line spacing.

**Records Processing:** Provides the ability to process documents that contain structured data (text created files) such as lists and tables. Processing includes the ability to establish criteria for selecting records and to sort based upon the contents of one or more fields.

Record selection provides the ability to describe fields within records and use qualifiers such as "equal to" or "more than" to select records within the documents. These qualifiers can be combined with "and" or "or" to form more complex selection criteria.

Sorting can be done based upon one or more fields with a total maximum length of up to 60 characters and is done in ascending or descending order.

**Text Arithmetic:** Provides a means for an operator to add, subtract, multiply and divide single numbers, or rows or columns of numbers. It also provides the capability for complex arithmetic operations which can be retained in the text both as a record of what was done and as a means to minimize re-keying for repeated calculations.

**Spelling Verification and Assistance:** Used to check the spelling of a single word, or of all the words in a page or a complete document, and to assist in correcting words found in error. This function uses an IBM-supplied dictionary which is comprised of approximately 100,000 general English language words, 40,000 medical terms and 30,000 legal terms. The dictionary can be extended with a user-supplied list of words, limited only by the amount of storage the user wishes to allocate for this purpose.

**Document Formatting:** Provides the facilities for detailed page layout of the document. Includes such functions as:

Automatic or manual hyphenation.

Specifying at entry time centering, headings, footings, page numbering, page ending, annotation, text to be kept together and spaces for graphics.

Formatted documents in the general spool file can be viewed on any 1920 character or larger display locally or remotely attached to the 8100/DPCX system. (DPCX function)

**Document Printing:** Enables documents to be queued for printing by the 3732 PRINT key or via commands. A range of printers are available for printing draft or final copy either locally or remotely attached to the 8100/DPCX system. The print request is placed on a DOSF queue which has specific characteristics for printing. These include margins, length and width, and the code of the paper to be used. The operator, in addition to line spacing, selects the print format such as:

Justified ... where the right margin is aligned by adding spaces to each line where required.

Formatted ... where the line endings are with "ragged right" endings.

As entered ... where most of the commands that control the formatting are printed but are not executed.

When justified or formatted printing takes place, the document is printed in final format including, for example, headings, footings, centering and page numbering. When the operator uses the PRINT key, a menu is displayed allowing the operator to proceed using

## PROGRAM PRODUCTS

## DOSF R2, R3 &amp; R4 (cont'd)

predefined parameters or to make changes. Documents to be printed are formatted before being placed into the general spool. Thus, when more than one copy is required, the processing load will decrease since formatting will only need to happen once rather than once per copy.

Printer drawer selection can be specified for printers which have a multiple sheet-feed capability.

Support is provided to allow the user to change the type style used when printing on a printer with multiple type style capability. For example, a word can be italicized in the middle of a sentence. This change can take effect at any point in the document and can apply to as little as a single character or as much as the rest of the document.

**HELP Facility:** Provides the operator with a menu driven capability invoked via the HELP key when immediate assistance is needed. HELP provides explanations of functions and commands. During command input, invoking HELP will provide additional operator guidance.

**Other Operator Functions:** Include the ability to list all the documents in permanent storage, send messages to other operators on this 8100 system, (can be sent to other 8100/DOSF and 3730 systems via DISOSS) view messages sent from other operators, remove documents from a print queue and stop the printer.

With a single operation it is possible to process a group of documents as an entity. This function helps to increase the accuracy and ease of operation, and includes deleting, sending or retrieving and placing on a print queue. For example, retrieve all documents not already in permanent store that were ordered between two specified dates.

Queue list processing allows the operator to change requests on queues and to display queue contents.

Journaling, (a DPCX function) resulting in hard copy output, is available for some operator actions.

**PRINCIPAL/PROFESSIONAL OFFICE SUPPORT:** DOSF includes significant office support for the principal and professional, as well as for the secretary.

**Menu interface to text commands:** DOSF learnability and usability are aided with a menu interface for a number of DOSF text commands and immediate commands. The strength of this menu interface is that it allows the new or occasional user to quickly become productive with DOSF while still providing the power of commands to the experienced user. For example, to create a centered heading, the user selects the heading option from the menu and completes the prompts. He then keys in the text. The appropriate DOSF text commands will be automatically placed in the document.

**Text editor help:** The DOSF editor provides text command identification via cursor pointing. This aids the occasional or new user in revising a document.

**Document file management:** DOSF has the capability of organizing documents into file folders. Documents can now be assigned to folders. The user is given the ability to list folder names, select a specific folder, and list the documents contained within that folder. The user can then select and edit any document listed in that folder. This facility allows the user to organize and work on his documents as he does today.

**Easy access to multiple documents:** Up to seven working stores are available to the user. A menu interface is provided to allow easy movement between these working stores. This function allows a user to automate the way he handles documents today. For example, a user might view a letter in one working store. That letter may reference another letter, causing the user to put aside the first letter and get the referenced letter into a second working store. The user may then create a response to the first letter in a third working store.

**Work in process capability:** If the user is interrupted in a work session, all currently active working stores can be suspended and the group of working stores be given a name. When the user wishes to resume the work session, he can then recall this group and continue working as before. A menu interface is provided to manage the suspended groups.

**Automated annotate capability:** An automated annotate capability is available to allow the user to add notes at any point in a document which is being viewed in a working store. The user indicates where he wants the annotation to appear in the document and keys in the text. The system automatically frames the note, and includes the author's name, date and time. This function becomes invaluable when documents are passed for review within a department or organization. Likewise, a principal could add instructions for a secretary to take special action on a document before distributing it. The document can be printed with or without the annotations. This facility is available on a 3732 Display or an 8775 Display with IDTF.

## AUTOMATED TEXT FUNCTIONS

Automatic text functions enable the users to accurately and simply produce standard business documents, such as contracts or agreements, and repetitive documents such as confirmation or marketing letters. The capability provided includes:

Generating a standard business document from prestored text. These standard texts, (i.e., contract phrases for example) are used unchanged for more than one document and are protected from operator change. They are called out in sequence by the operator. There may be places within the text for the user to enter data. Thus, the end result is a unique document.

Using a pattern document previously entered on a 3732 or 8775 with IDTF licensed program terminal, a user at any 8100/DPCX or host attached via the Host Command Facility display that is 1920 characters or larger can cause the creation of a personalized document. The unique data for the pattern document can be from the keyboard, a stored document, a text created file, a DPCX user data set, or a program. The invoking operator can control the number of copies and printing format. Once the input has been completed, the operator is free to do other work while the system completes the letter.

Preprinted forms can be personalized in the same manner as described above using a pattern document.

Mass mail can be generated by using a pattern document with name and address inserted from a file. Mass mail processing takes place as a background job, freeing the operator to do other work.

User written text application programs can be written to meet specific organizational requirements beyond those described above.

**327X/8775 (without IDTF licensed program) Text Capability:** The general purpose display stations attached to the 8100/DPCX system are primarily used for data processing applications. DOSF in conjunction with DPCX provides support for these terminals (1920 character or larger) in a number of important ways:

- Ability to browse thru a formatted document on the DPCX general spool file.

- Ability to invoke a pattern letter, key in the keyboard input(s), specify the variable field source(s) and to initiate the processing.

- Initiation of DOSF procedures and applications specifically written for these terminals.

- Ability to process documents such as placing a request on:

- A local queue for processing such as archive, printing or deleting.

- DOSF archive queue for subsequent host processing by DISOSS, Document Interchange Facility, user written application.

- To initiate DOSF functions related to its operation such as:

- Define parameters (host sessions, operator profiles ...) initiate functions (host sessions, printing ...) control the system (queues, terminal access, operator access ...) send broadcast messages, receive messages create and update the data dictionary,

Host attached displays via the Host Command Facility and DPCX can do all the functions described above.

In addition, 327X/8775 terminals via DPCX and Data Stream Compatibility, have access to host based text and data processing programs. Text programs include ATMS, STAIRS, Document Library Facility and Document Composition Facility.

## PROCEDURES AND APPLICATION PROGRAMMING

**Tailoring** of the system is provided thru the use of user written procedures. Procedures can be used for example, to simplify repetitive operations, decrease operator errors, increase the uniformity of operations and to provide unique commands. Procedures can be invoked at different points in systems operation such as, at the end of DPCX IPL, after operator log on, thru an operator entered command or by an application program. Procedures can contain commands, keyboard entries, DPCX commands, and can invoke both DOSF or DPCX services. Procedures are entered as a document, and then transferred to the procedure library.

**Application Programming:** Provides the ability to extend the IBM-provided functions. It can be used for example, to implement more advanced automated text functions, office management facilities, and to access host or local data bases. Programs can be interactive with an operator or once initiated, be completely independent of the operator. Text applications have the ability to use both text and data processing programming statements including most DPCX functions and access methods.

DOSF applications are written using programming statements that have been designed specifically to support text functions. In addition, DPCX programming statements can be used. Programs are written using Host Prep licensed program and/or host support (SCP) that executes on the S/370, 303X or 4300 systems. This provides facilities for program compilation, in conjunction with the Assembler. Programs are then placed on a VSAM data set. DSX, the Distributed System Executive, can be used to store and distribute programs. Program testing via SYSDEBUG, is available on the 8100/DPCX System.

## PROGRAM PRODUCTS

## DOSF R2, R3 &amp; R4 (cont'd)

## HOST SUPPORT

**Host Interface:** Host interface includes the ability to use IBM-provided functions or to use user written programs to send or receive host documents or transactions.

DOSF provides a document transmission facility (DTF) to send or receive documents between the 8100/DPCX system and host programs such as DISOSS or user written applications. The host applications can be in environments provided by VTAM, ACF/VTAM, ACF/VTAME TCAM, ACF/TCAM, CICS/VS or IMS/VS.

Both DISOSS and the Document Interchange Facility interface into DOSF with programs that reside in the 8100/DPCX system to provide additional capability without user programming. This includes sending or receiving documents. With DISOSS, there is additional ability to send commands for archive, delete, search, retrieve and optional features to print at the host, directly view on a 3732 display or send to STAIRS/VS. DISOSS support can either be interactive or batch.

User written programming capability includes the ability to communicate with host applications interactively or batch. This includes the ability to use IMS/VS and CICS/VS transaction and mapping support.

## SECURITY of DOCUMENTS

Access control is by means of hardware keylocks, operator passwords and operator access codes. In addition, documents have additional control fields. Documents have a name which can be up to 15 characters in length; subdocument names are up to 8 characters. To process a document from Permanent Store, this name must be entered. When a document is to be stored, the operator has the ability to specify an up to 5 character GET CODE, and an up to 5 character DELETE CODE. Thus, to obtain a copy of a document or to delete it, these codes must be known.

Further protection is provided by specifying in each operator's profile, ability to obtain, delete, list or store documents in another operator's Permanent Store. A specific operator's Permanent Store can be protected by prohibiting all other operators from access or listing contents except the controlling operator.

For applications in which sensitive data is sent over external communication facilities, user management may wish to augment these facilities with the application of cryptography. This is a user responsibility.

**Backup and Recovery:** Provides ability to recover from both operator errors and disk errors. Operator errors include loss of data from, for example, altering a profile, or deleting documents before archiving. Disk errors can result in the loss of operator profiles, DOSF environment information, queue IDs and characteristics, and etc.

The controlling operator can take checkpoints of the data stored in the system to be used to reestablish the lost information. This can at times result in only partial recovery, depending upon the time since the last checkpoint.

**Document Exchange:** Documents created on a 3730 system can be sent to a DOSF/8100 system via DISOSS or diskette. These documents are upward compatible with the DOSF support. Documents containing 3730 wide table text commands will automatically be converted to DOSF wide text when retrieved from permanent store.

Documents created on a DOSF/8100 system can be sent to a 3730 system via DISOSS or diskette. These documents are compatible with the 3730 system provided the text commands contained within the document are supported by the receiving 3730 system. DOSF text commands that must be excluded include, for example, blind text, block overstrike, boldface printing, line numbered output, variable hyphenation, revision indicators or documents containing wide text. See *DOSF General Information Manual: Introduction* (GC27-0546).

DISOSS support for DOSF documents includes store, retrieve, delete and search. Excluded are the optional features of DISOSS - i.e., host printing, direct viewing on a 3732 and formatting for STAIRS/VS - when these documents contain DOSF text commands not supported by DISOSS. Refer to the current *DISOSS General Information Manual* (GH12-5124) for details.

DOSF also provides DISOSS/8100 users support for the printing of final form documents created on a 6580 Displaywriter. The documents may be distributed from the Host Document Library or between the systems through the network document distribution facilities of DISOSS. The interchanged documents must be printed on the 5210 with EC #996869 installed.

The Document Interchange Facility can exchange DOSF documents with the Document Library Facility. Not all DOSF text commands may be supported. Refer to the current *Document Interchange Facility General Information Manual* (GH20-2440) for details.

## SYSTEM COMPONENTS

**8775 with IDTF Licensed Program:** Attaches either via direct attached loop operating at speeds up to 38.4K bps or via communication port. Provides an 8775 display function with text entry and edit

capability. Two additional operator selectable, downstream loadable functions are also supported: Enhanced Function (Feature #3624) and Multiple Partitions and Scrolling (Feature #5110).

The 87-key EBCDIC Typewriter/Text Entry and Edit Keyboard provides the characters and functions of the 87-key EBCDIC Typewriter Keyboard with additions for text edit and entry.

The terminal can be used for either text entry and edit or for data processing applications.

With the IDTF licensed program loaded, the 8775 provides functions similar to those available with the 3732 Text Display Station plus some text functions not provided by the 3732, while retaining the data functions of the 8775. Only a 1920-character screen size is supported. The terminals operate in either text entry and edit state or in data state. Switching between the two states does not require a downstream load. It is performed automatically under DPCX program control, dependent upon operator selected functions.

With the Enhanced Function (feature #3624) loaded, highlighting, partitioning, field validation, programmed symbols and APL (display only) via host are supported.

With the Multiple Partitions and Scrolling function (feature #5110) loaded, multiple partitioning and vertical scrolling is supported.

Each of the three functions is downstream loaded from the 8100 using the appropriate 8775 terminal setup procedure and each is mutually exclusive of the other; therefore only one function at a time is allowed per terminal.

**3732 Text Display Station:** provides a 1,920-character display (24 lines X 80 characters) designed specifically to provide text entry, revision and related document functions.

The top line of the display provides the user with horizontal positioning information such as a scale that indicates the margins, tab stops and current cursor position. With wide text, line two is used to indicate screen position and column scale. The bottom line of the display provides the user with such information as page number and line width and depth settings.

The keyboard is designed for text operations with keys for entry of data similar to a typewriter. In addition, there are function and control keys used during document creation, revision, formatting and printing.

The terminal is supported by DOSF, a text program product. DPCX support includes user written programs using a subset of Full Screen Processing support. Applications can be written, for example, for data capture and local and/or host inquiry and update including host communications. Most DPCX provided system services can be initiated and controlled via the 3732.

The 3732 display and keyboard are different than the 327X and 8775 displays. The keyboard does not have PA or PF keys, although alternative keys will provide the equivalent AID bytes. The character set has additional characters used for text. The 3732 does not support 3270 data stream compatibility.

The 3732 can be located up to 2,000 feet from the 8100/DPCX system. Attachment to the 8100 requires a Display and Printer Attachment port and 3732 Specify Code #9610 for 8100 attachment.

**6580 Displaywriter:** The 8100 with DOSF can be used as a 'cluster' or 'departmental' controller for the Displaywriter. This function provides document storage and printer sharing capabilities for the Displaywriter. Documents created on a Displaywriter can be filed on the 8100 and printed on a 5210 mdl E Printer with EC 996869 supported by the 8100. By making the 8100 disk storage available to the Displaywriter, the need for diskettes at the Displaywriter is greatly reduced. This also reduces the need to attach a printer directly to a Displaywriter. To meet the needs of users who have a variety of attachment requirements, DOSF Release 4 provides for additional ways to attach the Displaywriter.

The 6580 Displaywriter can be directly attached to an 8100 via the Display Printer Adapter (DPA) using RPQ 8D0098 and PRPQ P10074. DOSF will also support the attachment of a Displaywriter with feature #8332 and licensed program 5608-SR9 to a 3274 Control Unit or 3276 Control Unit Display Station attached either to a local or remote 8100 loop or to an 8100 Data Link Adapter (DLA). These attachment alternatives allow for the exchange of documents directly between Displaywriter and 8100/DOSF.

The Displaywriter can also be supported as a 3270 workstation in Data Stream Compatibility mode, but this attachment does not support document transfer.

**5210 Printer:** A correspondence quality table-top, bi-directional serial impact printer with speeds up to 40 (mdl E01) or 60 (mdl E02) characters per second. The 5210 prints on tractor-fed continuous stationery, single sheets (cut forms) supplied from a two-drawer sheet-feed attachment or cut forms manually loaded. The character set supported is compatible with the 3732 for document printing including characters in superscript or subscript locations. Printing width

## PROGRAM PRODUCTS

**DOSF R2, R3 & R4 (cont'd)**

is 132 characters using 10 pitch, 158 characters using 12 pitch and 198 characters using 15 pitch. The one million character ribbon is contained in a snap-in cartridge designed for ease of insertion and removal. The printwheel is contained in a drop-in cartridge and support is provided for changing printwheels at any point while printing a document. The 5210 without EC 996869 attaches to DPCX only via a 9.6K bps loop. With EC 996869 (available July, 1983) installed, it attaches via loops operating at speeds of up to 38.4K bps. The proportional spacing capability of the 5210 is not supported by the DOSF formatter.

**3736 Printer:** A bidirectional, serial impact printer with a speed of up to 55 characters per second. The 3736 prints on tractor-fed continuous stationery or on manually-loaded single sheets (cut forms), using interchangeable 96 character print wheel, 10 or 12 pitch. The character set supported is compatible with the 3732 for document printing, including printing characters in superscript or subscript locations. Printing width is 132 characters using 10 pitch or 158 characters using 12 pitch. Film ribbons are used to provide correspondence quality printing. This directly attached printer can be located up to 2000 feet from the 8100/DPCX system. Attachment to the 8100 requires a Display and Printer Attachment port.

**3262 Printer:** Provides medium speed line printing for text documents. Attached to the 8100/DPCX system via direct attached loops with speeds up to 38.4K bps. The printer is available in two models, 2 and 12, with nominal printing speeds of 253 and 125 lines per minute with a print band providing printing compatible with the 3732 input. Functions not supported are superscript, subscript and boldface printing. Printing width is up to 132 characters.

**Other Printers:** Provides the ability to print documents on any printer attached to the 8100/DPCX system. Some special characters are not supported on these printers and will be printed as a unique character or result in a print check

Printers attached to the system include direct attached loop 3230, 3262, 3268, 3287, 3289; direct attached 3284, 3286, 3287, 3288; and communication port attached 6670; display control unit attached 3262, 3268, 3287 and 7436-1 RPQ correspondence quality printer, RPQ #XC5575. Display control units can be either direct attached loop or communication port attached.

**INSTALLATION**

All customers receive the same set of diskettes. These are read into the system by DPCX and then DOSF is customized to satisfy the specific site requirements. This customizing includes setting a unique DOSF identification, setting normal operator entry parameters, setting disk storage allocation and operator access to functions.

An automated installation/customization facility, ASSIST, is available to users whose systems operate with at least 29 million bytes of disk storage. For users of DOSF releases prior to Release 2.1, there is a further restriction that their system must operate with no host communication, no user programming and only direct attached terminals and printers. This facility, an option of the installation program, simplifies the installation/customization process and the system is ready for use at the end of the procedure. Details are contained in the Installation Instructions which are provided with the system.

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS** Minimum

1 IBM 8100 Information System configured to support the appropriate level of DPCX. See "Software Requirements", below.

1 IBM 3732 Text Display Station via direct attachment.

1 X 90K bytes real storage for DOSF

(Minimum Processor storage for DPCX/DOSF is 768K bytes. Enhanced configurability and performance can be realized by the addition of processor storage.)

1 X 4M bytes disk space for DOSF

**SOFTWARE REQUIREMENTS**

DOSF Release 2.0 requires DPCX Release 2.1 and DOSF Release 2.1 requires DPCX Release 2.2, both with the appropriate level of feature #6001 configured for DXAM/RSAM and general spool.

DOSF Release 3 requires DPCX Release 3. Printing of Displaywriter documents and Scanmaster I support is dependent upon DISOSS/370 Version 3 and DISOSS/8100 Version 1.1.

See *DOSF General Information Manual* (GC27-0546) and *DPCX General Information Manual* (GC27-9075) for additional information.

**3730 COMPATIBILITY**

Programs written for the 3730 system using the same or equivalent device type are upward compatible at both the source and object level to the DPCX/DOSF system, provided that there are no hard coded device addresses. User written application programs using 3730 wide table support executing on DOSF may have unpredictable results. 3730 documents are upward compatible to DOSF documents. They can be

transferred to DOSF via DISOSS or diskette. Documents using 3730 wide table support are converted to DOSF wide text support when initially retrieved from Permanent Store. See section on "Document Exchange" for added detail.

**ASCII Support:** ASCII support is available in the United States and Canada only. When specified for DOSF, it must be specified for DPCX also. Specify #2990.

**RELEASE 2 CONTENTS**

Revision indicators used to indicate document revisions.

Blind carbon copy used to identify text that will be included or excluded from a copy of a document when printed.

Find/change improvements that will allow locating and replacement of strings optionally interpreting capitalization, spacing, punctuation and underscoring.

Block underscore/deunderscore will allow the operator to define the block or column of the text and initiate the function. This can be from two characters to a whole document.

Block overstrike allows selection of a character or system default to overstrike text. The operator identifies a block of the text with imbedded text commands that are later interpreted before printing. This is used where the original text should not be deleted.

Bold face printing allows the operator to identify text; i.e., a character, word, sentence, phrase or block, that will be printed highlighted to attract the reader's attention. For example, on the 3736 printer, the character will be printed once, and then printed a second time slightly offset while on the 5210 the character is reprinted, but with no offset.

Automatic hyphenation can be specified by the user to have the system automatically insert hyphens in words that are found to cross the right margin of a page when adjusting a document. This function employs the dictionary used by Spelling Verification .

Variable hyphenation permits an operator to alter the system defaults used during the adjust with hyphenation function which can improve the appearance of printing.

Line numbering will allow an operator to have a document printed with line numbers in the margin to assist in reviewing. Numbering starts on each page and is by line or every five lines as selected.

Spelling Verification and Assistance is used to check the correct spelling of a single word, or of all the words in a page or a complete document, and to assist in correcting words found in error.

Text arithmetic provides a means for an operator to add, subtract, multiply and divide single numbers, or rows or columns of numbers.

Multiple sheet-feed support provides the user with the ability to specify drawer selection for printers with a multiple sheet-feed capability.

Type style change allows the user to change the type style used when printing on a printer with multiple type style capability.

**RELEASE 2.1 CONTENTS**

Records processing provides the ability to process documents that contain structured data (text created files) such as lists and tables. Processing includes the ability to establish criteria for selecting records and to sort based upon the contents of one or more fields.

Additional Automated Text commands allow the user to:

- Generate formatted reports from text created files stored in the system.
- Use text created files containing lists or tables as a source of imbedded data for documents or patterns.
- Insert a field from a file directly into a document in Working Store.

Additional Mass Mail commands provide a simplified means of merging data from a "master" document containing constant information and a "control" document containing variable information into a Mass Mail document using a technique of switch codes.

Alternate Working Store provides a means for an operator to interrupt work done on one document, and then return to the point of interruption on the first document. The system saves the contents of Working Store before "swapping" to the Alternate Working Store and restores them when "swapping" back.

Support for the 5210 enhances document printing flexibility and support by providing a loop attached printer and a capability to print documents at 10, 12 or 15 pitch. The 5210 also permits the user to use the DOSF multiple sheet-feed support and the type style change support when printing documents.

Support for the 8775 with the IDTF licensed program loaded provides functions similar to those available with the IBM 3732 Text Display Station, plus some text functions not provided by the 3732, while retaining the data functions of the 8775. The terminal can therefore be used where there is a need for both text and data processing applications.

**DOSF R2, R3 & R4 (cont'd)****RELEASE 3 CONTENTS**

DOSF Release 3 complements the 8140 model C support provided by DPCX Release 3, and provides users with the capability to take advantage of increased storage and performance improvements available with this processor. This support, coupled with the DPCX Release 3 enhancement doubling the number of user tasks from 31 to 62 that can be active concurrently, offers improved system flexibility for accounts where increased processing power and additional storage is required, or where sufficient processing power is available but additional active terminal support is needed.

To meet the needs of users who have requirements for text capabilities at sites remotely located from the 8100 processor, DPCX Release 3 extends its configuration support to include data link attached loops. With this enhanced support, any loop attachable device, whether for data or text applications, is available for use at a remote location. With appropriately configured displays and printers, remote DOSF workstations are supported.

DISOSS/8100 users are provided with support for the Scanmaster I, as well as the printing of final form documents created on the IBM Displaywriter. DISOSS/370 Version 3 is also a prerequisite for this support.

The automated text facilities of DOSF are enhanced by the capability to insert fields from Relative Sequential Data Sets (RSDS) records into a document. The support is identical to that provided for index files, e.g., field lengths of up to 200 characters and record keys of up to 24 characters.

On prior releases of DPCX/DOSF systems, functional interfaces were provided through both DPCX and DOSF system services as well as commands. As a result, users had to decide which system service or command should be used to perform a particular function. DPCX/DOSF will remove many of these redundant interfaces and provide a single command processor interface for the desired function.

Support is provided to print documents at either 6 or 8 lines per inch on the 5210 printer. (Prior releases support only 6 lines per inch.)

The restriction of having a maximum of one text command in a line being processed by Find/Select or Sort/Select is removed. Processing will no longer be affected if a line contains multiple text commands as long as that line contains no other data.

A new option is added to SYSXFEA3 to provide a means to monitor disk space usage in the spool file.

**RELEASE 4 CONTENTS**

DOSF Release 4 complements the 8130 mdl B and 8150 processor support provided by DPCX Release 4, and allows users to take advantage of the increased performance of these processors.

Host or 8100/DOSF-attached 6580 Displaywriter users can edit documents created on an 8100/DOSF system via a 3732 Text Display Station or 8775 Display Station with IDTF (Interactive Display Text Facility). Likewise, any document created on a Displaywriter can be edited by an 8100/DOSF user via a 3732 or 8775/IDTF workstation. Documents exchanged between the two systems must be converted to the receiving system's format for subsequent editing. This conversion occurs within the 8100/DOSF controller.

Because they are created in different environments, the two forms of revisable form documents express common concepts in different ways, and each also has concepts that the other cannot express at all. Therefore, the conversion between these two forms of revisable documents is necessarily limited. However, many typical documents can be converted while still retaining their external format.

For planning purposes, the following list of 6580 Displaywriter text controls and functions are not handled when a Displaywriter document is converted to a DOSF document: Inhibit pagination, spell attributes text unit name, Reportpack shell documents, included text, right/colon tab alignment, justification, operator message, auto-outline, footnotes, insert escaped graphic, release left margin, begin/end column, set visual attributes, index, unit backspace, half-line spacing, proportional space management.

For planning purposes, the following list of DOSF controls and functions are not handled when a DOSF document is converted to a 6580 Displaywriter document: Annotation, arithmetic, blind text, column tabulate, deferred get, double strike, line numbers, imbeds, multiple-line records, revision indicators, subdocument, skip forward/diagram/line, begin/end centering, column tabs, margin text greater than 256 characters.

More detailed information regarding these incompatibilities is available in the appropriate product reference manuals.

Documents created on a 6580 Displaywriter can be filed on the 8100 and printed on a 5210 mdl E Printer with EC 996869 supported by the 8100. By making the 8100 disk storage available to the Displaywriter, the need for diskettes at the Displaywriter is greatly reduced. This also reduces the need to attach a printer directly to a Displaywriter. Because of differences in the internal structures of the documents, a

Displaywriter document will require more storage and take more time to format for printing than the same size DOSF document.

The Displaywriter can be directly attached to an 8100 via the Display Printer Adapter (DPA). It can also be attached through a 3274 Control Unit attached to a local or remote 8100 loop or an 8100 Data Link Adapter (DLA). These attachment alternatives allow for the exchange of documents directly between Displaywriter and 8100/DOSF. The Displaywriter can also take advantage of the 8100 system's file and printer services with these attachment alternatives. In addition, it is supported as a 3270 workstation without file transfer.

Users of host-attached 6580 Displaywriters can file and retrieve Level 3 DCA and final-form documents to and from the Host Document Library. Please note that a Displaywriter request to retrieve a DOSF-editable document will result in DISOSS/370 transforming the DOSF-editable document to a final-form document prior to transmitting the document to the Displaywriter.

DOSF Release 3 allowed DISOSS/8100 users to receive final form documents distributed from a host-attached 6580 Displaywriter. DOSF Release 4 enhances that support by allowing DISOSS/8100 to receive Level 3 DCA documents which have been distributed from a host-attached Displaywriter. When DISOSS/8100 receives these documents, they will be formatted into final form and made available for viewing or printing by the recipient. In addition, the existing DISOSS/8100 support for distribution of DOSF documents has been extended to allow distribution of Level 3 DCA documents which are resident in the 8100/DOSF permanent storage.

DOSF learnability and usability have been greatly enhanced with a new menu interface for a number of DOSF text commands and immediate commands. The strength of this menu interface is that it allows the new or occasional user to quickly become productive with DOSF while still providing the power of commands to the experienced user.

The DOSF editor has been extended to provide text command identification via cursor pointing. This aids the occasional or new user in revising a document.

A new concept of organizing documents into file folders is being introduced into the 8100/DOSF system. Documents can now be assigned to folders. The user is given the ability to list folder names, select a specific folder and list the documents contained within that folder. The user can then select and edit any document listed in that folder. This facility allows the user to organize and work on his documents as he does today.

An additional five working stores are being made available to the user, increasing the total to seven. A new menu interface is provided to allow easy movement between these working stores.

If the user is interrupted in a work session, all currently active working stores can be suspended, and the group of working stores be given a name. When the user wishes to resume the work session, he can then recall this group and continue working as before. A menu interface is provided to manage the suspended groups.

An automated annotate capability has been added to DOSF Release 4 to allow the user to add notes at any point in a document which is being viewed in a working store. The user indicates where he wants the annotation to appear in the document and keys in the text. The system automatically frames the note and includes the author's name, date, and time. This function becomes invaluable when documents are passed for review within a department or organization. Likewise, a principal could add instructions for a secretary to take special action on a document before distributing it. The document can be printed with or without annotations.

Permanent store security is enhanced to allow for document access to be defined at the operator number level. The document accesses supported are get, add, delete, replace, and list. Operators can now be grouped by departments, so that they share documents pertaining only to their department.

Significant flexibility and functional capability are provided with a new Data Stream Compatibility - Extended (DSC-E) facility. While the functional capabilities of the DSC facility in DPCX Release 3 remain unchanged, the user may now optionally invoke the DSC-E facility which provides the following new functions:

- A Suspend/Resume 'Hot' Key Switch: DSC-E allows a user to have an active host task and an active 8100 task simultaneously. The user may now switch between these two tasks by pressing a single user-designated PF or PA key. When communication with the host application is suspended, all DPCX functions and applications (including DOSF) are available to the user. The user may then return to (resume) the host application by again pressing the same PF or PA key. A host session may be suspended any time the display keyboard is unlocked; a host session may be resumed any time the DPCX task is at a point where a command may be entered.
- A Screen Capture/User Exit Capability: Display screens generated by a host application can be captured by DOSF and stored as a document. A user-written application may optionally be invoked to

**DOSF R2, R3 & R4 (cont'd)**

make any desired modifications to the screen before the document is created. The document resulting from a screen capture function is a DOSF document which can be edited, imbedded in another document, or printed. The screen capture function is invoked by pressing the user-designated PF or PA key.

When the DSC-E option is selected, two user tasks are always made active. This is independent of whether the 'suspend/resume' function is ever used. The current DSC facility continues to use only a single task.

It should also be noted that the DSC-E facility cannot be initiated from the host. DSC-E can be initiated by a user of any DPCX/DOSF display, except a 3732. When the DSC-E facility is used, the local copy function on an 8775 is supported only if the printer adapter feature #5580 is installed.

Also, a single command is provided for quickly and easily accessing the Data Stream Compatibility functions of DPCX. These functions can now be invoked by entering the LOGON command directly from the DPCX 'Enter Command' screen. The user can specify whether the current DSC or the new DSC-E function is to be invoked.

The DOSF facility for viewing documents formatted for printing has been enhanced to allow viewing of DCA Level 2 documents. Documents created on a Displaywriter and distributed to the 8100/DOSF DISOSS/370 can now be viewed by any 8100/DOSF system display. DOSF Release 3 allowed only for the printing of these documents.

As an aid to better managing Automated Text pattern letters, DOSF Release 4 provides a facility for listing and printing pattern letter specifications. The document created by this facility lists the pattern routing information and the specification information for each imbed in the pattern. The imbeds are grouped by type.

Pattern letters can now process numerical data without operator intervention. Automated text processing will now resolve all text arithmetic commands when generating documents. The arithmetic commands may be either in a pattern letter or in text brought into a document via Document Imbeds or Deferred Gets.

The repetitive letters facility has been made more flexible. Letters generated by the MERGE command will be put on a print queue only if the user requests. Also, the user can specify that the generated documents be either deleted from or retained in permanent store after they are printed.

DOSF will support the increased number of user data sets available in DPCX Release 4.

DOSF records can now contain text commands on the same line as data. This enhancement broadens the applicability of the DOSF records processing facility by lessening the distinction between text files and documents.

Select/Sort can now be done on an entire document without the operator being prompted for a target area.

Archiving reliability has been improved by the system immediately reading back each section written to diskette to ensure the data was recorded accurately.

The spool file list processing function provides the control operator the ability to list and process formatted documents in the system spool file. A new command, SPOOLPRC, will display a list of all or a subset of the documents in the spool file. The control operator can then select documents from the list to be either viewed, printed or deleted.

The following usability functions are included:

- Text commands can now be entered in either lower or upper case.
- The number of lines allowed in a heading or footing has been increased to 50. This provides more flexibility in the content and the placement of headings and footings.
- A new text command allows the user to specify the left margin at any point in the document. This command overrides the left margin characteristics specified in the queue definition.
- The text arithmetic facility has been enhanced to allow for processing to continue when a divide by zero situation is encountered. The current method causes processing to cease. A warning message will be issued, and the result of the calculation will be null.
- Three new system arguments have been added to the command procedure facility. These arguments provide access to the document name, get code, and operator number of the last document stored when the last STORE command was invoked. This new facility will add more power and flexibility to procedures which store a document using the prompt followed by a print request for a stored document.
- The Temporary Left Margin can now be set beyond position 79 and up to position 127.
- Multiple backspaces are now supported on the 8775/IDTF Display.

- Three lines of text will now be displayed when the tabrack is changed on an 8775/IDTF Display.

**RELEASE 4 ENHANCEMENTS CONTENTS**

The 3278 with 3270 Personal Computer Attachment is supported by DPCX/DOSF Release 4. The 3270 Personal Computer Attachment support is provided via the 3278 with 3274 Control Unit which may be attached to 8100 directly-attached and data link-attach loops and communication links. With this attachment capability, the 3278 with 3270 Personal Computer Attachment may be used in the following ways:

- **Personal Compute Mode:** Using the 3278 as the monitor and keyboard of the IBM Personal Computer, all Personal Computer functions can be performed.
- **Interactive Mode with DPCX/DOSF:** In this mode of operation, the 3278 operates the same as it did prior to the installation of the IBM Personal Computer attachment. The user can quickly change between DPCX/DOSF interactive mode and Personal Compute mode with the simultaneous pressing of two keys at the 3278 keyboard.
- **Interactive mode with an S/370 host via DPCX DSC:** In this mode of operation, the 3278 can appear as an S/370 attached display, again operating the same as it did prior to the installation of the Personal Computer Attachment.
- **S/370 Host File Transfer Mode via DPCX DSC:** The 3278 with 3270 Personal Computer Attachment provides a file transfer capability between the 3278 with 3270 Personal Computer Attachment and an S/370 Host system. This same file transfer can be accomplished with a DPCX-attached 3278 with 3270 Personal Computer Attachment via the DPCX DSC facility.
- **DPCX/DOSF File Transfer Mode:** This new facility in DPCX/DOSF is described in the following section.

**File Exchange between DPCX/DOSF and the 3278 with 3270 Personal Computer Attachment:** DPCX/DOSF Release 4 now supports the exchange of files between DOSF permanent store and a 3278 with 3270 Personal Computer Attachment. Any file resident on the 3278 with 3270 Personal Computer Attachment diskette may be transferred to the DPCX/DOSF system, and any member of DOSF permanent store may be transferred to the 3278 with 3270 Personal Computer Attachment.

To initiate the transfer of files, the 3278 with 3270 Personal Computer Attachment user must be logged on to DOSF, and be in a state where a command can be entered. A HOST command (or HOST-equivalent command in a customer program) must then be entered at the 3278 with 3270 Personal Computer Attachment to invoke a 3278 with 3270 Personal Computer Attachment using IBM Personal Computer Data Transfer Sample Application Program (or an equivalent customer-written program) that places the 3278 with 3270 Personal Computer Attachment in file transfer mode. The exchange of files is accomplished with a PUTFILE command to transfer files from the 3278 with 3270 Personal Computer Attachment to the 8100, and a GETFILE command that transfers files from the 8100 to the 3278 with 3270 Personal Computer Attachment. Parameters may be specified on the commands, or optionally a prompt screen is provided. The file name is the only mandatory parameter. Files may continue to be sent in either direction until the Sample Program in the 3278 with 3270 Personal Computer Attachment is terminated. While the Sample Program (HOST) is active in the 3278 with Personal Computer Attachment, other Personal Computer functions cannot be performed.

**Storing and Processing PC files in the 8100:** Personal Computer files that are transferred from the 3278 with 3270 Personal Computer Attachment to an 8100 DPCX/DOSF system are stored in DOSF permanent store. A CONVERT command may optionally be used to change the file to the DOSF format. Both versions of the file are stored in DOSF permanent store.

- **PC Files Converted to DOSF Documents:** A Personal Computer file that is converted to DOSF format and stored in DOSF permanent store may be processed in the same manner as other DOSF documents. This includes retrieval of the document at the 3278 with 3270 Personal Computer Attachment.
- **PC Files Stored as PC Files:** A Personal Computer file may be retrieved by any 3278 with 3270 Personal Computer Attachment in the same format in which it was originally created. The 3278 with 3270 Personal Computer Attachment user may also archive and delete the file, and if the file is in EDIT format containing ASCII data, it may also be printed at the DPCX/DOSF system. The same functions may also be invoked by any 3270-type device attached to the DPCX/DOSF system.

**DOSF R2, R3 & R4 (cont'd)**

**DOSF List Processing Enhancements:** Personal Computer files may also be processed via the document list processing function of DOSF. This function has been enhanced such that all saved Personal Computer files are identified as Personal Computer files. The 3278 with 3270 Personal Computer Attachment user can therefore list all Personal Computer files and select the following functions to be performed:

- Retrieve an IBM Personal Computer file to be sent to the 3278 with 3270 Personal Computer Attachment.
- Print a file as described above.
- Delete or archive a file.

**Enhanced Search with Support for PC Files:** The search function has been enhanced to be able to qualify the permanent store search by specifying the file type (e.g., Personal Computer). Additional enhancements also allow the searching for document/file names by prefix, suffix or character string within the name. The new search functions will use one or more '\*' to indicate how the document/file names are to be searched.

**PERFORMANCE CONSIDERATIONS**

**DOSF Performance:** The performance of DOSF depends upon a number of interrelated factors. Those important to DOSF performance are the 8100/DPCX configuration, the number and characteristics of the concurrent applications, operator input and output rates, host link characteristics and the host application characteristics. Thus, the process of determining performance is complex and to ensure that each configuration is acceptable, that configuration and its characteristics should be carefully assessed.

**Comparison of 8100/DPCX/DOSF Performance to 3730:** It should be noted that the factors given below are generalizations and that some systems will get better or worse performance depending upon many variables. There is no warranty or guarantee that the performance factors given below will apply to a customer configuration.

The 8140 processor provides approximately 1.4 times more processing capability than the processor used in the 3730 system (3791) while the 8130 processor is approximately equivalent. The disk performance for both 8100 processors is about two times that of the fixed disk used in the 3730 system (3791), assuming random accesses over moderately loaded files.

With the structure of the DPCX operating system and the DOSF application program on a 768K byte or larger processor, the following may be expected for many systems:

- 8130 system to perform in the range of approximately 1 to 1.5 times the 3730 system.
- 8140 system to perform in the range of 1.4 to 2.5 times the 3730 system.

These above improvements apply to direct attached terminals interacting with local 8100 applications.

**8140 Model C Performance:** The 8140 model C is supported in DPCX/DOSF Release 3. There are two processing elements within the 8140 model C. One of these processing elements performs the same functions as the 8130 and 8140 A and B models, while the other is restricted in that it does not directly attach channel logic or system control function. The normal mode of operation with both processing elements operating on the 8140 model C processor is called dual mode. The 8140 model C can also operate with a single processing element which is called single mode.

DPCX/DOSF Release 3 and 8140 model C operating in dual mode, and the increase in the allowable number of active tasks, introduce a new performance growth path for processor bound office system 8100 users. They are capable of providing up to 60 percent increased throughput over a similarly configured and heavily loaded 8140 model B operating under DPCX Release 2.2/DOSF Release 2.1. In those cases where the processor was heavily utilized, an improvement in response time may be possible by going to the 8140 model C and DPCX/DOSF Release 3 for the same throughput.

The throughput improvement actually achieved by an 8140 model C operating with DPCX Release 3 depends on many factors, some of which are:

- Installed real storage.
- Input/output load.
- Configuration.
- Number of concurrent active tasks.
- Processor utilization.
- Application.

Additionally, an application characterized by heavy communication traffic and/or DASD load may not achieve the full performance improvement potential. For example, RJE and DSC/DSFC would normally be DASD-bound tasks. Also, tasks utilizing all, or substantial portions, of the system resources may not experience performance gains.

The increased number of concurrent active user tasks provides improved system flexibility for accounts where sufficient processing capability exists.

Applications running on the 8140 model C in single mode with DPCX Release 2.2/DOSF Release 2.1 or DPCX/DOSF Release 3 will experience performance equivalent to the 8140 model B.

**8130 Model B and 8150 Performance:** The 8130 B and 8150 B provide the following throughput improvements for the same or better response times compared to current 8100 Processors:

- 8130 B: Up to 1.4 times an 8130 A
- 8150 B: Up to 2.0 times an 8140 C
- 8150 B: Up to 3.2 times an 8140 B

The throughput improvements are based on similarly configured and heavily loaded systems. Response time improvements for the same throughput will also be possible.

The throughput improvement actually achieved by the new processors depends on many factors, some of which are:

- Installed real storage
- Input/Output load
- Configuration
- Number of concurrently active user tasks
- Processor utilization
- Application environment

In addition, an application characterized by heavy communication traffic and/or DASD load may not achieve the full performance potential. For example, RJE and DSC would normally be communications-bound tasks. Large sorts and document archiving to and from diskettes would normally be DASD-bound tasks. Also, tasks utilizing all, or substantial portions, of the system resources will not experience performance gains.

**Data Stream Compatibility - Extended Performance:** The performance of the DSC function currently provided in DPCX Release 3 remains unchanged in DPCX Release 4. Typically, the 8100 process time is very small for DSC (for example, a transaction every 45 seconds of 40 characters in and 800 characters out would use less than one percent of an 8140 B).

The DSC-E facility in DPCX Release 4 which allows switching between a host application and a DPCX application will utilize between two and three times the amount of 8100 process time as the current DSC facility for identical operations. In the example above, the DSC-E user would utilize between two and three percent of an 8140 B. The response time, however, should not change noticeably. The performance of the DSC-E facility when using the 'suspend/resume' function or invoking user programs to access screen data is dependent on the user functions and applications.

**DOCUMENTATION**  
(available from Mechanicsburg)

*DOSF General Information (GC27-0546) ... Licensed Program Summary (GC27-0544).*

RPOs ACCEPTED: No

PROGRAM PRODUCTS

IBM TYPOGRAPHIC FONTS FOR THE 4250 PRINTER

- ITC Avant Garde Gothic ... 5771-AAA\*
- Monotype Baskerville ... 5771-AAB\*\*
- Monotype Bodoni ... 5771-AAC\*\*
- Candida ... 5771-AAD\*\*\*
- Monotype Century ... 5771-AAE\*\*
- Monotype Century Schoolbook ... 5771-AAF\*\*
- Excelsior ... 5771-AAG+
- Futura ... 5771-AAH++
- Monotype Garamond ... 5771-AAJ\*\*
- Helvetica ... 5771-AAK+
- Optima ... 5771-AAL+
- Palatino ... 5771-AAN+
- Monotype Rockwell ... 5771-AAP\*\*
- ITC Souvenir ... 5771-AAQ\*
- Monotype Times New Roman ... 5771-AAR\*\*
- Univers ... 5771-AAT+
- Typewriter and Pi ... 5771-AAW

APL Fonts

- The 132 APL characters in Light Italic at 10 and 12 characters-per-inch.

Pi Fonts

- Contains typographic, scientific and mathematical symbols with the upper and lower case Greek alphabet. There are 178 characters.
- Medium and Bold, Serif and Sans Serif typefaces in 4 sizes from 6 to 12 points ... a total of 16 fonts.

DESCRIPTION

Document processing and publishing applications require a large variety of typefaces in order to satisfy demands for aesthetics, variety of style, emphasis and readability. To provide these needs, IBM makes available a set of 17 program products containing 1,247 type fonts of graphic art quality in 22 distinct typeface families.

Intended for use with the 4250 Printer, the fonts consist of digitized alphabetic and other character forms in sizes ranging from 6 to 72 points (approximately 1/12" to 1") in height. Each character pattern is produced at a resolution of 600 x 600 dots (pels) per square inch, making it possible to reproduce faithfully the typeface designs. The results are letter forms of high graphic arts quality, style and variety. An international character set of 183 characters, satisfying the requirements of 11 languages, is provided in these 1,224 fonts.

In addition to proportionally spaced, typographic typefaces, 5 fonts in 3 mono-spaced, typewriter families are also offered. The character set combines the ICS with 34 additional characters for compatibility with system printer and SCRIPT/VS text character sets.

An extended character set is provided in Helvetica and Times New Roman for ease-of-migration to the 4250 Printer from system printers using TN, T11 or SCRIPT VS character sets.

Also included is the APL typeface family, which contains two fonts of 132 characters each. The other font families, called pi fonts, provide 16 fonts that contain a special set of the most commonly used mathematical, scientific and typographical symbols, together with the Greek alphabet.

Code page tables which associate each character name with its standard hexadecimal code point in each language, and a set of 'coded fonts', or table entries relating each code page with a font, completes each family package.

PURPOSE

Provides a wide selection of digitized, typographic quality fonts for use by the 4250 Printer. The typefaces included in each product are described below.

Family Name	Typefaces
ITC Avant Garde Gothic	Roman & Italic - Medium, Bold
Monotype Baskerville	Roman & Italic - Medium, Bold
Monotype Bodoni	Roman & Italic - Medium, Bold
Candida	Roman - Medium, Bold, Semibold & Italic - Medium, Bold
Monotype Century	Roman & Italic - Medium, Bold
Monotype Century Schoolbook	Roman & Italic - Medium, Bold
Excelsior	Roman - Medium, Bold & Italic - Medium
Futura	Roman & Italic - Medium, Bold, Semibold
Monotype Garamond	Roman & Italic - Medium, Bold
Helvetica	Roman & Italic - Light, Medium, Bold
Optima	Roman & Italic - Medium, Bold
Palatino	Roman & Italic - Medium, Bold
Monotype Rockwell	Roman & Italic - Medium, Bold
ITC Souvenir	Roman & Italic - Medium, Bold
Monotype Times New Roman	Roman & Italic - Medium, Bold
Univers	Roman & Italic - Light, Medium, Bold and Bold Condensed
Typewriter and Pi	
Prestige Elite	Roman - Medium, 12 pitch
Courier	Roman & Italic - Medium, 12 pitch & Roman - Medium, 10 pitch
Letter Gothic	Roman - Bold, 12 pitch
Light Italic	Italic - Light, 10 & 12 pitch
Pi Font Sans Serif	Roman - Medium, Bold
Pi Font Serif	Roman - Medium, Bold

Typeface names are registered trademarks of the following enterprises:

- \* International Typeface Corporation.
- \*\* Monotype Corporation, Ltd.
- \*\*\* Ludwig and Mayer GmbH & Co.
- + Mergenthaler Linotype Co.
- ++ Fundicion Tipografica Neufville, S.A.

The typeface family names of these products are the trademarked property of the indicated licensors. Any document, including formal proposals, used to commercialize these products should indicate this fact.

HIGHLIGHTS

- Print Quality
  - Letter-forms of graphic arts quality digitized from the original artwork at 600 x 600 dots (pels) per square inch expressly for the 4250 Printer.
- Proportionally Spaced Typographic Typeface Families
  - 16 widely used families and their popular typefaces.
  - The 72 typefaces in these 16 families are each provided in 17 sizes from 6 to 72 points (approximately 1/12" to 1") ... a total of 1,224 fonts, each consisting of a multilingual, 183-character International Character Set (ICS).
  - An extended character set is provided for Helvetica and Times New Roman for ease-of-migration to the 4250 Printer from system printers using TN, T11 or SCRIPT/VS character sets.
  - Eleven Languages Supported - Danish, Dutch, English, Finnish, French, German, Italian, Norwegian, Portuguese, Spanish and Swedish.
- Monospaced Typeface Families
  - Typewriter Fonts
    - 5 fonts in 3 IBM typewriter families using an expanded set of 217 characters provide compatibility with standard IBM TN, T11 or SCRIPT/VS character sets, in addition to the ICS.

CUSTOMER RESPONSIBILITIES

The customer is responsible for:

- Adequate storage capacity
- Use of system utilities to load fonts to DASD devices.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

- An IBM 4250 Printer or functionally equivalent printer and its prerequisites.
- Processor storage as required by Composed Document Printing Facility licensed program (5668-997).
- Sufficient DASD storage for desired typeface families.
- Storage Requirements: DASD storage required for each product is shown below in megabytes.

Product	MB	Product	MB
5771-AAA	6.0	5771-AAB	6.2
5771-AAC	6.2	5771-AAD	8.0
5771-AAE	6.6	5771-AAF	7.0
5771-AAG	5.0	5771-AAH	8.2
5771-AAJ	6.2	5771-AAK	8.4
5771-AAL	5.5	5771-AAN	5.9
5771-AAP	6.5	5771-AAQ	7.0
5771-AAR	6.4	5771-AAT	12.0
5771-AAW	1.0		

SOFTWARE REQUIREMENTS

- The Composed Document Printing Facility licensed program (5668-997) and its prerequisites under MVS, VM and VSE.

DOCUMENTATION  
(available from Mechanicsburg)

Composed Document Printing Facility General Information Manual (GC33-6133) ... Composed Document Printing Facility Installation and Operation (SC33-6135) ... IBM 4250 Printer, Type Font Catalog (G520-0004).

TERMINOLOGY

- Point - A typographer's measure approximately equal to 1/72 inch.

**Typographic Fonts for the 4250 Printer (cont'd)**

- **Baseline** - The line on which type appears to stand.
- **Size** - The distance specified, in points, between baselines when type is set solid, that is, with no additional interline spacing.
- **Font** - A set of characters in one size of one typeface. Example: Univers, Italic, bold, condensed, 12 points.
- **Typeface** - One variation of a character design style, independent of character size. Example: Univers, Italic, bold, condensed.
- **Typeface Family** - All typefaces of a single design style. Example: Univers.
- **Pitch** - Characters-per-inch.

## PROGRAM PRODUCTS

**IBM PERSONAL COMPUTER MACRO ASSEMBLER  
6024002****PURPOSE**

The Macro Assembler operates with the IBM Personal Computer Disk Operating System (DOS). Programs written in Assembler language are assembled into executable machine code that may run several times faster than equivalent high-level language routines. Additionally, the Assembler permits the programmer to design detailed program functions that are often impossible in a higher-level language. Assembler-produced programs, called "object" files, may be called from programs written from the following IBM Personal Computer languages: BASIC, Pascal, and FORTRAN.

**HIGHLIGHTS**

- Relocatable object modules
  - Definition of macros to generate commonly-used instruction sequences
  - Two versions: 96KB macro and 64KB subset
- Machine language of each instruction
  - Start and end addresses
  - Name, length, class of each segment
  - Public and local names and their attributes
  - Line numbers
  - Alphabetic cross-reference of variables
- Compatible with IBM Personal Computer BASIC, Pascal, and FORTRAN programs

The Assembler language program is created using a text editor such as the EDLIN utility program that is packaged with DOS, or a full-screen text editor such as the Personal Editor (6024051) which is a separate licensed program. The Macro Assembler is then used to assemble the program. Next, the DOS Linker translates the Assembler relocatable output into a load module, ready for loading and execution. While this process must take place on a 64KB or larger diskette system, the load module itself could be run on a diskette system with as little as 32KB memory. When a load module is designed for use as a subroutine of a higher-level language program (IBM Personal Computer BASIC, Pascal, or FORTRAN), the appropriate instructions must be included in the calling program.

Both versions of the Macro Assembler are co-resident on one diskette. A reference manual is packaged with the diskette.

**CUSTOMER RESPONSIBILITIES**

Customers are responsible for producing backup copies of the original diskettes when copying is permitted according to the terms and conditions of the IBM Program License Agreement and perform backup and recovery procedures for data diskettes.

**BRANCH OFFICE RESPONSIBILITIES (None)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with at least 96KB of memory and one diskette drive. One of the following display options required for text entry:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

A minimum 96KB, one diskette drive system is required to produce an assembler language object module using the full Macro Assembler version. A subset version is provided to assemble programs on a 64KB system. This version does not support macros, repeat functions (REPT, IRP, IRPC), record pseudo-ops, or structure pseudo-ops.

**SOFTWARE REQUIREMENTS**

Both Assembler versions must be executed under control of the IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases. When used with the IBM Personal Computer Disk Operating System Version 2.0, the Macro Assembler may reside on a fixed disk drive, and it may access fixed disk files. The DOS Linker program (on the DOS Diskette) is also required for the linkage editor process. A text editing program (EDLIN) for entry of the Assembler source program is resident on the DOS Diskette. If full-screen text editing is required, the Personal Editor is available as a separate product.

**PACKAGING**

*IBM Personal Computer Macro Assembler Reference Manual* - The correct procedures for writing, assembling, linking and running an Assembler program are described in the *Macro Assembler Reference Manual*. A complete instruction set reference is included. Details about the Linker program and EDLIN are included in the *IBM Personal Computer Disk Operating System Manual*.



## PROGRAM PRODUCTS

## IBM PERSONAL COMPUTER BASIC COMPILER 6024003

### PURPOSE

With BASIC Compiler, programs written in IBM Personal Computer BASIC (Interpreter) may be converted to object code for improved run-time performance. Most functions supported by the Disk and Advanced versions of the BASIC Interpreter are also supported by the BASIC Compiler.

### HIGHLIGHTS

Programs may be written and tested using the BASIC Interpreter and the BASIC program editor. Performance gains of several times over interpreter timings are possible (results vary by program). Object modules may be linked with subroutines written with the IBM Personal Computer Macro Assembler. Compiled programs may not be listed or modified, as source or BASIC Interpreter files can, thus providing some application security. Some double-precision arithmetic is supported by the compiler (trig functions, FOR-NEXT loop variables). The compiler checks every program statement for syntax errors during compilation. (BASIC Interpreter checks syntax of statements during program execution. It may miss errors in untested statements.) Demo program provided for training purposes. Compiler "metacommands" (directives) are available to control output formats and run-time options.

### DESCRIPTION

The BASIC Compiler permits a programmer to convert an existing program written in IBM Personal Computer BASIC (Interpreter) to object code for a significant improvement in run-time performance. A high degree of compatibility between the interpreter and compiler has been maintained to minimize program modifications.

Each BASIC program to be compiled must be created as a source (ASCII) file using the BASIC program editor or an editor such as the EDLIN utility program on the DOS diskette. The compiler is then used to compile the program, producing a machine language file. Finally, a Linker program resident on the BASIC Compiler diskette is used to convert the machine language file into one that is ready for loading and execution (load module). The compiled load module contains some language functions that the interpreter has in the system unit's read-only-memory (ROM). For this reason, the compiled program may be larger in memory than the interpreter version plus the BASIC or BASICA (resident) Interpreter extensions.

### CUSTOMER RESPONSIBILITIES

The customer is responsible for producing backup copies of the original compiler diskettes.

Application programs using compiled code may require licensed run-time libraries. Information concerning distribution *must* be obtained from IBM.

Usage of the run-time module is an option taken at compile time. Programs compiled without this option can be distributed with no additional considerations, but may require significantly more diskette space.

Since there are some minor differences between the language functions supported by the BASIC Interpreter and Compiler versions, the customer should be prepared to make changes to an existing interpreter program prior to compilation. These differences are summarized in the Compatibility section below.

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

A minimum 64KB, one-diskette drive system is required to compile a BASIC program, although the program itself may be executable on a smaller system (two drives are recommended for easier operation).

While the IBM Monochrome Display with the IBM Monochrome Display and Printer Adapter as well as the IBM Color Display with the Color/Graphics Monitor Adapter (40- or 80-column formats) are supported, 80-columns are recommended for displaying compiler messages and listings.

#### SOFTWARE REQUIREMENTS

The IBM Personal Computer DOS Diskette provides the necessary I/O routines and Linker. When used with DOS Version 2.0, the BASIC Compiler may reside on a fixed disk drive, and it may access fixed disk files.

### COMPATIBILITY

BASIC Interpreter Command, Function, or Statement	BASIC Compiler Differences
LOAD, SAVE, AUTO, EDIT, LIST, ILIST, DELETE, MERGE, NEW, RENUM, CONT	Not supported on compiler. These commands are normally associated with program editing in the interpreter environment.
CHAIN, COMMON	Compiler function is a subset of interpreter. MERGE, DELETE and ALL options operate on lines in an interpretive program only. COMMON must appear in each program; variables must be listed in the same order in each program.
Commands referencing "CAS1:" (LIST, RUN, LOAD, SAVE, etc.) and MOTOR DEF FN, DEFINIT/SNG/DBL/STR, and DIM	Cassette operations are not supported. In a compiler program these statements must appear before functions or variables are referenced.
Dynamic array dimensioning and ERASE statement	Not supported.
Integer overflow error handling	Subset of interpreter function. /D compiler option available to provide additional support.
"Soft Key" support (default character strings assigned to function keys F1-F10)	Defaults are not supported. Programs may assign values using KEY statement.
String handling	Character-string length in interpretive BASIC is 256 characters; in compiled BASIC it may be up to 32,767 characters. The string descriptor (referred to by VARPTR and some assembler language subroutines) is three bytes long in the interpreter; four bytes in the compiler.
DRAW, PLAY	"X String" and "=variable" require use of VARPTR.
OPEN COM	LEN = number option must be added to support GET or PUT

### DOCUMENTATION

*IBM Personal Computer BASIC Compiler Manual.*

The *BASIC Compiler Manual* should be used with the *BASIC Reference Manual* (6025013) and the *Disk Operating System Manual* (6172220). The *BASIC Reference Manual* contains additional cross-reference information to the compiler product, and will be shipped with new system units.

### PACKAGING

The BASIC Compiler is resident on two diskettes. It is packaged with the *IBM Personal Computer BASIC Compiler Manual*.

**VISICALC\*  
6024004****PURPOSE**

VisiCalc is an electronic spreadsheet application.

**HIGHLIGHTS**

- A "worksheet" of 254 rows and 63 columns
- Automatic recalculation of entire worksheet with new or changed data
- Automatic recalculation which takes care of the order of recalculation
- Step-by-step instructions with examples for all major features
- Quick Reference Summary card for easy reference
- Overlay of multiple worksheets to a single worksheet
- Variable column width
- Ability to view two parts of worksheet simultaneously
- Horizontal and Vertical dual-window synchronization
- Extensive functions and operators
- Fixed Title option for scrolling
- Replicate function for repetitive entries
- Transcendental functions
- Scientific notation available
- Communicates with other programs through the DIF\*\* format

**DESCRIPTION**

VisiCalc is a program that creates worksheets in which a user can create dynamic tables of information. Each worksheet is composed of 254 rows and 63 columns which allow for 16,002 (254 X 63) unique locations or "cells". VisiCalc allows the user to perform processing in these tables by using algebraic formulas in cell locations in which the variables are other cell locations. When the value in one cell location changes, the entire worksheet including cell formulas is automatically recalculated. The display screen is called the window to the worksheet in which the resultant values (the result of calculating the formulas) are displayed. The formulas can be changed in place (edited), or moved or duplicated (by single cell or block of cells) to another location on the worksheet and saved on disk or diskette for later editing/processing. Two or more worksheets can be "overlaid", allowing for combination of data. Blocks of the worksheet can be saved in DIF\*\* format which can then be read by applications supporting the DIF\*\* format such as VisiPlot\*\*\*, and Multiplan by Microsoft. DIF format does not include cell formulas, only the resultant values. This application is known also as an "electronic spreadsheet".

VisiCalc for the IBM Personal Computer is a unique tool which allows the businessman, the accountant, the analyst, and the planner an efficient way to solve their problems with no knowledge of a traditional programming language. VisiCalc combines the convenience and familiarity of a pocket calculator with the powerful memory and electronic screen capabilities of the IBM Personal Computer. Taking advantage of the tutorial nature of the documentation, new users will be able to build a spread sheet of numeric values easily, which they can then modify, causing the complete spread sheet to be recalculated using the new value or values entered.

Users can add labels, headings, and lines to their data to allow the printing of reports displaying the different "what if" situations which can be computed with the simple change of one or more of the data elements.

The VisiCalc program provides the facility to arrange data into a grid of up to 63 columns and 254 rows. Any element in this grid can be a numeric value, a label, or a formula. These formulas allow elements of the grid to relate to other elements, and have a wide range of flexibility. The formulas can also use the standard functions provided by VisiCalc. Some of these are: Summation, net present value, integer, and trigonometric functions.

**CUSTOMER RESPONSIBILITIES**

The customer must perform an initial setup procedure to format blank diskette(s) and copy portions of DOS onto the diskette(s). A specification file must be created for unique requirements; or, one of the sample files can be used. A DOS batch file can be prepared to automatically "boot" the emulation program at power-on time.

**BRANCH OFFICE RESPONSIBILITIES (None)**

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with at least 64KB of memory, and one diskette drive or an IBM 5160 Personal Computer XT is required. In addition, one of the following 80-column display options is required:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter (1504900)
- IBM Color Display and the IBM Color/Graphics Monitor Adapter
- An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

**SOFTWARE REQUIREMENTS**

IBM Personal Computer Disk Operating System (DOS) Version 1.1 or 2.0

The VisiCalc\* program resides on diskette only. VisiCalc\* data files may reside on diskette or fixed disk.

**PACKAGING**

VisiCalc is distributed with the following:

*User's Reference Manual* ... Quick Reference Summary Card ... one program diskette ... one backup program diskette

\* Trademark of Personal Software, Inc.

\*\* Trademark of Software Arts, Inc.

\*\*\* Trademark of VisiCorp.

**EASYWRITER VERSION 1.1  
6024005****PURPOSE**

EasyWriter is a versatile and easy-to-use word processor featuring a menu-driven interface that allows users with varied skills to be productive quickly.

**HIGHLIGHTS**

- Full-screen editing
- Variable margin size
- Variable line spacing
- Insert and delete characters, words and lines
- Undelete (bring back) deleted characters and words
- Help menus on screen
- Automatic page numbering
- Search and replace
- Margin justification
- Tab set
- Titles and headings
- Block moves and copies
- Line centering
- Word count
- Linking and appending files
- VisiCalc\* print files may be converted and merged into EasyWriter documents with the transfer program.

**DESCRIPTION**

EasyWriter allows users to write letters, reports, articles, even books. The text can be edited on the screen before it's printed, allowing the user to make changes, prepare personalized form letters, and much more.

Once EasyWriter is loaded into the computer's memory, EasyWriter displays the first of three system menus -- the File System menu. From this menu the user can save, revise, delete, link, protect, edit, append and format a file. The user can print a file from any menu. The Help menu describes options available to the user while text is being worked on. The Additional Commands menu allows the user to perform special functions such as setting margins and tabs as well as displaying the document in a print format.

All 12 fonts of the IBM 5152 model 2 Graphics Printer are available to the user. In addition, print files can be transmitted over the Asynchronous Communications Adapter to a serial printer.

The simple text entry and the full-function, full-screen text editor facilitate: Adding, inserting, deleting, and correcting of existing files; horizontal and vertical scrolling through text; and global selective search and replace. This is combined with the flexibility of formatting the output to the printer.

**CUSTOMER RESPONSIBILITIES**

Customers are responsible for producing backup copies of the original diskettes, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement. Customers must install DOS on the EasyWriter program diskette according to instructions in the *EasyWriter Reference Manual*.

**BRANCH OFFICE RESPONSIBILITIES (None)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with at least 64KB of memory and one diskette drive or an IBM 5160 Personal Computer XT is required. In addition, one of the following 80-column display options is required:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

The available work area in a Personal Computer with 64KB is 13.9KB. To avoid an out of space condition when running on a 64KB system, the user may split a large file into two smaller files. These may be linked together and treated as a single document. In a 96KB or larger system, EasyWriter supports a larger document size, up to a maximum of 24KB characters.

**SOFTWARE REQUIREMENTS**

IBM Personal Computer Disk Operating System Version 1 or subsequent versions and releases. The EasyWriter program resides on diskette only. EasyWriter data files may reside on diskette or fixed disk. Any DOS formatted diskette may be used for EasyWriter files.

**PACKAGING**

*Reference Manual* ... Quick Reference Summary card ... one program diskette

\* VisiCalc is a trademark of Personal Software, Inc.

**IBM PERSONAL COMPUTER PASCAL COMPILER  
6024010****PURPOSE**

The IBM PC Pascal Compiler operates with the IBM Personal Computer Disk Operating System (DOS). It provides the capability to compile Pascal programs conforming to ISO Working Draft #6 (with the exception of conformant arrays).

**HIGHLIGHTS**

- Generally conforms to ISO Draft (ISO/TC 97/SC 5 N595)
- Separate compilation of large program segments
- Object modules may be combined with subroutines written in IBM PC FORTRAN or Macro Assembler
- Variable length strings
- Super-array type supported
- Machine-oriented constructs
- Compiler Directives and Metacommands
- Flags for Jumps, Globals, Identifier level, Control level header, trailer, general listing format textual error and warning messages
- Extended CASE range
- Bitwise logical Boolean operators
- Extended Intrinsic
- Extended I/O

**DESCRIPTION**

The Pascal Compiler is available as an optional software product. The IBM Personal Computer Pascal version supports all of the facilities of the International Standards Organization (ISO) Working Draft #6, with the exception of conformant array parameters, which are instead provided by the "super array" type. Many additional features are also supported.

The Pascal program must be created as a source (text) file using a text editor such as the EDLIN utility program that is packaged with DOS on the DOS Diskette, or the Personal Editor, which is a separate IBM product. The Pascal Compiler is then used to compile the program, producing a machine language (object) file in relocatable format. Finally, the Linker program, packaged with DOS on the DOS Diskette, is used to convert the relocatable program into one that is ready for loading and execution at a specific memory address.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for producing backup copies of the original compiler diskettes. Since the reference manual does not provide a tutorial on the language, the customer should have some prior knowledge of Pascal.

**BRANCH OFFICE RESPONSIBILITIES (None)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with at least 128KB of memory, and two diskette drives ... one of the following display options required for text entry:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

The IBM 5152 model 2 Graphics Printer is recommended

**SOFTWARE REQUIREMENTS**

- IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases
- If a compiled program performs diskette I/O, the IBM Personal Computer DOS must be diskette and memory resident.

**PACKAGING**

A *Pascal Compiler Reference Manual*. Since the Disk Operating System (DOS) is used during the program entry, compilation, linking, and execution phases, the *DOS Reference Manual* is required.

The Pascal Compiler comes on three diskettes.

**IBM PERSONAL COMPUTER COBOL COMPILER  
6024011****PURPOSE**

With the COBOL compiler, programs may be written in ANSI standard COBOL. These programs are then compiled to an interpretive object code for execution on the IBM Personal Computer.

The COBOL compiler for the Personal Computer is designed according to the specifications for American National Standard (ANS) Programming Language COBOL (X3.23-1974) as understood and interpreted by IBM as of February 1982. American National Standard COBOL is compatible with, and identical to, ISO 1989-1978 standard of the International Organization for Standardization.

**HIGHLIGHTS**

The following functional modules are supported:

- 1 NUC1, 2 (Nucleus)
- 1 TBL 1, 2 (Table-handling)
- 1 SEQ1, 2 (Sequential I-O) except RERUN
- 1 REL 0, 2 (Relative I-O) except RERUN
- 1 INX 0, 2 (Segmentation)
- 1 LIB 0, 2 (Library)
- 1 IPC 0, 2 (Inter-program Communication)

**Additional Features**

- From ANS Level 2 Nucleus:
  - Level 88 conditions
  - AND, OR, NOT conditions
  - Nested IF statements
  - STRING and UNSTRING
  - PERFORM VARYING...UNTIL
- From ANS Level 2 Table-Handling:
  - SEARCH ALL statement
- From ANS Level 1 Debug (DEB 0,2)
  - SOURCE-COMPUTER paragraph WITH DEBUGGING MODE clause

**Other IBM Personal Computer COBOL Features**

- Object modules may be linked with modules produced by the IBM Personal Computer Macro Assembler
- ACCEPT and DISPLAY extensions for formatted screen handling
- CHAIN to other programs

**DESCRIPTION**

The COBOL compiler for the Personal Computer is designed according to the specifications for American National Standard (ANS) Programming Language COBOL (X3.23-1974) as understood and interpreted by IBM as of February 1982. American National Standard COBOL is compatible with, and identical to, ISO 1989-1978 standard of the International Organization for Standardization.

Each COBOL program must be created as a source (text) file using a text editor such as the EDLIN utility program that is packaged with the IBM Personal Computer DOS on the DOS Diskette, or the Personal Editor, which has full-screen function. The COBOL Compiler is then used to compile the program, producing an object file in relocatable format. Finally, the Linker program is used to convert the relocatable file into one ready for loading and execution using the COBOL run-time library.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for producing backup copies of the original compiler diskettes. Since the reference manual does not provide a tutorial on the language, the user should have some prior knowledge of COBOL. Programs may be written on standard COBOL coding forms.

The COBOL run-time library contains proprietary code. A distribution agreement between the customer and IBM is required before application programs can be distributed to others. For additional information, see the *COBOL Reference Manual*, or write to IBM, PO Box 1328-P, Boca Raton, Florida 33432.

**BRANCH OFFICE RESPONSIBILITIES (None)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with a minimum of 64KB memory and two diskette drives or an IBM 5160 Personal Computer XT is required to compile a COBOL program, although the program itself may be executable on a smaller system. An 80-column display is recommended for displaying compiler messages and listings. One of the following display options is required:

- An IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- An IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column Color monitor with the IBM Color/Graphics Monitor Adapter

The IBM 5152 model 2 Graphics Printer is recommended.

**SOFTWARE REQUIREMENTS**

The IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases is required. When the IBM Personal Computer Disk Operating System Version 2.0 is used, the COBOL compiler may be resident on a fixed disk drive and it may access fixed disk files.

**PACKAGING**

*IBM Personal Computer COBOL Reference Manual*. Since the IBM Personal Computer Disk Operating System (DOS) is used during the program compilation, linking, and execution phases, the *DOS Reference Manual* is required. If the Personal Editor is used to enter the programs, the *Personal Editor Reference Manual* is required. The COBOL Compiler is resident on two diskettes packaged with the *IBM Personal Computer COBOL Reference Manual*.

**UCSD p-System\* with UCSD Pascal\***  
**6024016**  
**UCSD p-System with FORTRAN-77**  
**6024017**

**PURPOSE**

The UCSD p-System consists of an operating system and either one or two languages for the IBM Personal Computer. The p-System provides the programmer with an extended Version IV.0 of the operating system, including a full-screen editor, program debugger, graphics support, an assembler, file handler, native code generator, and a print spooler. The system is available with either UCSD Pascal, FORTRAN-77, or both languages.

p-System with FORTRAN-77 - FORTRAN-77 Compiler

\* UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California.

**HIGHLIGHTS**

- The p-System provides an excellent environment for program development.
- The language compilers generate "p-code", a portable, machine-independent format.
- A Native Code Generator may be used to convert p-code to efficient code for better performance.
- Machine-level reference and tutorial documentation is provided. FORTRAN-77 is ANSI-1977 level, supporting a wide range of engineering and scientific applications.
- It provides extensions to UCSD Pascal for development and commercial programming.
- Structured programming produces programs that are more efficient and easier to maintain.

**DESCRIPTION**

The UCSD p-System, with either UCSD Pascal or FORTRAN-77, is designed to run on an IBM Personal Computer with a minimum of 64KB and two diskette drives. A program is entered via the p-System's editor, then compiled to p-code and stored on diskette. The p-code version can then be executed as needed. The p-System filer maintains a library of user-written programs on diskette. For convenience, run-time or execution routines may be moved to an application program diskette.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for producing backup copies of the original diskette or for copying UCSD p-System files onto application program diskettes. Such copying is provided for convenience, but UCSD p-System resident diskettes may not be distributed to other users.

**BRANCH OFFICE RESPONSIBILITIES (None)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

A minimum 64KB, two diskette drive system is required to run the UCSD p-System, although some application programs may execute in less memory.

Both 40- and 80-column display output is supported although 80-column displays (IBM Monochrome or Color Display) are recommended.

**SOFTWARE REQUIREMENTS**

Run-time routines may be packaged with application programs to provide the necessary execution prerequisites, although licensing of such routines is **required** for redistribution to others.

**DATA SECURITY**

The customer is responsible for the protection of data from unintended modification, destruction, or disclosure, and for the accuracy and integrity of the results.

**DOCUMENTATION**

Publications are packaged with diskettes for the products described above. They are:

Development (p-System)

*Beginner's Guide for the UCSD p-System ... User's Guide for the UCSD p-System ... Internal Architecture Guide for the UCSD p-System ... Assembler Reference Manual for the UCSD p-System*

FORTRAN-77 Compiler

*FORTRAN-77 Reference Manual for the UCSD p-System*

UCSD Pascal Compiler

*UCSD Pascal Reference for the UCSD p-System*

**PACKAGING**

The three major p-System components are the development (operating) system, FORTRAN-77 compiler, and UCSD Pascal compiler. They are packaged as four products on diskettes with related publications. They are available as the development system with a language. The second language is available with the development system or at a later time.

p-System with UCSD Pascal - UCSD Pascal Compiler

**MULTIPLAN by MICROSOFT  
6024022****PURPOSE**

The IBM Personal Computer Multiplan is an advanced electronic spreadsheet for financial modeling and reporting.

**HIGHLIGHTS**

- Provides a "worksheet" of 255 rows X 63 columns
- Tutorial models on diskette
- Online help text
- Linking of active model to models on secondary (disk) storage
- Full support of IBM Personal Computer keyboard
- Full support of color capabilities
- Variable column width
- Natural language commands and variable (cell) names up to 8 display windows
- Extensive functions and operators
- Automatic recalculation which takes care of the order of recalculation
- Sorting of alphabetic or numeric data
- Cell protection
- Continuous formatting (allows entries across cell boundaries)
- Full-line (cell) editing
- Iterative solutions to simultaneous equations in more than one variable

*User's Reference Manual ... Reference Card ... one program diskette ... one tutorial diskette.*

\* Trademark of Software Arts, Inc.

\*\* Trademark of Personal Software, Inc.

**DESCRIPTION**

The IBM Personal Computer Multiplan is a spread-sheet simulator which is applicable to many different kinds of numeric modeling and planning. It provides a framework for holding the relationships between constant and varying elements of a numeric model. This gives the user the opportunity to do projections, what-ifs, sensitivity analysis, budget and resource planning, scheduling, and a host of other applications that involve extensive manipulation of numbers and formulas.

The electronic worksheet is represented by a grid of cells. The user fills out the worksheet by entering words, numbers, or formulas into the cells. In this respect, the "electronic worksheet" is like a ledger with headings, values, and algebraic formulas filled via the keyboard, and the display screen provides a window to view the worksheet. Two or more completely different parts of the worksheet can be viewed through windows, or entire areas of the worksheet can be given a name which can be used in formulas and commands to refer to all the cells in the area. Cells may be "designed" (formatted) to further reflect the type of data they contain. For applications which require a "third dimension" (depth), Multiplan allows creation of more than one sheet. The active sheet may then refer to named-cells on different, inactive sheets.

After backing up the diskettes and transferring DOS to the program diskette, Multiplan is loaded by inserting the program diskette and turning on the computer. The user may obtain help at any time during the session by pressing "H" for help from the main menu or "?" from any sub-menu.

**CUSTOMER RESPONSIBILITIES**

Customers are responsible for producing backup copies of the original diskettes when copying is permitted according to the terms and conditions of the IBM Program License Agreement and perform backup and recovery procedures for data diskettes.

**BRANCH OFFICE RESPONSIBILITIES (None)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with at least 64KB of memory and one diskette drive, or an IBM 5160 Personal Computer XT is required. In addition, one of the following display options is required:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

The IBM 5152 model 2 Graphics Printer is required in order to print a worksheet.

**SOFTWARE REQUIREMENTS**

IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases. When used with the IBM Personal Computer Disk Operating System Version 2.0, Multiplan may be resident on a fixed disk drive and it will support files on the fixed disk.

**COMPATIBILITY**

Multiplan can read DIF\* files from diskette put there by Multiplan or any of the VisiCalc\*\* series packages that support DIF\* format. Note that DIF\* format does not pass formulas - only constants and labels.

**PACKAGING**

Multiplan is distributed with the following:

## PROGRAM PRODUCTS

**ASYNCHRONOUS COMMUNICATIONS SUPPORT  
VERSION 2  
6024032****PURPOSE**

This support allows users, with no additional programming, to use their IBM Personal Computers as asynchronous (start/stop) TTY ASR 33/35 terminals.

**HIGHLIGHTS**

- The user may interactively specify:
  - Bit rate (75 bps to 9600 bps)
  - Parity
  - Number of stop bits
  - Line turnaround characters
  - Local or host ECHO/no ECHO
  - XON/XOFF support
- Specifications for interaction with a particular host may be stored for later use, eliminating the need to respecify at each initiation.
- Programs and data may be sent from an IBM Personal Computer to a host system, or received from a host system and placed in an IBM Personal Computer file.
- Menu-selectable options:
  - Dow Jones News Service\*
  - The Source\*\*
- Files can be transferred between an IBM Personal Computer and most host systems.
- Binary files can be converted to ASCII format (or vice versa) using the utility program supplied.
- Either of two Asynchronous Communications Adapter ports can be used if two asynchronous cards are installed.
- While receiving from the host, there is an option to print data or store it on a file.

**DESCRIPTION**

Asynchronous Communications Support Version 2 provides improved ease-of-use, file transfer capability, and additional functions. Version 1 is no longer available.

In addition to supporting the system as an interactive terminal, the package allows the IBM Personal Computer to exchange program and data files with the host system with which it is communicating. The user has flexibility in specifying TTY ASR 33/35 terminal protocol, for attachment to a variety of host computers. It also provides for communication between two IBM Personal Computers for transferring program and data files.

Asynchronous Communication Support is designed to allow connection to most host systems which support TTY ASR 33/35 asynchronous terminals. Common settings such as parity, stop bits, and bps rates are specified interactively at program initiation.

**CUSTOMER RESPONSIBILITIES**

Customers are responsible for producing backup copies of the original diskette, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement, acquiring the necessary communications modems, cables, subscriptions, and passwords.

**BRANCH OFFICE RESPONSIBILITIES (None)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

- An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with at least 64KB of memory, one diskette drive, and an Asynchronous Communications adapter.
- One of the following display options is required:
  - IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
  - IBM Color Display and the Color/Graphics Monitor Adapter
  - A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter
- A customer-supplied full-duplex modem or direct cable connection to a local host computer
- A customer-provided EIA RS232-C cable for adapter to modem connection

**SOFTWARE REQUIREMENTS**

- IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions and releases IBM Disk BASIC.
- When used with the IBM Personal Computer Disk Operating System Version 2.0, the Asynchronous Communications Support

program may reside on a fixed disk drive and it can support fixed disk files.

**PACKAGING**

The Asynchronous Communications Support Program is resident on one diskette and comes with the following documentation:

Asynchronous Communications Support Program

\* Dow Jones is a trademark of Dow Jones and Company, Incorporated.

\*\* The Source is a service mark of Source Telecomputing Corporation, a subsidiary of The Reader's Digest Association, Inc.

**CP/M-86\* OPERATING SYSTEM  
6024035****PURPOSE**

CP/M-86 is a single-user operating system for the IBM Personal Computer. It manages information stored on diskettes and also provides an interface between a program and the IBM Personal Computer hardware.

**HIGHLIGHTS**

- Management of data files
- Cataloging
- Creating text and object files
- Copying files to diskette and other media
- Renaming and erasing files
- Verification of directory
- Write and run programs written in Assembler language.

**Programming Interface**

- Function calls for device handling and memory management
- Escape sequences for cursor and color control
- Light-pen input

**Programming Utilities**

- Line-oriented text editor
- Assembler
- Command-file generator
- Debugging program

**Device Handling**

- XON/XOFF and ETX/ACK protocols for Asynchronous Communications Adapter
- Selectable bps rate, parity, stop bits, and number of data bits
- Logical and physical devices
- Automatic Processing of Command Sequences
- Time-of-day and date
- Programmable function keys by using a utility or user program
- On-screen HELP function
- Status line displays user number, date, and time-of-day

**Utilities and Commands**

- ASM86 - Assembles INTEL 8088 source code into machine code  
 ASSIGN - Assigns physical devices (e.g., printer) to logical devices (e.g., console-output)  
 COPYDISK - Copies contents of an entire diskette to another diskette  
 DDT86 - Allows monitoring and testing the execution of programs  
 DIR - Displays the names of files cataloged in online directory  
 DIRS - Displays the names of files cataloged with current user number and the SYS attribute  
 ED - Allows editing of text files  
 ERA - Removes files from the directory  
 FUNCTION - Allows assignment of text and control characters to function and keypad keys  
 GENCMD - Produces command (CMD) files  
 HELP - Summarizes information for CP/M-86 commands  
 NEWDISK - Formats diskettes and optionally transfers a copy of the operating system  
 PIP - Allows copying, editing, combining, transmitting, and renaming diskette files  
 PROTOCOL - Sets XON, ETX, NONE protocols  
 REN - Changes the name of a file  
 SPEED - Specifies bps rate, parity, stop bits, number of data bits, for Asynchronous Communications Adapter  
 STAT - Gives statistical information about diskette files  
 SUBMIT - Processes a file of commands  
 TOD - Sets time of day and date  
 TYPE - Displays text files on screen  
 USER - Sets user number

**DESCRIPTION**

CP/M-86 is a single-user operating system for the IBM Personal Computer. It manages information stored on diskettes and also provides an interface between a program and the IBM Personal Computer hardware. Up to two physical drives or four logical drives are supported by utility programs that perform the following tasks: Formatting diskettes, copying files to other devices, and providing data about diskette files. Also supported by CP/M-86 are the IBM 5152 Model 2 Graphics Printer, the Asynchronous Communications Adapter, the IBM Monochrome Display, and the Color/Graphics Monitor Adapter (including customer-supplied light-pen) and the IBM Color Display. Dynamic memory management controls the allocation of memory and assigns specific memory areas to application programs. Program development utilities include an editor, an assembler, a debugging program, and a program to produce command files.

CP/M-86 may reside on its original (packaged) diskette, a copy, or as part of a diskette containing other programs. If any of these are present in Drive A when the computer is turned on, or whenever System Reset is performed, CP/M-86 will be loaded into memory. The operating system, or control program, is now ready to accept user commands to

run one of the CP/M-86 utility programs, execute a built-in command, or start a user program. Unless system I/O devices require reassignment (e.g., using the Asynchronous Communications Adapter for printer output), no configuration steps are necessary.

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for producing backup copies of the original diskette. While CP/M-86 files may be copied to an application program diskette for convenience, such a diskette may not be distributed to other users.

**BRANCH OFFICE RESPONSIBILITIES (None)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

CP/M-86 requires at least one diskette drive and 32KB of memory. The DDT86 debugging program requires 48KB, while the ASM86 Assembler requires 64KB of memory. The operating system resides in 19KB of memory.

One of the following display options is required:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

**SOFTWARE REQUIREMENTS**

CP/M-86 does not require as a prerequisite, nor is it compatible with, either the IBM Personal Computer DOS or the UCSD p-System\*\*.

**COMPATIBILITY**

Application programs supported by other versions of CP/M-86 (e.g., CP/M-80) will run on the IBM Personal Computer after undergoing a migration process. This process includes transferring the original program source code from the other computer (usually via a communications link), modifying any program statements affected by language or hardware differences, and recompiling the program using an appropriate language compiler. Although CP/M-86 provides an 8088 Assembler, IBM does not offer CP/M-86 language compilers.

**CONVERSION**

CP/M-86 files on non-IBM computers must be "communicated" between machines to account for differences in diskette formats.

**DATA SECURITY**

The customer is responsible for the protection of data from unintended modification, destruction, or disclosure, and for the accuracy and integrity of the results.

**PACKAGING**

The CP/M-86 manual explains the use of the utilities and commands by giving examples and sample sessions.

CP/M-86 is resident on a single diskette, packaged with a *CP/M-86 Operating System Manual*.

\* Trademark of Digital Research, Inc.

\*\* Trademark of the Regents of the University of California.

**SNA 3270 EMULATION and SNA RJE SUPPORT  
6024036****PURPOSE**

The SNA 3270 Emulation and SNA RJE Support Program provides significant connectivity enhancements for the IBM Personal Computer. These extensions provide additional flexibility for interactive and office system use of the IBM Personal Computer as an intelligent work station. Operating in SNA 3270 emulation mode, the Personal Computer appears to the host system as an IBM 3274 Model 51C.

**HIGHLIGHTS**

- Communications Interface
  - Supports IBM SDLC Communications Adapter
  - Both switched and leased line (including multipoint) support
  - Modem support
- EIA RS232-C Interface
  - Half duplex
  - External clocking
  - Up to 4800 bps
  - Constant request to send and line turn-around
- Online diagnostics with line trace, error logging, and analysis
- SNA 3270 emulation
  - The IBM Personal Computer appears to the host system as an IBM 3274 model 51C Control Unit.
  - The IBM Personal Computer uses the same screen formats as supported by the IBM 3278 Display Station, except for the status line. The following features are provided:
    - Logical Unit Type 2 (LU2)
    - 24 - 3270 program function keys
    - Local print key
    - Audible alarm
    - EBCDIC line transmission support
    - Keyboard numeric lock
    - 3279 base color mode support
    - 3279 Color Emulation
    - Status line messages
    - User-definable 3270 keys
- 3287 Models 1 and 2 printer emulation:
  - For local copy
  - Host-initiated screen print

The IBM Personal Computer will connect to host subsystems that support the above devices and features/options. A configuration utility to tailor the communications environment is supplied.

- SNA 3770 RJE support
  - The IBM Personal Computer appears to the host system as an IBM 3770 communications terminal with the following features:
    - Logical Unit type 1 (LU1)
    - FM Header Type 1
    - TS Profile 3 and FM Profile 3
    - Outbound from host compression
    - ASCII or EBCDIC line transmission support
    - Transparency
    - Device support for console, card/punch, and printer
  - The IBM Personal Computer will connect to host subsystems that support the above devices and features/options. A configuration utility to tailor the communications environment is supplied.
  - Transmit and receive source and object data in IBM Personal Computer DOS-compatible format
  - Formatted printing:
    - Channel control
    - Page size
    - Tab setting
    - Set line density (1 to 72 lpi)
    - Selectable diskette drives
    - Print to diskette or printer
    - End of job statistics
    - Multiple data set print/punch output
    - Multiple job file support from keyboard or diskette

**DESCRIPTION**

When used with the IBM SDLC Adapter, SNA 3270 Emulation and RJE Support licensed program permits the IBM Personal Computer to act as a terminal that can communicate with a host system in one of two modes, either supporting SNA 3270 or SNA 3770 RJE.

It includes access method software to support the IBM SDLC Adapter, with additional support to provide both SNA 3270 Emulation and SNA 3770 RJE interfaces to the user.

**CUSTOMER RESPONSIBILITIES**

Customers are responsible for producing backup copies of the original diskette, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement, acquiring the necessary communications modems, cables, subscriptions, and passwords.

**BRANCH OFFICE RESPONSIBILITIES (None)****SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

- An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with at least 128KB of memory, and one diskette drive.
- One of the following 80-column display options:
  - IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
  - IBM Color Display and the Color/Graphics Monitor Adapter
  - An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter
- SDLC Communications Adapter (1502090)
- Communications Adapter Cable (1502067)
- Synchronous Communications modem with clocking up to 4800 bps on a switched or leased line
- Host Computer system with compatible IBM SNA 3270 Display System support

**SOFTWARE REQUIREMENTS**

- IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions and releases
- When used with the IBM Personal Computer Disk Operating System Version 2.0, the SNA 3270 Emulation and SNA RJE Support Program may be resident on a fixed disk drive and may access fixed disk files.

**PACKAGING**

The SNA 3270 Emulation and SNA RJE Support Program is resident on a single diskette which is shipped with a *User's Guide*.



## PROGRAM PRODUCTS

**BINARY SYNCHRONOUS 3270 EMULATION PROGRAM  
6024037****PURPOSE**

The Binary Synchronous Communications is a connectivity enhancement to the IBM Personal Computer. This extension provides additional flexibility for interactive and office system use of the IBM Personal Computer as an intelligent work station. Operating in BSC 3270 emulation mode, the Personal Computer appears to the host system as one of the following IBM 3270 BSC devices:

3271 mdl 2/3277 mdl 2	Leased line
3274 mdl 51C/3278 mdl 2	Leased line
3275 mdl 2	Switched and leased line
3276 mdl 2	Leased line

**HIGHLIGHTS**

- Communications Interface
  - Supports IBM BSC Communications Adapter (1502075)
  - Both switched and leased line support
  - Modem support
- EIA RS232-C interface
  - Half duplex
  - External clocking
  - Up to 9600 bps
- Constant line trace, error logging and communications statistics accumulation
- BSC 3270 emulation

The IBM Personal Computer appears to the host system as one of the following IBM 3270 BSC devices:

  - 3271 model 2/3277 model 2 (leased line)
  - 3274 model 51C/3278 model 2 (leased line)
  - 3275 model 2 (switched and leased line)
  - 3276 model 2 (leased line)
- The IBM Personal Computer uses the same screen formats as supported by the IBM 3275, 3276, 3277 and 3278 except for the status line. Only the following features are provided:
  - 12 program function keys
  - Local print key
  - Audible alarm
  - EBCDIC line transmission support
  - Keyboard numeric lock
  - IBM 3279 base color mode support
  - Status line messages
- Printer support
  - 3284 model 3 (when configured as a 3275)
  - 3284 model 2
  - 3286 model 2
  - 3288 model 2

The IBM Personal Computer will connect to host subsystems that support the above devices and features/options Configuration utility to tailor the communications environment
- Additional non-3270 functions provided:
  - User-definable 3270 keys
  - PRINT command allows users to route printer directed data to a file
  - SEND command allows ASCII file data to be written to the unprotected fields on the display for modification and/or transmission to the host
  - TRACE command formats and prints or displays the communications line trace
  - STATS command displays communications statistics

**DESCRIPTION**

When used with the IBM BSC Communications Adapter, the BSC 3270 Emulation licensed program permits the IBM Personal Computer to act as a terminal that can communicate with a host system supporting BSC 3270.

It includes access method software to support the IBM BSC Communications Adapter with additional support to provide BSC 3270 Emulation.

The *User's Guide* describes both installation and operation. A configuration program uses menus to prompt the user for various options available using default values for the most common configurations.

**CUSTOMER RESPONSIBILITIES**

Customers are responsible for producing backup copies of the original diskette, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement, and acquiring the necessary communications modem, cables, subscriptions, and passwords.

**BRANCH OFFICE RESPONSIBILITIES (None)**

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

- An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with at least 128KB of memory and one diskette drive
- One of the following 80-column display options:
  - IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
  - IBM Color Display and the Color/Graphics Monitor Adapter
  - An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter
- BSC Communications Adapter (1502075)
- Communications Adapter Cable (1502067)
- Synchronous Communications modem with clocking up to 9600 bps on a switched or leased line
- Host Computer system with compatible IBM 3270 Display System support
- IBM 5152 model 2 Graphics Printer

**SOFTWARE REQUIREMENTS**

IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions and releases ... when used with the IBM Personal Computer Disk Operating System Version 2.0, the Binary Synchronous 3270 Emulation Program may reside on a fixed disk drive and it may access files on disk.

**DATA SECURITY**

The customer is responsible for the protection of data from unintended modification, destruction, or disclosure and for the accuracy and integrity of the results.

**PACKAGING**

*Personal Computer Binary Synchronous 3270 Emulation User's Guide* (packaged with the diskette) ... this program is resident on a single diskette ... The user's guide is packaged with the diskette.



## PROGRAM PRODUCTS

**IBM PERSONAL COMPUTER PEACHTREE BY  
PEACHTREE SOFTWARE INCORPORATED  
6024039****PURPOSE**

PeachText is a powerful word processor that can be learned quickly. Like other word processors, PeachText has the basic ability to prepare, revise and type a document. But PeachText can be used for much more than basic word processing. Through the use of logical commands (such as IF/THEN) and data that can change throughout documents (variables), PeachText can make decisions and pull information into appropriate places.

**HIGHLIGHTS**

- 80-column display of upper and lower case characters
- Full-screen editor
- Use of full function keyboard
- Online help text
- Ability to display and/or merge part of a second document while editing another
- Pauses can be built into a document to allow keyboard entry of variables while printing
- Use of conditional commands to retrieve and print data from a data file
- Display of document on screen allows user to view the print format of the document prior to printing
- Allows proportional printing on some specialty printers
- Global and selective search and replace
- PeachText creates DOS-ASCII files
- Automatically configured for the IBM Graphics Printer
- Word wrap-around and automatic carriage returns
- Special program utility mode for programmers
- Block operations
- Ability to use files larger than available memory work space by paging from diskette

**DESCRIPTION**

The PeachText program may be learned through a series of lessons in a tutorial format. This tutorial is friendly and easy to use and takes the beginner through the basic features of the program as well as the more advanced features. Error messages are clear and informative and provide the user with suggestions concerning the options which are available. The help screen provides information about function key usage and cursor movement activities, edit and print commands. The Edit Status Screen and Print Status Screen display information about the current activity, plus command options. The PeachText program operates in two modes, edit and print. Each mode has a command screen, from which the user can enter commands to manipulate text and/or format text. The user also has the option to enter imbedded commands which will be interpreted by the formatter at print time. The text can be printed to the display screen allowing the user to view the final format prior to printing.

**CUSTOMER RESPONSIBILITIES**

To successfully install and use the program, the customer should read the *User's Reference Manual* to understand the operation of the system, and perform the following tasks:

- Making a backup copy of the program diskette
- Completing the "Getting Started" chapter of the *User's Reference Manual*
- Performing backup and recovery procedures

**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

- An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with a minimum of 64KB of memory and one diskette drive.
- One of the following 80-column display options:
  - An IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
  - An IBM Color Display with both the Color/Graphics Monitor Adapter and the Printer Adapter
  - A direct-drive 80-column black and white or 80-column color monitor with both the Color/Graphics Monitor Adapter and the Printer Adapter
- An IBM 5152 model 2 Graphics Printer

**SOFTWARE REQUIREMENTS**

IBM Personal Computer Disk Operating System (DOS) Version 1.1 or subsequent versions and releases. With IBM Personal Computer Disk Operating System Version 2.0, PeachText may reside on a fixed disk drive and may access fixed disk files.

**PACKAGING**

PeachText is distributed with the following:

*User's Reference Manual* ... one program diskette ... one demonstration diskette ... function key template ... Reference Card.



## IBM 3101 EMULATION PROGRAM 6024042

### PURPOSE

The IBM 3101 Emulation Program allows the Personal Computer to connect to another computer system as if it were an IBM 3101 Display terminal. This allows the user to access a host system for interactive applications residing there as well as the normal stand-alone processing which is available when the IBM 3101 Emulation Program is not executing.

\*\* The Source is a service mark of Source Telecomputing Corporation, a subsidiary of The Reader's Digest Association, Inc.

### HIGHLIGHTS

The 3101 Emulation Program emulates the IBM 3101 model 20, with some differences. Users may specify line characteristics and keyboard mapping. Sample specification files are provided for:

- VM/370, MVS/TSO
- IBM 7426 Terminal Interface Unit (TIU) for IBM 8100
- Yale IUP for Series/1
- 3101 Pass-through (PVM)
- Dow Jones News Service\*
- The Source\*\*
- Communications with another IBM Personal Computer

### DESCRIPTION

The IBM 3101 Emulation Program, provides four main functions:

- Emulates the IBM 3101 Display Terminal according to user-selected options contained in specification files
- Provides several specification files as examples of popular 3101 configurations
- Transmits ASCII format files to and from host computer and local storage diskettes
- Converts ASCII format diskette files to and from binary format

The customer must perform an initial setup procedure to format blank diskette(s) and copy portions of DOS onto the diskette(s). A specification file must be created for unique requirements; or, one of the sample files can be used. A DOS batch file can be prepared to automatically "boot" the emulation program at power-on time.

### CUSTOMER RESPONSIBILITIES

Customers are responsible for producing backup copies of the original diskette, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement, and acquiring the necessary communications modems, cables, subscriptions, and passwords.

BRANCH OFFICE RESPONSIBILITIES (None)

### SPECIFIED OPERATING ENVIRONMENT

#### HARDWARE REQUIREMENTS

- An IBM 5160 Personal Computer XT, or an IBM 5150 Personal Computer with at least 64KB of memory and one diskette drive
- One of the following 80-column display options:
  - IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
  - IBM Color Display and the Color/Graphics Monitor Adapter
  - An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter
- Asynchronous Communications Adapter
- User-provided, full-duplex modem or direct cable connection to a local host computer
- User-provided EIA RS232-C cable for adapter to modem connection

#### SOFTWARE REQUIREMENTS

IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases is required. When used with the IBM Personal Computer Disk Operating System Version 2.0, the IBM 3101 Emulation Program may reside on a fixed disk drive, and may access files on the fixed disk.

#### COMPATIBILITY

Some IBM 3101 functions not supported are:

- Transparent mode
- Half-duplex modems
- Reverse channel and controlled request-to-send
- Non-EIA RS232-C interfaces
- Reverse video
- Non-blinking cursor
- Highlighting via color/graphics monitor adapter
- Program mode and ATTR keys
- Local mode
- Print line function
- Print and send message functions, and send mark function
- Foreign language features
- Dow Jones is a Trademark of Dow Jones and Company, Inc.

PROGRAM PRODUCTS

**IBM PERSONAL COMPUTER  
DISK OPERATING SYSTEM (DOS) Version 2.0  
BASIC LANGUAGE EXTENSIONS Version 2.0  
6024061**

**DOS VERSION 2.0**

**PURPOSE**

The IBM Personal Computer Disk Operating System (DOS) provides the required support between the IBM Personal Computer hardware and an application program. It supports one or more 5-1/4-inch diskette drives, single- or dual-sided, and one or two fixed disks. In addition, DOS provides a user with the ability to display a diskette directory, and rename, erase, display, compare, or copy files. DOS also permits "chaining" a series of programs in a predefined "job stream". Either a job stream or a single program may be designated for automatic execution when the system is first turned on.

**HIGHLIGHTS**

- Supports diskette drives and fixed disk. Formatted capacity increased to 180KB for single-sided; 360KB for dual-sided diskettes
- Fixed disk initialization program for fixed disk support
- DOS can be started from diskette or fixed disk
- File space allocated dynamically as data is added
- Backup, restore commands to support fixed disk
- Tree-structured directories
- Command to display the directory structure
- Commands to create and remove subdirectories
- Sequential and direct access of data files
- File recovery utility
- Current date and time used in directory entries
- Supports "job stream" sequence of programs as batch files. Conditional (IF-THEN-ELSE) logic supported
- Automatic execution of program or job stream following power-on
- Graphics screen dump to printer
- Global filename characters for filename searches
- Multiple disk I/O memory buffers for improved performance
- Accepts commands entered in upper or lower case
- Line editor, debug, disk format, disk check, diskette copy, diskette compare programs
- Linker for language compilers
- User-installable device drivers may be added for new hardware support
- Optional verify after write
- Extended screen and keyboard controls
- Redirected I/O (example: Keyboard input and direct output to a file)
- Piping: Output from program "A" used as input to program "B"
- Divert parallel printer output to Asynchronous Communications Adapter (example: attach a serial printer)
- Background file print utility permits simultaneous file printing with other activity
- Extended device error trapping

**DESCRIPTION**

DOS provides an input-output interface for programs written for the BASIC interpreter or any high-level compiler language supported by DOS on the IBM Personal Computer. DOS provides line editor and debug utility programs to aid in program development. A linker program is provided to convert language compiler relocatable modules to executable load modules. DOS Version 2.0 offers function not available in previous versions (1.0 and 1.1) with a higher user memory requirement (DOS 2.0 is approximately 12KB larger than DOS 1.1). Where standard (documented) programming protocols have been observed, most DOS 1.0 and 1.1 programs should run under Version 2.0 without change. Examples of non-standard protocols are access of absolute memory locations where DOS resides and direct calls to the BIOS. Since DOS 2.0 uses more memory, some programs may no longer be able to fit in the same size machines. The program will still require the same amount of user memory - but with DOS 2.0 taking more memory, the amount remaining for the program will be less. In these cases, a program may have to be divided into smaller segments, or more memory may have to be added to the system. The IBM Personal Computer DOS resides on the DOS diskette. A second diskette contains the linker and the sample programs. If the DOS diskette is present in diskette drive "A:", or if DOS is resident on the fixed disk, when the system is started or restarted, DOS will automatically be loaded into random access memory. DOS can also be copied to any formatted diskette to provide the same function. If automatic program execution is not used each time DOS is initialized, DOS will ask the user for the current date and time. This information will be used to identify the most recent update to a file. If the AUTOEXEC option is used and "unattended" operation is desired, date and time prompting can be bypassed. DOS Version 2.0 uses approximately 24KB of random access storage. This is an increase over DOS Versions 1.0 and 1.1. On some systems, this means that additional memory may be required to permit an application program to be loaded and run. In general, 64KB is a minimum memory requirement for DOS 2.0 systems. The recommended memory for a system with a fixed disk is 128KB or more. Note: Prior to running a BASIC language program performing diskette I/O, one of the two language extensions, Disk BASIC or

Advanced BASIC, must be loaded into memory. See the section on IBM Personal Computer BASIC Language Extensions for additional information about memory requirements.

**DOS Version 2.0 Functions**

Note: (N) = new DOS 2.0 Function

DOS Command or Utility	Function
ASSIGN	Substitute diskette drive assignments (N)
BACKUP	Backup fixed disk files to diskette (N)
BAT	Batch file support
BREAK	Check for Ctrl/Break Interrupt (N)
CHDIR	Change directory (N)
CHKDSK	Check diskette or fixed disk
CLS	Clear screen (N)
COMP	Compare files
CONFIG.SYS	Configuration File (N)
COPY	Copy files
CTTY	Substitute screen and keyboard (N)
DATE	Set date
DEBUG	Load, alter, display/execute files
DEL,ERASE	Delete files
DIR	List directory
DISKCOMP	Compare diskettes
DISKCOPY	Copy diskette
EDLIN	Line editor
EXE2BIN	Convert .EXE files to .COM format
FDISK	Initialize a fixed disk (N)
FIND	Search for string in file (N)
FORMAT	Format diskette or fixed disk
GRAPHICS	Graphics screen dump (N)
LINK	Link-edit a compiled program
MKDIR	Create a sub-directory (N)
MODE	Set display or printer options
MORE	Pause after displaying screenful (N)
PATH	Specify directory paths (N)
PAUSE	Remark within batch file, then wait
PRINT	Print files in "background" (N)
PROMPT	Change DOS prompt (N)
RECOVER	Recover file (N)
REM	Remark from batch file
RENAME,REN	Rename a file
RESTORE	Restore files from diskette to fixed disk (N)
RMDIR	Remove Directory (N)
SET	Set environment (N)
SORT	Sort data (N)
SYS	Transfer DOS to another diskette or fixed disk
TIME	Set time of day
TREE	Display directory path (N)
TYPE	Display file contents
VER	Display DOS version (N)
VERIFY	Write-verify data to diskette (N)
VOL	Display disk(ette) label (N)

**BASIC LANGUAGE EXTENSIONS, VERSION 2.0**

**PURPOSE**

The IBM Personal Computer BASIC Interpreter is structured in three functional levels: ROM Interpreter (Cassette), Disk, and Advanced. The Disk and Advanced BASIC language extensions are both resident on the DOS diskette. Version 2.0 of BASIC will only work with Version 2.0 of DOS.

**HIGHLIGHTS**

- Superset of function to many microcomputer BASICs
- Disk BASIC is a superset of Cassette-level BASIC, and Advanced BASIC is a superset of both
- Provides new graphics, music, and function key enhancements
- Reduces the need for special machine language subroutines
- Compatible with the IBM Personal Computer BASIC Compiler (6024003)
- Provides high-level communications support
- Advanced graphics supported: Paint, Circle, Get/Put display contents, Store and Draw line segments, line styling, tiling, viewpoints, windows
- Advanced light-pen and joystick support
- Event trapping of communications, function keys, joystick or light pen, music, and timer activity
- Path name support for tree-structured directories

**DESCRIPTION**

Disk BASIC and Advanced BASIC extensions are optional, and may be loaded into memory from the DOS diskette or from a fixed disk. Cassette BASIC provides the necessary cassette input/output instructions (the IBM 5160 Personal Computer XT does not support cassette attachment) as well as support for the display, keyboard,

**IBM Personal Computer DOS V2  
BASIC Language Extensions V2 (cont'd)**

printer, light-pen, and joysticks. In addition, it provides a full complement of editing, logic, math, and string functions. Cassette BASIC is standard on the IBM 5150 Personal Computer and the IBM 5160 Personal Computer XT in the form of built-in read only memory. The Disk BASIC extensions to the language provide a full set of instructions, commands, and built-in function which support the Disk Operating System and add date, time of day, and communications capabilities. Advanced BASIC extensions include all Disk BASIC functions as well as enhanced display graphics, light-pen, and joystick support. Advanced BASIC includes both the Graphics Macro Language and the Music Macro Language (trademarks of Microsoft, Inc.). In addition, Advanced BASIC supports interrupts from the light-pen, game controllers, function keys, and communications adapters.

**BASIC Language Extensions, Version 2.0 Functions**

(N) = new function in Version 2.0

Disk Basic	Advanced Basic	Function
CHAIN	CHAIN	Chain to next program
CHDIR	CHDIR	Change Directory (N)
CIRCLE	---	Draw a circle
CLOSE	CLOSE	Close an I/O device
COMMON	COMMON	Pass variables to chained program
COM	COM	Enable communications interrupt
CVI,CVS,	CVI,CVS,	
CVD	CVD	Convert data from disk/diskette file
DATE	DATE	Current date
---	DRAW	Draw a predefined "picture"
EOF	EOF	End of file indicator
FIELD	FIELD	Define disk/diskette file records
FILES	FILES	Display disk/diskette directory
GET	GET	Read a random file record
---	GET	Read graphics image from display
INPUT#	INPUT#	Input from disk or communications
INPUT)	INPUT)	Input from communications
INP	INP	Input byte from external device
KILL	KILL	Delete disk/diskette file
LINE	LINE	Input variable length line from disk/diskette
INPUT#	INPUT#	
LLIST	LLIST	List a program on theprinter
LOAD	LOAD	Load a program from disk/diskette
		Return next disk/diskette file record number
LOC	LOC	Return count of characters in communication channel
LOF	LOF	
LSET	LSET	Move data into random file buffer
MERGE	MERGE	Merge a program from disk/diskette
MKDIR	MKDIR	Make directory (N)
MKI,MKS	MKI,MKS	
MKD	MKD	Convert data to random buffer format
NAME	NAME	Rename a disk/diskette file
	ONKEY	
---	GOSUB	Branch on function key
	On COM	
---	GOSUB	Branch on communications interrupt
	ON PEN,	
---	STRIG GOSUB	Branch on light-pen or joystick
---	ON PLAY	Continuous music during program run (N)
---	ON TIMER	Branch on time interval (N)
OPEN	OPEN	Open an I/O device
---	PAINT	Fill enclosed area with color
---	PEN	Enable light-pen interrupt
---	PLAY	Play predefined music
		Map an expression to relative or actual coordinates (N)
---	PMAP	
PRINT#	PRINT#	Write to I/O device in print format
PUT	PUT	Write buffer to a random file
---	PUT	Write graphics pattern to display
RMDIR	RMDIR	Remove directory if empty (N)
RUN	RUN	Run a disk/diskette resident program
SAVE	SAVE	Save a program on disk/diskette
		Read setting of joystick or enable joystick interrupt
---	STICK	
SYSTEM	SYSTEM	Return to operating system environment
TIME)	TIME	Time of day
		Number of seconds since midnight or system reset (N)
TIMER	TIMER	Memory address of file buffer
VARPTR)	VARPTR)	Define display viewports for graphics output (N)
---	VIEW	
WIDTH#	WIDTH#	Set width of data for device
		Define logical limits for graphics output (N)
---	WINDOW	
		Write to a sequential disk/diskette file
WRITE#	WRITE#	

**CUSTOMER RESPONSIBILITIES**

The customer is responsible for producing a backup copy of the original DOS diskette, and for creating copies of DOS on other diskettes or fixed disk drives as required. All newly purchased diskettes must be initialized using the DOS FORMAT utility. Fixed disks must be initialized with both the FDISK and FORMAT utilities.

**SPECIFIED OPERATING ENVIRONMENT**

**HARDWARE REQUIREMENTS**

The IBM Personal Computer DOS Version 2.0 requires an IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with a minimum of 64KB and one diskette drive. A minimum of 128KB is recommended if a fixed disk drive is installed. Some user application programs may require more than the stated minimum amount of memory.

The IBM Personal Computer BASIC version 2.0 requires an IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with a minimum of 48KB of memory and one diskette drive. For most applications, however, 64KB or 96KB of memory will be required. Since BASIC does not address more than a 64KB workspace, more than 96KB of user memory is normally not used.

**SOFTWARE REQUIREMENTS**

The IBM Personal Computer Disk Operating System (DOS) Version 2.0 is a prerequisite to the use of the IBM Personal Computer BASIC language extensions, version 2.0.

**PACKAGING**

The IBM Personal Computer Disk Operating System Version 2.0 is resident on two diskettes. One diskette contains DOS and the BASIC language extensions. The second diskette contains the Linker program and sample programs.